

## RESPIRATORY QUIZ

1. **Answer A.** If a chest drainage system is disconnected, the nurse may place the end of the chest tube in a container of sterile saline or water to prevent air from entering the chest tube, thereby preventing negative respiratory pressure. The nurse should apply an occlusive dressing if the chest tube is pulled out — not if the system is disconnected. The nurse shouldn't clamp the chest tube because clamping increases the risk of tension pneumothorax. The nurse should tape the chest tube securely to prevent it from being disconnected, rather than taping it after it has been disconnected.

2. **Answer B.** Pneumonia is the most common complication of influenza. It may be either primary influenza viral pneumonia or pneumonia secondary to a bacterial infection. Other complications of influenza include myositis, exacerbation of chronic obstructive pulmonary disease, and Reye's syndrome. Myocarditis, pericarditis, transverse myelitis, and encephalitis are rare complications of influenza. Although septicemia may arise when any infection becomes overwhelming, it rarely results from influenza. Meningitis and pulmonary edema aren't associated with influenza.

3. **Answer B.** Initially, the nurse should plug the opening in the tracheostomy tube for 5 to 20 minutes, and then gradually lengthen this interval according to the client's respiratory status. A client who doesn't require continuous mechanical ventilation already is breathing without assistance, at least for short periods; therefore, plugging the opening of the tube for only 15 to 60 seconds wouldn't be long enough to reveal the client's true tolerance to the procedure. Plugging the opening for more than 20 minutes would increase the risk of acute respiratory distress because the client requires an adjustment period to start breathing normally.

4. **Answer A.** As the respiratory center in the brain becomes depressed, hypoxia occurs, producing wheezing, bradycardia, and a decreased respiratory rate. Delirium is a state of mental confusion characterized by disorientation to time and place. Hyperventilation (respiratory rate greater than that metabolically necessary for gas exchange) is marked by an increased respiratory rate or tidal volume, or both. Semiconsciousness is a state of impaired consciousness characterized by limited motor and verbal responses and decreased orientation.

5. **Answer D.** In respiratory acidosis, ABG analysis reveals an arterial pH below 7.35 and partial pressure of arterial carbon dioxide (PaCO<sub>2</sub>) above 45 mm Hg. Therefore, the combination of a pH value of 7.25 and a PaCO<sub>2</sub> value of 50 mm Hg confirms respiratory acidosis. A pH value of 7.50 with a PaCO<sub>2</sub> value of 30 mm Hg indicates respiratory alkalosis. Options B and C represent normal ABG values, reflecting normal gas exchange in the lungs.

6. **Answer B.** Administration of a corticosteroid such as prednisone suppresses the body's natural cortisol secretion, which may take weeks or months to normalize after drug discontinuation. Abruptly discontinuing such therapy may cause the serum cortisol level to drop low enough to trigger acute adrenocortical insufficiency. Hyperglycemia, glycosuria, GI bleeding, restlessness, and seizures are common adverse effects of corticosteroid therapy, not its sudden cessation.

7. **Answer D.** A patent airway and an adequate breathing pattern are the top priority for any client, making impaired gas exchange related to airflow obstruction the most important nursing diagnosis. The other options also may apply to this client but are less important.

8. **Answer B.** A non-rebreather mask can deliver levels of the fraction of inspired oxygen (FIO<sub>2</sub>) as high as 100%. Other modes — simple mask, face tent and nasal cannula — deliver lower levels of FIO<sub>2</sub>.

9. **Answer B.** The nurse should perform chest physiotherapy at least 2 hours after a meal to reduce the risk of vomiting and aspiration. Performing it immediately before a meal may tire the client and impair the ability to eat. Percussion and vibration, components of chest physiotherapy, may worsen bronchospasms; therefore, the procedure is contraindicated in clients with bronchospasms. Secretions that have mobilized (especially when suction equipment isn't available) are a contraindication for postural drainage, another component of chest physiotherapy.

10. **Answer D.** Hypotension, hypothermia, and vasoconstriction may alter pulse oximetry values by reducing arterial blood flow. Likewise, movement of the finger to which the oximeter is applied may interfere with interpretation of SaO<sub>2</sub>. All of these conditions limit the usefulness of pulse oximetry. Fever, tachypnea, and tachycardia don't affect pulse oximetry values directly.

11. **Answer B.** Maintaining a patent airway is the most basic and critical human need. All other interventions are important to the client's well-being but not as important as having sufficient oxygen to breathe.

12. **Answer C.** Controlled coughing helps maintain a patent airway by helping to mobilize and remove secretions. A moderate fluid intake (usually 2 L or more daily) and moderate activity help liquefy and mobilize secretions. Bed rest and sedatives may limit the client's ability to maintain a patent airway, causing a high risk of infection from pooled secretions.

13. **Answer A.** Tidal volume is the amount of air inspired and expired with each breath. Residual volume is the amount of air remaining in the lungs after forcibly exhaling. Vital capacity is the maximum amount of air that can be moved out of the lungs after maximal inspiration and expiration. Dead-space volume is the amount of air remaining in the upper airways that never reaches the alveoli. In pathologic conditions, dead space may also exist in the lower airways.

14. **Answer C.** An  $FO_2$  greater than 0.5 for as little as 16 to 24 hours can be toxic and can lead to decreased gas diffusion and surfactant activity. The ideal oxygen source is room air  $FIO_2$  0.18 to 0.21.

15. **Answer B.** A positive reaction means the client has been exposed to TB; it isn't conclusive of the presence of active disease. A positive reaction consists of palpable swelling and induration of 5 to 15 mm. It can be read 48 to 72 hours after the injection. In clients with positive reactions, further studies are usually done to rule out active disease. In immunosuppressed clients, a negative reaction doesn't exclude the presence of active disease.

16. **Answer B.** Before weaning a client from mechanical ventilation, it's most important to have baseline ABG levels. During the weaning process, ABG levels will be checked to assess how the client is tolerating the procedure. Other assessment parameters are less critical. Measuring fluid volume intake and output is always important when a client is being mechanically ventilated. Prior attempts at weaning and ECG results are documented on the client's record, and the nurse can refer to them before the weaning process begins.

17. **Answer B.** The ABG results reveal respiratory alkalosis. The best intervention to raise the  $PaCO_2$  level would be to have the client breathe into a paper bag. All of the other options — such as administering a decongestant, offering fluids

frequently, and administering supplemental oxygen — wouldn't raise the lowered PaCO<sub>2</sub> level.

18. **Answer C.** The most significant and direct indicator of the effectiveness of oxygen therapy is the PaO<sub>2</sub> value. Based on the PaO<sub>2</sub> value, the nurse may adjust the type of oxygen delivery (cannula, venturi mask, or mechanical ventilator), flow rate, and oxygen percentage. The other options reflect the client's ventilation status, not oxygenation.

19. **Answer A.** Endotracheal suctioning removes secretions as well as gases from the airway and lowers the arterial oxygen saturation (SaO<sub>2</sub>) level. Coughing and incentive spirometry improves oxygenation and should raise or maintain oxygen saturation. Because of superficial vasoconstriction, using a cooling blanket can lower peripheral oxygen saturation readings, but SaO<sub>2</sub> levels wouldn't be affected.

20. **Answer A.** The nurse should measure and document the amount of chest tube drainage regularly to detect abnormal drainage patterns, such as may occur with a hemorrhage (if excessive) or a blockage (if decreased). Continuous bubbling in the water-seal chamber indicates a leak in the closed chest drainage system, which must be corrected. The nurse should keep the collection chamber below chest level to allow fluids to drain into it. The nurse should not strip chest tubes because doing so may traumatize the tissue or dislodge the tube.

21. **Answer B.** Conditions that increase oxygen demands include obesity, smoking, exposure to temperature extremes, and stress. A client with chronic bronchitis should drink at least 2,000 ml of fluid daily to thin mucus secretions; restricting fluid intake may be harmful. The nurse should encourage the client to eat a high-protein snack at bedtime because protein digestion produces an amino acid with sedating effects that may ease the insomnia associated with chronic bronchitis. Eating more than three large meals a day may cause fullness, making breathing uncomfortable and difficult; however, it doesn't increase oxygen demands. To help maintain adequate nutritional intake, the client with chronic bronchitis should eat small, frequent meals (up to six a day).

22. **Answer B.** Skin color doesn't affect the mucous membranes. The lips, nail beds, and earlobes are less reliable indicators of cyanosis because they're affected by skin color.

23. **Answer D.** The therapeutic serum theophylline concentration ranges from 10 to 20 mcg/ml. Values below 10 mcg/ml aren't therapeutic.

24. **Answer A.** To avoid a hypotensive reaction from rapid I.V. administration, the nurse should infuse vancomycin slowly, over 60 to 90 minutes, in a large volume of fluid. Although neutropenia may occur in approximately 5% to 10% of clients receiving vancomycin, this adverse effect reverses rapidly when the drug is discontinued

25. **Answer C.** Extreme anxiety may lead to respiratory alkalosis by causing hyperventilation, which results in excessive carbon dioxide (CO<sub>2</sub>) loss. Other conditions that may set the stage for respiratory alkalosis include fever, heart failure, and injury to the brain's respiratory center, overventilation with a mechanical ventilator, pulmonary embolism, and early salicylate intoxication. Type 1 diabetes mellitus may lead to diabetic ketoacidosis; the deep, rapid respirations occurring in this disorder (Kussmaul's respirations) don't cause excessive CO<sub>2</sub> loss. Myasthenia gravis and narcotic overdose suppress the respiratory drive, causing CO<sub>2</sub> retention, not CO<sub>2</sub> loss; this may lead to respiratory acidosis, not alkalosis.

26. **Answer D.** The client is hypoxemic because of bronchoconstriction as evidenced by wheezes and a subnormal arterial oxygen saturation level. The client's greatest need is bronchodilation, which can be accomplished by administering bronchodilators. Albuterol is a beta<sub>2</sub> adrenergic agonist, which causes dilation of the bronchioles. It's given by nebulization or metered-dose inhalation and may be given as often as every 30 to 60 minutes until relief is accomplished. Alprazolam is an anxiolytic and central nervous system depressant, which could suppress the client's breathing. Propranolol is contraindicated in a client who's wheezing because it's a beta<sub>2</sub> adrenergic antagonist. Morphine is a respiratory center depressant and is contraindicated in this situation.

27. **Answer C.** The client with COPD retains carbon dioxide, which inhibits stimulation of breathing by the medullary center in the brain. As a result, low oxygen levels in the blood stimulate respiration, and administering unspecified, unmonitored amounts of oxygen may depress ventilation. To promote adequate gas exchange, the nurse should use a Venturi mask to deliver a specified, controlled amount of oxygen consistently and accurately. Drinking three glasses of fluid daily wouldn't affect gas exchange or be sufficient to liquefy secretions, which are common in COPD. Clients with COPD and respiratory distress should be placed in

high Fowler's position and shouldn't receive sedatives or other drugs that may further depress the respiratory center.

28. **Answer A.** Pursed-lip breathing helps prevent early airway collapse. Learning this technique helps the client control respiration during periods of excitement, anxiety, exercise, and respiratory distress. To increase inspiratory muscle strength and endurance, the client may need to learn inspiratory resistive breathing. To decrease accessory muscle use and thus reduce the work of breathing, the client may need to learn diaphragmatic (abdominal) breathing. In pursed-lip breathing, the client mimics a normal inspiratory-expiratory (I:E) ratio of 1:2. (A client with emphysema may have an I:E ratio as high as 1:4.)

29. **Answer A.** The therapeutic range for the serum theophylline level is 10 to 20 mcg/mL. If the level is below the therapeutic range, the client may experience frequent exacerbations of the disorder. Although all the options identify values within the therapeutic range, option A is the option that reflects a need for compliance with medication.

30. **Answer A.** Continuous gentle bubbling should be noted in the suction control chamber. Option B is incorrect. Chest tubes should only be clamped to check for an air leak or when changing drainage devices (according to agency policy). Option C is incorrect. Bubbling should be continuous and not intermittent. Option D is incorrect because bubbling should be gentle. Increasing the suction pressure only increases the rate of evaporation of water in the drainage system.

31. **Answer B.** The presence of fluctuation of the fluid level in the water seal chamber indicates a patent drainage system. With normal breathing, the water level rises with inspiration and falls with expiration. Fluctuation stops if the tube is obstructed, if a dependent loop exists, if the suction is not working properly, or if the lung has reexpanded. Options A, C, and D are incorrect.

32. **Answer B.** If the chest drainage system is disconnected, the end of the tube is placed in a bottle of sterile water held below the level of the chest. The system is replaced if it breaks or cracks or if the collection chamber is full. Placing a sterile dressing over the disconnection site will not prevent complications resulting from the disconnection. The physician may need to be notified, but this is not the initial action.

33. **Answer D.** When the chest tube is removed, the client is asked to perform the Valsalva maneuver (take a deep breath, exhale, and bear down). The tube is quickly withdrawn, and an airtight dressing is taped in place. An alternative instruction is to ask the client to take a deep breath and hold the breath while the tube is removed. Options A, B, and C are incorrect client instructions.

34. **Answer B.** If the tube is dislodged accidentally, the initial nursing action is to grasp the retention sutures and spread the opening. If agency policy permits, the nurse then attempts immediately to replace the tube. Covering the tracheostomy site will block the airway. Options 1 and 3 will delay treatment in this emergency situation.

35. **Answer A.** The nurse reports stridor to the physician immediately. This is a high-pitched, coarse sound that is heard with the stethoscope over the trachea. Stridor indicates airway edema and places the client at risk for airway obstruction. Options B, C, and D are not signs that require immediate notification of the physician.

36. **Answer B.** This client has sustained a blunt or a closed chest injury. Basic symptoms of a closed pneumothorax are shortness of breath and chest pain. A larger pneumothorax may cause tachypnea, cyanosis, diminished breath sounds, and subcutaneous emphysema. Hyperresonance also may occur on the affected side. A sucking sound at the site of injury would be noted with an open chest injury.

37. **Answer B.** Clinical manifestations of chronic obstructive pulmonary disease (COPD) include hypoxemia, hypercapnia, dyspnea on exertion and at rest, oxygen desaturation with exercise, and the use of accessory muscles of respiration. Chest x-rays reveal a hyperinflated chest and a flattened diaphragm if the disease is advanced.

38. **Answer D.** One of the first pulmonary symptoms is a slight cough with the expectoration of mucoid sputum. Options A, B, and C are late symptoms and signify cavitation and extensive lung involvement.

39. **Answer B.** Tuberculosis is definitively diagnosed through culture and isolation of *Mycobacterium tuberculosis*. A presumptive diagnosis is made based on a tuberculin skin test, a sputum smear that is positive for acid-fast bacteria, a chest x-ray, and histological evidence of granulomatous disease on biopsy.

40. **Answer B.** Tuberculosis is an infectious disease caused by the bacillus *Mycobacterium tuberculosis* and is spread primarily by the airborne route. Options A, C, and D are incorrect.

41. **Answer B.** Oxygen is used cautiously and should not exceed 2 L/min. Because of the long-standing hypercapnia that occurs in emphysema, the respiratory drive is triggered by low oxygen levels rather than increased carbon dioxide levels, as is the case in a normal respiratory system.

42. **Answer D.** Pursed-lip breathing facilitates maximal expiration for clients with obstructive lung disease. This type of breathing allows better expiration by increasing airway pressure that keeps air passages open during exhalation. Options A, B, and C are not the purposes of this type of breathing.

43. **Answer B.** To obtain a sputum specimen, the client should rinse the mouth to reduce contamination, breathe deeply, and then cough into a sputum specimen container. The client should be encouraged to cough and not spit so as to obtain sputum. Sputum can be thinned by fluids or by a respiratory treatment such as inhalation of nebulized saline or water. The optimal time to obtain a specimen is on arising in the morning.

44. **Answer C.** If a biopsy was performed during a bronchoscopy, blood-streaked sputum is expected for several hours. Frank blood indicates hemorrhage. A dry cough may be expected. The client should be assessed for signs of complications, which would include cyanosis, dyspnea, stridor, bronchospasm, hemoptysis, hypotension, tachycardia, and dysrhythmias. Hematuria is unrelated to this procedure.

45. **Answer C.** Hypoxemia can be caused by prolonged suctioning, which stimulates the pacemaker cells in the heart. A vasovagal response may occur, causing bradycardia. The nurse must preoxygenate the client before suctioning and limit the suctioning pass to 10 seconds.

46. **Answer C.** During suctioning, the nurse should monitor the client closely for side effects, including hypoxemia, cardiac irregularities such as a decrease in heart rate resulting from vagal stimulation, mucosal trauma, hypotension, and paroxysmal coughing. If side effects develop, especially cardiac irregularities, the procedure is stopped and the client is reoxygenated.

47. **Answer A.** In an acidotic condition, the pH would be low, indicating the acidosis. In addition, a low bicarbonate level along with the low pH would indicate a metabolic state. Therefore, options B, C, and D are incorrect.

48. **Answer A.** The common clinical manifestations of pulmonary embolism are tachypnea, tachycardia, dyspnea, and chest pain.

49. **Answer A.** The client should be instructed to hold his or her breath for at least 10 to 15 seconds before exhaling the mist. Options B, C, and D are accurate instructions regarding the use of the inhaler.

50. **Answer D.** After bronchoscopy, the nurse keeps the client on NPO status until the gag reflex returns because the preoperative sedation and local anesthesia impair swallowing and the protective laryngeal reflexes for a number of hours. Additional fluids are unnecessary because no contrast dye is used that would need flushing from the system. Atropine and midazolam would be administered before the procedure, not after.

51. **Answer D.** Rib fractures are a common injury, especially in the older client, and result from a blunt injury or a fall. Typical signs and symptoms include pain and tenderness localized at the fracture site and exacerbated by inspiration and palpation, shallow respirations, splinting or guarding the chest protectively to minimize chest movement, and possible bruising at the fracture site. Paradoxical respirations are seen with flail chest.

52. **Answer C.** Flail chest results from fracture of two or more ribs in at least two places each. This results in a "floating" section of ribs. Because this section is unattached to the rest of the bony rib cage, this segment results in paradoxical chest movement. This means that the force of inspiration pulls the fractured segment inward, while the rest of the chest expands. Similarly, during exhalation, the segment balloons outward while the rest of the chest moves inward. This is a telltale sign of flail chest.

53. **Answer A.** Pneumothorax is characterized by restlessness, tachycardia, dyspnea, pain with respiration, asymmetrical chest expansion, and diminished or absent breath sounds on the affected side. Pneumothorax can cause increased airway pressure because of resistance to lung inflation. Acute respiratory distress syndrome and pulmonary embolism are not characterized by absent breath sounds. An endotracheal tube that is inserted too far can cause absent breath sounds, but

the lack of breath sounds most likely would be on the left side because of the degree of curvature of the right and left main stem bronchi.

54. **Answer C.** Instructions for using a metered-dose inhaler include shaking the canister, holding it right side up, inhaling slowly and evenly through the mouth, delivering one spray per breath, and holding the breath after inhalation.

55. **Answer D.** The earliest detectable sign of acute respiratory distress syndrome is an increased respiratory rate, which can begin from 1 to 96 hours after the initial insult to the body. This is followed by increasing dyspnea, air hunger, retraction of accessory muscles, and cyanosis. Breath sounds may be clear or consist of fine inspiratory crackles or diffuse coarse crackles.

56. **Answer C.** The normal pulmonary capillary wedge pressure (PCWP) is 8 to 13 mm Hg, and the client is considered to have high readings if they exceed 18 to 20 mm Hg. The client with acute respiratory distress syndrome has a normal PCWP, which is an expected finding because the edema is in the interstitium of the lung and is noncardiac.

57. **Answer A.** The client with emphysema has hyperinflation of the alveoli and flattening of the diaphragm. These lead to increased anteroposterior diameter, referred to as "barrel chest." The client also has dyspnea with prolonged expiration and has hyperresonant lungs to percussion.

58. **Answer B.** The client with tuberculosis usually experiences cough (productive or nonproductive), fatigue, anorexia, weight loss, dyspnea, hemoptysis, chest discomfort or pain, chills and sweats (which may occur at night), and a low-grade fever.

59. **Answer A.** When percussing the chest wall, the nurse expects to elicit resonant sounds — low-pitched, hollow sounds heard over normal lung tissue. Hyperresonant sounds indicate increased air in the lungs or pleural space; they're louder and lower pitched than resonant sounds. Although hyperresonant sounds occur in such disorders as emphysema and pneumothorax, they may be normal in children and very thin adults. Dull sounds, normally heard only over the liver and heart, may occur over dense lung tissue, such as from consolidation or a tumor. Dull sounds are thudlike and of medium pitch. Flat sounds, soft and high-pitched, are heard over airless tissue and can be replicated by percussing the thigh or a bony structure.

60. **Answer C.** Constant bubbling in the chamber indicates an air leak and requires immediate intervention. The client with a pneumothorax will have intermittent bubbling in the water-seal chamber. Clients without a pneumothorax should have no evidence of bubbling in the chamber. If the tube is obstructed, the nurse should notice that the fluid has stopped fluctuating in the water-seal chamber.

61. **Answer A.** For a client with an ET tube, the most important nursing action is auscultating the lungs regularly for bilateral breath sounds to ensure proper tube placement and effective oxygen delivery. Although the other options are appropriate for this client, they're secondary to ensuring adequate oxygenation.

62. **Answer B.** The use of accessory muscles for respiration indicates the client is having difficulty breathing. Diaphragmatic and pursed-lip breathing are two controlled breathing techniques that help the client conserve energy.

63. **Answer D.** The nurse observes respiratory excursion to help assess chest movements. Normally, thoracic expansion is symmetrical; unequal expansion may indicate pleural effusion, atelectasis, pulmonary embolus, or a rib or sternum fracture. The nurse assesses vocal sounds to evaluate air flow when checking for tactile fremitus; after asking the client to say "99," the nurse palpates the vibrations transmitted from the bronchopulmonary system along the solid surfaces of the chest wall to the nurse's palms. The nurse assesses breath sounds during auscultation.

64. **Answer C.** In a client with COPD, an ineffective cough impedes secretion removal. This, in turn, causes mucus plugging, which leads to localized airway obstruction — a known cause of atelectasis. An ineffective cough doesn't cause pleural effusion (fluid accumulation in the pleural space). Pulmonary edema usually results from left-sided heart failure, not an ineffective cough. Although many noncardiac conditions may cause pulmonary edema, an ineffective cough isn't one of them. Oxygen toxicity results from prolonged administration of high oxygen concentrations, not an ineffective cough.

65. **Answer A.** The common feature of all types of pneumonia is an inflammatory pulmonary response to the offending organism or agent. Although most types of pneumonia have a sudden onset, a few (such as anaerobic bacterial pneumonia and mycoplasmal pneumonia) have an insidious onset. Antibiotic therapy is the primary treatment for most types of pneumonia; however, the antibiotic must be specific

for the causative agent, which may not be responsive to penicillin. A few types of pneumonia, such as viral pneumonia, aren't treated with antibiotics. Although pneumonia usually causes an elevated WBC count, some types, such as mycoplasmal pneumonia, don't.

66. **Answer A.** Hypoxia is the main breathing stimulus for a client with COPD. Excessive oxygen administration may lead to apnea by removing that stimulus. Anginal pain results from a reduced myocardial oxygen supply. A client with COPD may have anginal pain from generalized vasoconstriction secondary to hypoxia; however, administering oxygen at any concentration dilates blood vessels, easing anginal pain. Respiratory alkalosis results from alveolar hyperventilation, not excessive oxygen administration. In a client with COPD, high oxygen concentrations decrease the ventilatory drive, leading to respiratory acidosis, not alkalosis. High oxygen concentrations don't cause metabolic acidosis.

67. **Answer D.** Respiratory depression is the most serious complication of epidural analgesia. Other potential complications include hypotension, decreased sensation and movement of the extremities, allergic reactions, and urine retention. Typically, epidural analgesia causes central nervous system depression (indicated by drowsiness) as well as a decreased heart rate and blood pressure.