TRUE/FALSE

1. During spontaneous ventilation, the diaphragm and other respiratory muscles create gas flow by raising the pleural, alveolar, and airway pressures.

   ANS: F PTS: 1 REF: Pulmonary Considerations

2. Positive pressure ventilation causes an increase in intrathoracic pressure and compression of the pulmonary blood vessels leading to an overall decrease in ventricular output, stroke volume, and pressure readings.

   ANS: T PTS: 1 REF: Hemodynamic Considerations

3. Oliguria is defined as urine output < 400 mL in 24 hours (or <160 mL in 8 hours).

   ANS: T PTS: 1 REF: Renal Considerations

4. The caloric cost of breathing for COPD patients is about 10 times that of normal individuals because of the increased work of breathing necessary to overcome the high airway resistance and V/Q abnormalities.

   ANS: T PTS: 1 REF: Nutritional Considerations

5. Sustained hyperventilation of less than 24 hours causes respiratory alkalosis and increases cerebral blood flow and intracranial pressure.

   ANS: F PTS: 1 REF: Neurologic Considerations

MULTIPLE CHOICE

1. Under normal conditions, the ____ and tidal volume are directly related in positive pressure ventilation.
   a. airflow resistance
   b. pressure gradient
   c. alveolar pressure
   d. airway pressure

   ANS: B PTS: 1 REF: Pulmonary Considerations

2. Positive pressure ventilation increases ____ and decreases cardiac output.
   a. PIP
   b. PEEP
   c. mPaw
   d. P_I

   ANS: C PTS: 1 REF: Cardiovascular Considerations

3. A decreased venous return (or filling of ventricles) leads to a reduction in ____.
   a. intrathoracic pressure
   b. stroke volume
   c. compression of pulmonary vessels
   d. stroke volume and cardiac output

   ANS: D PTS: 1 REF: Cardiovascular Considerations

4. During mechanical ventilation, ____ is not affected to a great extent because of the capability of the systemic venous circulation to compensate or regulate changing blood pressure and volume.

a. pulmonary capillary wedge pressure
b. pulmonary artery pressure
c. stroke volume
d. cardiac output

ANS: A PTS: 1 REF: Hemodynamic Considerations

5. Which of the following is important for eliminating wastes, clearance of certain drugs, and regulating fluid, electrolyte, and acid-base balance?
a. intestine
b. lungs
c. kidneys
d. liver

ANS: C PTS: 1 REF: Renal Considerations

6. Which of the following is a drug that is eliminated by tubular secretion?
a. digoxin
b. vancomycin
c. furosemide
d. phenobarbital

ANS: C PTS: 1 REF: Renal Considerations

7. ____ dysfunction may be monitored by measuring the prothrombin time and bilirubin and albumin levels.
a. Liver
b. Kidney
c. Cardiovascular
d. Gastrointestinal

ANS: A PTS: 1 REF: Hepatic Considerations

8. Which of the following is an effect of PEEP and increased intra-abdominal pressure?
a. decreased atelectasis
b. decreased functional residual capacity
c. increased compliance of ventricles
d. increased cardiac output

ANS: B PTS: 1 REF: Abdominal Considerations

9. ____ is an example of a nonmechanical cause of muscle fatigue that may lead to ventilatory failure.
a. Low chest wall compliance
b. Low lung compliance
c. Malnutrition
d. High airway resistance

ANS: C PTS: 1 REF: Nutritional Considerations

10. Energy requirements for critically ill patients are normally computed by using the Harris-Benedict equation. This equation estimates the resting energy expenditure (REE) based on weight, height, age, and ____.
a. additional metabolic needs
b. gender
c. stress factor
d. degree of infection

ANS: B PTS: 1 REF: Nutritional Considerations

11. When TPN is used, it is essential to keep the amount of dextrose, a(n) ____, to a minimum as it can cause lipogenesis and increase O_2 consumption and CO_2 production.
a. carbohydrate
b. amino acid
c. fat
d. electrolyte

ANS: A PTS: 1 REF: Nutritional Considerations

12. Carbon dioxide acts as a vasodilator in ____ blood vessels.
a. hepatic
c. gastrointestinal

b. renal
d. cerebral

ANS: D PTS: 1 REF: Neurologic Considerations

13. Which of the following is a neurologic change associated with hypoxemia?
    a. increased cerebral blood flow
    b. increased intracranial pressure
    c. decreased mental and motor functions
    d. impaired cerebral metabolism

    ANS: C PTS: 1 REF: Neurologic Considerations

14. During positive pressure ventilation, pressures measured in the ____, left atrium, pulmonary artery, and right atrium are slightly higher than those measured during spontaneous ventilation.
    a. aorta
    b. superior vena cava
    c. pulmonary veins
    d. left ventricle

    ANS: A PTS: 1 REF: Cardiovascular Considerations

15. Which of the following is a pathophysiologic change associated with short-term (<24 hours) hyperventilation?
    a. leftward shift of oxyhemoglobin curve
    b. reduced O_2 release to tissues
    c. cerebral tissue hypoxia
    d. decreased cerebral blood flow

    ANS: D PTS: 1 REF: Neurologic Considerations

COMPLETION

1. In _____, the level of positive pressure is dependent on the mechanical tidal volume, as well as the patient's compliance and airflow resistance.

   ANS:
   volume-controlled ventilation
   volume controlled ventilation

   PTS: 1 REF: Pulmonary Considerations

2. During pressure-controlled ventilation, the peak inspiratory pressure (PIP) is preset according to the estimated _____ requirement of a patient.

   ANS: tidal volume

   PTS: 1 REF: Pulmonary Considerations

3. Mean airway pressure is a function of _____, respiratory frequency, peak inspiratory pressure, and positive end-expiratory pressure.

   ANS: inspiratory time

   PTS: 1 REF: Cardiovascular Considerations

4. When _____ is added to mechanical ventilation, the blood flow to the liver is noticeably reduced.

ANS:
PEEP
positive end-expiratory pressure
positive end-expiratory pressure (PEEP)

PTS: 1 REF: Hepatic Considerations

5. GI complications may be caused by a(n) _____ of perfusion to the GI tract and medications that are commonly used in mechanically ventilated patients.

ANS: decrease

PTS: 1 REF: Gastrointestinal Considerations

SHORT ANSWER

1. Compare continuous positive airway pressure (CPAP) and positive end-expiratory pressure PEEP.

ANS:
In comparing continuous positive airway pressure (CPAP) and PEEP, PEEP exerts a more negative effect on the cardiac output as it raises the mPaw (and PIP) proportionally. The effect of PEEP can be detrimental to the cardiac output because PEEP is the end-expiratory pressure used in addition to positive pressure ventilation. In CPAP, the pressure includes only the airway pressure during spontaneous breathing.

PTS: 1 REF: Cardiovascular Considerations

2. Describe the relationship between PEEP and hepatic perfusion.

ANS:
The rate of hepatic blood flow is inversely related to the level of PEEP. In one study, the hepatic blood flow decreased 3%, 12%, and 32% at PEEP of 10, 15, and 20 cm H_2O, respectively. The decrease in hepatic blood flow is solely caused by a reduction in cardiac output as a result of PEEP. This inference is made because the ratio of hepatic blood flow to cardiac output remains unchanged at 15% during mechanical ventilation without PEEP.

PTS: 1 REF: Hepatic Considerations

3. Explain why adequate nutritional support is essential in the management of critically ill patients.

ANS:
Malnutrition in critically ill patients can create muscle fatigue, ventilatory insufficiency, and ventilatory failure. This sequence of events can lead to a need for mechanical ventilation. It can also make weaning from mechanical ventilation difficult or unsuccessful. However, excessive nutritional support is also undesirable since it may cause excessive carbon dioxide production, as well as increased work of breathing in order to eliminate excessive carbon dioxide.

PTS: 1 REF: Nutritional Considerations

4. Outline some indicators of neurologic impairment due to ventilatory and oxygenation failure?

ANS:

When neurologic functions are impaired due to ventilatory and oxygenation failure, the patient may experience headache, mental status changes, motor disturbances, and ocular abnormalities. The patient usually describes the headache as “pressure in the head” having a higher intensity during night and early morning hours. Hypoxia, hypercapnia, and acidosis are responsible for the changes in a patient’s mental status. Early mental disturbances include drowsiness, forgetfulness, and irritability. In severe or chronic cases of hypoxia and hypercapnia, stupor and coma may occur. Hypercapnia may also cause muscle tremor and ocular abnormalities.

PTS: 1 REF: Neurologic Considerations

5. Discuss a few indicators of renal failure.

ANS:
For adequate removal of body wastes, urine output must be above 400 mL in a 24-hour period. Decreased urine output is an early sign of renal insufficiency or failure. This condition is called oliguria and is defined as urine output less than 400 mL in 24 hours (or less than 160 mL in 8 hours). Other early signs of renal failure include elevation of serum blood urea nitrogen (BUN) and creatinine, products of nitrogen metabolism. The kidney is responsible for eliminating these nitrogenous wastes to prevent toxic accumulation in the body; thus an increase in serum levels of BUN and creatinine indicates compromised renal function.

PTS: 1 REF: Renal Considerations