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# **AACN CSC**

## **Cardiac Surgery Certification Exam**



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## Question: 1

Which of the following is indicative of right-sided heart failure?

- A. elevated jugular venous pressure
- B. hypotension
- C. interstitial edema on chest x-ray
- D. significant orthopnea

**Answer: A**

Explanation:

Of these symptoms, only the elevated jugular venous pressure is seen in right-sided heart failure. All of the other symptoms listed are present with left-sided heart failure. Other symptoms of right-sided heart failure include tachycardia, extremity edema, and persistent cough or wheezing.

## Question: 2

Abnormal pulsus paradoxus is characterized by systolic blood pressure that is

- A. mm Hg higher during inhalation than exhalation.
- B. mm Hg lower during inhalation than exhalation.
- C. >10 mm Hg higher during inhalation than exhalation.
- D. mm Hg lower during inhalation than exhalation.

**Answer: D**

Explanation:

Pulsus paradoxus is a systolic blood pressure that is markedly lower during inhalation than exhalation. Pulsus paradoxus with a more than 10 mm Hg difference is considered abnormal and is a common sign of cardiac tamponade. A decrease in blood pressure 10 mm Hg or less during inspiration is a normal finding, but an increased pressure difference may indicate a number of cardiopulmonary complications, including pericardial effusion, pericarditis, pulmonary embolism, cardiogenic shock, chronic obstructive pulmonary disease, asthma, and obstruction of the superior vena cava. Blood pressure should be reevaluated if pulsus paradoxus is found to ensure correct readings.

## Question: 3

Which of the following patients are at most risk for developing an abdominal aortic aneurysm?

- A. a 75-year-old female smoker with hypertension, well-controlled with medication
- B. a 51-year-old male, non-smoker, with elevated LDL cholesterol
- C. a 79-year-old male smoker with hypertension, hypercholesterolemia, and COPD
- D. a 62-year-old male smoker with no chronic medical problems

**Answer: C**

Explanation:

Being of older age and male are the two biggest risk factors to developing an abdominal aortic aneurysm. Other risk factors include hypertension, COPD, smoking, and peripheral artery disease. Recent health initiatives have increased the awareness of screening those individuals who are at higher risk for developing an aneurysm. A routine screening ultrasound is recommended for those patients.

### Question: 4

A postoperative patient has increased bleeding from the chest tube and has developed widespread petechiae and gastrointestinal bleeding over the last 3 hours. Signs and symptoms include the following:

- Blood pressure: 80/40 mm Hg
- Heart rate: 120 bpm
- Respirations: 32 breaths/min
- Temperature: 38.6°C
- Prothrombin time: 6 seconds
- Fibrinogen: 0.8 mg/dL
- Platelet count: 50,000/mm<sup>3</sup>

The patient is exhibiting increasing signs of shock. The most likely cause of these signs is

- A. acute liver failure.
- B. disseminated intravascular coagulopathy.
- C. hemolytic uremic syndrome.
- D. heparin-induced thrombocytopenia.

**Answer: B**

Explanation:

Disseminated intravascular coagulation triggers both coagulation and hemorrhage through a complex series of events that includes trauma that causes tissue factor (transmembrane glycoprotein) to enter the circulation and bind with coagulation factors, triggering the coagulation cascade. Clotting and hemorrhage continue at the same time, placing the patient at high risk for death, even with treatment. Symptoms include the following:

- Bleeding from surgical or venous puncture sites
- Evidence of gastrointestinal bleeding with distention and bloody diarrhea
- Hypotension and acute symptoms of shock
- Petechiae and purpura with extensive bleeding into the tissues
- Prolonged prothrombin and partial thromboplastin times

- Decreased platelet counts and fragmented red blood cells
- Decreased fibrinogen

### Question: 5

A patient is in the critical care unit being treated for sepsis. On his second day of treatment, he develops hypokalemia that is not responding to potassium administration. Which other electrolyte abnormality should be looked for?

- A. hyperglycemia
- B. hypernatremia
- C. hypocalcemia
- D. hypomagnesemia

**Answer: D**

Explanation:

Magnesium is necessary for potassium uptake and maintenance. If hypokalemia will not improve despite administration of potassium, this may be due to low levels of magnesium preventing the potassium from being used.

### Question: 6

A patient who has undergone coronary artery bypass grafting surgery with a left internal thoracic artery graft had topical hypothermia of the heart and phrenic nerve during surgery. Following cardiac surgery, especially in which there is topical hypothermia of the heart and phrenic nerve, the patient is at increased risk for

- A. left lower lobe atelectasis.
- B. right lower lobe atelectasis.
- C. cardiac ischemia.
- D. stroke.

**Answer: A**

Explanation:

Direct topical hypothermia (cold cardioplegia) to the heart can damage the left phrenic nerve and cause paresis or paralysis of the diaphragm, resulting in an increased incidence of left lower lobe atelectasis. Harvesting of the internal thoracic artery is also associated with high rates of pleural effusions and atelectasis. Symptoms may be evident in the immediate postoperative period and include splinting, decreased ventilation, decreased oxygen saturation, and increased heart rate. Deep breathing, use of an incentive spirometer, or intermittent positive pressure breathing treatments may all help to prevent atelectasis.

### Question: 7

The EKG changes that are seen with severe hyperkalemia include

- A. absent P waves, a prolonged PR segment, ST depression, and inverted T waves.
- B. prolonged QRS, a bundle branch block, sinus bradycardia, and a sine wave.
- C. sinus tachycardia rhythm with ST segment elevation.
- D. irregularly irregular rhythm with rate usually >120 and inverted T waves.

**Answer: B**

Explanation:

Severe hyperkalemia is classified as a serum potassium level > 7 mEq/L. When the potassium level is slightly elevated, tall and peaked T waves can be seen on EKG. As this worsens, the PR segment becomes longer and the P waves eventually disappear. Once severe, the changes listed here are present on EKG. If this continues to worsen, it will result in cardiac arrest.

### Question: 8

A patient exhibits increasing confusion and weakness with ascending paralysis and changes in the electrocardiogram following open-heart surgery and cardiopulmonary bypass. Changes include the following:

- ST depression with peaked T waves
- Prolonged PR interval with some loss of P waves and small R waves
- QRS widening

These changes are consistent with which of the following?

- A. hypokalemia
- B. hyperkalemia
- C. hypocalcemia
- D. hypercalcemia

**Answer: B**

Explanation:

Hyperkalemia may occur with high levels of potassium in cardioplegia solutions during surgery, low cardiac output, marked tissue ischemia, renal insufficiency, medications (e.g.,  $\beta$ -blockers, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, potassium sparing diuretics), and metabolic/respiratory acidosis. Normal values are 3.5—5.5 mEq/L. Asystolic arrest may occur at levels over 6.5 mEq/L. The primary symptoms relate to the effect on the cardiac muscle:

- Ventricular arrhythmias with increasing changes in the electrocardiogram, leading to cardiac and respiratory arrest
- Weakness with ascending paralysis and hyperreflexia
- Diarrhea

- Increasing confusion

### Question: 9

What is the most common cause of ARDS, or acute respiratory distress syndrome?

- A. congestive heart failure
- B. sepsis
- C. COPD
- D. malignant hypertension

**Answer: B**

Explanation:

Sepsis is the most common cause of ARDS. Severe infection causes vascular instability within the lungs which leads to leakage of blood from the blood vessels to the lung tissue. This prevents adequate oxygenation of the blood and results in hypoxemia and multi-system organ failure due to poor perfusion.

### Question: 10

Weaning patients from mechanical ventilation in the initial postoperative period includes which of the following criteria?

- A. core temperature of 35.2°C
- B. heart rate of 124 bpm
- C. slight arrhythmia
- D. chest tube drainage of 40 mL/hr

**Answer: D**

Explanation:

Chest tube drainage of 40 mL/hr meets the criteria 50 mL/hr) for weaning from ventilation in the initial postoperative period. Other criteria include adequate reversal of neuromuscular blockade and an awake state without stimulation. Core temperature should be over 35.5°C. Hemodynamic status should be stable with a cardiac index of over 2.2 L/min/m<sup>2</sup>, systolic blood pressure of 100-140 mm Hg, a heart rate of less than 120 bpm, and no arrhythmias. Blood gases should be stable on ventilation with a pH of 7.30-7.50, partial pressure of carbon dioxide of less than 50 torr, a partial pressure of oxygen in arterial blood over 75 torr, and a fraction of inspired oxygen (FiO<sub>2</sub>) of 0.5.

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