

# Nursing

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## Question: 1

Which of the following can minimize the risk of barotrauma while jet ventilation is performed with emergency cricothyrotomy?

- A. Anesthesia machine fresh gas outlet
- B. Central wall oxygen
- C. Tank oxygen
- D. Pressure regulator

**Answer: D**

Explanation:

Correct answer: Pressure regulator

A pressure regulator helps minimize the risk of barotrauma during transtracheal jet ventilation.

Central wall oxygen, tank oxygen, and the anesthesia machine fresh gas outlet are sources of high-pressure oxygen during transtracheal jet ventilation; used alone, they do not control the flow-rate or help minimize the risk of barotrauma.

## Question: 2

Which of the following statements is true related to the artery of Adamkiewicz?

- A. It is typically unilateral and nearly always arises on the right side.
- B. Injury to this artery can result in anterior spinal artery syndrome.
- C. It provides major blood supply to the middle one-third of the spinal cord.
- D. It supplies blood to the entire posterior spinal cord.

**Answer: B**

Explanation:

Correct answer: Injury to this artery can result in anterior spinal artery syndrome.

The artery of Adamkiewicz, also called arteria radicularis magna, is one of the largest radicular arteries. It arises from the aorta and is typically unilateral, nearly always arising on the left side. It provides the major blood supply to the anterior, lower two-thirds of the spinal cord. Injury to this artery can result in anterior spinal artery syndrome.

## Question: 3

Which leads of an electrocardiogram monitor the left anterior descending artery to detect ischemia in the anteroseptal region of the heart?

- A. II and III
- B. V1-V4
- C. I and aVL
- D. V5-V6

**Answer: B**

Explanation:

Correct answer: V1-V4

The anteroseptal tissues of the heart are fed by the left anterior descending coronary artery; this area of the heart is monitored by leads V1-V4 of the electrocardiogram (EKG).

Leads II, III, and aVF monitor the inferior wall of the heart. Leads I, aVL, and V5-V6 monitor the lateral wall. Leads I, aVL, and V1-V4 monitor the anterior wall.

### Question: 4

A type 2 diabetic is scheduled to undergo surgery. They take the oral glucose-lowering agent, metformin, as part of their medication treatment for diabetes. Current recommendations on the use of biguanides for diabetics preparing to undergo surgery include all the following except:

- A. Metformin must be discontinued 48 hours prior to surgery to prevent the risk of the development of (potentially fatal) lactic acidosis.
- B. Metformin may be held the morning of surgery and then administered perioperatively in diabetic patients without any increased risk of (potentially fatal) lactic acidosis.
- C. Metformin may be continued as ordered in diabetic patients preparing to undergo surgery despite the risk of (potentially fatal) lactic acidosis.
- D. Metformin may be administered to diabetic patients preparing to undergo surgery because there is no proven increased risk of developing lactic acidosis during surgery.

**Answer: A**

Explanation:

Correct answer: Metformin must be discontinued 48 hours prior to surgery to prevent the risk of the development of (potentially fatal) lactic acidosis.

Currently, the biguanide class of oral glucose-lowering agents contains only one drug available in most countries, metformin. Metformin is preferred as a first-line oral glucose-lowering agent and is often available in combination with other oral glucose-lowering drugs as a single-tablet format. Anecdotal individual case reports of fatal lactic acidosis in diabetic surgical patients taking biguanides led to the blanket recommendation that biguanides must be discontinued 48 hours prior to surgery. Recent Cochrane Database review of use of biguanide drugs in diabetic surgical patients has not revealed any evidence showing an increased risk of developing (potentially fatal) lactic acidosis when compared to patients not taking biguanides.

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Current recommendations on the administration of biguanide drugs to diabetic surgical patients state that metformin may be continued in these patients despite the anecdotal, individual case reports of risk of lactic acidosis and that metformin may be administered perioperatively (close to the time of surgery) without any evidence showing an increased risk of (potentially fatal) lactic acidosis.

### Question: 5

Which of the following nerves is most likely to be affected by a thyroidectomy?

- A. Trigeminal nerve
- B. Superior laryngeal nerve
- C. Facial nerve
- D. Recurrent laryngeal nerve

**Answer: D**

Explanation:

Correct answer: Recurrent laryngeal nerve

Because of its position, the recurrent laryngeal nerve is susceptible to injury during thyroidectomy and other neck surgeries. Recurrent laryngeal nerve palsy results in hoarseness, or aphonia, and stridor.

The facial, trigeminal nerve, and superior laryngeal nerves are unlikely to be affected by thyroidectomy.

### Question: 6

Which of the following reversal agents is the best choice for a patient who has received the neuromuscular blocking agent (NMBA) rocuronium as part of the anesthesia "cocktail" during their surgery?

- A. Edrophonium
- B. Sugammadex
- C. Glycopyrrolate
- D. Neostigmine

**Answer: B**

Explanation:

Correct answer: Sugammadex

Due to the risk of neuromuscular blockade in patients who have received one of the NeuroMuscular Blocking Agent (NMBA) drugs during surgery, reversal drugs must be co-administered. A partial, or incomplete, reversal of neuromuscular blockade may ultimately cause upper airway obstruction and respiratory depression, necessitating careful monitoring of patients in the PACU who have received an NMBA. Reversal agents such as neostigmine and edrophonium may be administered to patients who have received NMBAs; however, the reversal drug-of-choice for patients who have received rocuronium (or vecuronium) is sugammadex.

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Sugammadex works by transporting the NMBA away from the neuromuscular junction unlike the other reversal agents, such as neostigmine or edrophonium, in which the mechanism of action is that of an anticholinesterase. Glycopyrrolate is not a reversal agent but must be administered with the cholinergic reversal agents (neostigmine and edrophonium) to prevent the development of bradycardia or excessive oral secretion as a result of the administration of the cholinergic drug.

### Question: 7

For which of the volatile anesthetic gases is the use of a Tec 6 vaporizer indicated?

- A. Sevoflurane
- B. Halothane
- C. Nitrous oxide
- D. Desflurane

**Answer: D**

Explanation:

Correct answer: Desflurane

The Tec 6 vaporizer is specifically for use in the delivery of desflurane. Desflurane nears a state of boiling at room temperature, thereby making use of a specially designed vaporizer ideal. The Tec 6 vaporizer heats desflurane gas to 2 atm of pressure to provide safe, accurate delivery of the gas. The anesthesia provider fills the desflurane bottle through use of a non-removable, permanently attached spout; this vaporizer does not need to be shut off to fill, although it is advisable to do so. The anesthesia level can then be determined by assessing the liquid crystal fill display.

The Datex-Ohmeda vaporizer also is designed for use in delivery of desflurane.

Halothane gas is no longer used within the United States but may be found in use in other countries around the world.

### Question: 8

A patient undergoes mediastinoscopy and the following day experiences hoarseness of his voice. Based on the procedure, which of the following is the most likely cause of his symptom?

- A. Cricoid cartilage injury
- B. Trauma to the trachea
- C. Hypoglossal nerve injury
- D. Recurrent laryngeal nerve injury

**Answer: D**

Explanation:

Correct answer: Recurrent laryngeal nerve injury

The recurrent laryngeal nerve may be injured during mediastinoscopy, and if injured, can result in hoarseness.

Injury to the trachea, hypoglossal nerve, or cricoid cartilage do not result in hoarseness of the voice.

### Question: 9

A healthy patient who has received a regional block for ophthalmic surgery begins to experience seizure activity shortly after the block was administered. The CRNA knows this negative event most likely occurred as a result of which of the following?

- A. Sub-Tenon injection of the anesthetic
- B. Systemic absorption of the topical ocular drop phenylephrine applied prior to administration of the regional block
- C. Intravascular injection of the anesthetic
- D. Use of a flat-grind needle when injecting the anesthetic

**Answer: C**

Explanation:

Correct answer: Intravascular injection of the anesthetic

Because the optic nerve is not a "true" cranial nerve but is instead a protrusion or outgrowth of the brain itself, the patient undergoing ophthalmic surgery is at risk for injury or insult to the brainstem as a result of the administration of regional ophthalmic blocks. Regional blocks that are inadvertently injected intravascularly into the central retinal artery or vein result in the sudden onset of a short burst of seizure activity. Other symptoms that may occur as a result of regionally-injected anesthetic impacting the brainstem include oversedation and brainstem anesthesia.

A sub-Tenon block is a type of regional anesthetic block used for producing significant ocular anesthesia. A flat-grind needle is often preferred by anesthesia providers when administering a regional block for ophthalmic surgery. The systemic absorption of topical ocular drop phenylephrine may produce malignant hypertension.

### Question: 10

A dual-hanger yoke system is holding two open oxygen E-cylinders. Where will the cylinder supply pressure gauge indicate the pressure?

- A. In the cylinder to the right
- B. In the cylinder to the left
- C. In the cylinder that is located in a higher position than the oxygen inlet
- D. In the cylinder with the highest pressure

**Answer: D**

Explanation:

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Correct answer: In the cylinder with the highest pressure

The location of the cylinders has no bearing on what pressure will be indicated by the pressure gauge. The pressure gauge will indicate the pressure in the cylinder having the higher pressure of the two cylinders.

### Question: 11

In the case of suspected crossover (cross-connection) during a case, which of the following actions must be taken immediately?

- A. Open the backup oxygen cylinder three-fourths of the way, and disconnect the pipeline gas at the wall
- B. Open the backup oxygen cylinder three-fourths of the way, and disconnect the pipeline gas at the machine
- C. Open the backup oxygen cylinder fully and disconnect the pipeline gas at the machine
- D. Open the backup oxygen cylinder fully and disconnect the pipeline gas at the wall

**Answer: D**

Explanation:

Correct answer: Open the backup oxygen cylinder fully and disconnect the pipeline gas at the wall

In case of crossover (cross-connection), if you do not disconnect the pipeline gas supply at the wall, the pipeline pressure exerted on the oxygen cylinder regulator will prevent the cylinder gas from flowing because the pipeline is maintained at a slightly higher pressure. The cylinder needs to be opened fully, not just the few quick turns it is given for checking to ensure a full flow of oxygen.

### Question: 12

All the following drugs are appropriate for use in a patient with hypertrophic cardiomyopathy except:

- A. amiodarone.
- B. Mannitol.
- C. enflurane.
- D. phenylephrine.

**Answer: B**

Explanation:

Correct answer: mannitol.

Anesthetic goals in a patient with hypertrophic cardiomyopathy are to minimize sympathetic stimulation and increase systemic vascular resistance (ventricular afterload). Mannitol is an osmotic diuretic. It should not be given to a patient with hypertrophic cardiomyopathy because it will decrease ventricular volume.

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Amiodarone helps to maintain normal sinus rhythm. In patients with hypertrophic cardiomyopathy, some degree of cardiac depression is typically desirable, and this can be obtained with enflurane. Phenylephrine helps to increase systemic vascular resistance, while minimizing sympathetic stimulation.

### Question: 13

All the following will trigger an alarm except:

- A. nitrous oxide in the oxygen pipeline gas supply.
- B. continuous high pressure circuit.
- C. negative pressure circuit.
- D. loss of pipeline oxygen pressure.

**Answer: A**

Explanation:

Correct answer: nitrous oxide in the oxygen pipeline gas supply.

Cross-connection of gas delivery pipelines does not trigger an alarm. Cross-connection of gases can occur anywhere, from the liquid oxygen supply and piping to the wall outlets, hoses, and internal circuitry of the anesthesia gas machine.

The oxygen low-pressure alarm sounds if loss of pipeline oxygen pressure occurs. A high-priority pressure alarm must sound if user-adjustable limits are exceeded if continuing high pressure is sensed or for negative pressure.

### Question: 14

Which of the following cardiac complications often occurs in healthy patients who are receiving anesthesia during surgery as a result of undiagnosed mitral valve prolapse?

- A. Bradycardia
- B. Premature ventricular contractions
- C. Ventricular tachycardia
- D. Hypotension

**Answer: B**

Explanation:

Correct answer: Premature ventricular contractions

The incidence of mitral valve prolapse, previously estimated to affect as many as 15% of the population within the United States, is now estimated to be between 1.6% to 2.4% of American adults. As many patients with mitral valve prolapse are asymptomatic, the condition often goes undiagnosed, resulting in "healthy" surgical patients experiencing cardiac sequelae or complications as a result of the mitral valve prolapse. It is not uncommon for these patients to experience premature ventricular contractions during surgery, with spontaneous resolution of the dysrhythmia most of the time.



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It is believed that sudden death in patients with mitral valve prolapse likely results from a ventricular dysrhythmia, such as ventricular tachycardia.

### Question: 15

Which of the following is a manifestation of Transurethral Resection of the Prostate (TURP) syndrome?

- A. Hyperosmolality
- B. Increased central venous pressure
- C. Decreased pulmonary artery pressure
- D. Hyponatremia

**Answer: B**

Explanation:

Correct answer: Increased central venous pressure

The absorption of large amounts of irrigation fluids (2 liters or more) during transurethral resection of the prostate results in symptoms of Transurethral Resection of the Prostate (TURP) syndrome. It can present intraoperatively or postoperatively and can be rapidly fatal. Manifestations include increased central venous pressures and the following:

- Hyponatremia
- Hypoosmolality
- Fluid overload: congestive heart failure, pulmonary edema, hypotension or hypertension
- Hemolysis
- Solute toxicity

Both hypertension and hypotension may occur with TURP syndrome; hypertension and reflex tachycardia are explained by the rapid volume expansion. Patients with poor left ventricular function may, in addition, have pulmonary edema from acute circulatory overload.

### Question: 16

Which of the following medications should be avoided in a client who has asthma?

- A. Sevoflurane
- B. Halothane
- C. Meperidine
- D. Ketamine

**Answer: C**

Explanation:

Correct answer: Meperidine

The use of drugs often associated with histamine release should be avoided in patients with asthma, including curare, atracurium, mivacurium, morphine, and meperidine.

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Ketamine is the only intravenous agent with bronchodilating properties and is a good choice for patients who are also hemodynamically unstable. Halothane and sevoflurane usually provide the smoothest inhalation induction with bronchodilation in asthmatic children.

### Question: 17

Which of the following statements is true about colloids?

- A. The oncotic pressure in colloids helps to disperse the solution into the interstitium.
- B. Colloid particles break down into smaller pieces in water just like crystalloids.
- C. They are used in combination with crystalloids when fluid replacement needs exceed 3 to 4 liters.
- D. They are used to replace blood loss at a 3:1 ratio.

**Answer: C**

Explanation:

Correct answer: They are used in combination with crystalloids when fluid replacement needs exceed 3 to 4 liters.

When fluid replacement needs are greater than 3 to 4 liters, colloids are generally given along with crystalloids.

Colloids do not break down into smaller pieces in water like crystalloids; they consist of high-molecular-weight substances that help to keep the solution intravascularly; they do not easily pass through capillary pores and are not easily dispersed into the interstitium. Colloids are used to replace blood at a 1:1 ratio; crystalloids are given at a 3:1 ratio.

### Question: 18

Which of the following statements is true related to the correct administration of epinephrine?

- A. It is the primary drug used in acute myocardial infarction due to its potent vasoconstrictive effects.
- B. For the treatment of a second-degree heart block type II, the appropriate dose of epinephrine to be administered is 10 to 20 mcg/minute.
- C. It is the primary drug administered in pulseless arrest, in part because of its potent vasoconstrictive effects.
- D. It cannot be administered via endotracheal tube.

**Answer: C**

Explanation:

Correct answer: It is the primary drug administered in pulseless arrest, in part because of its potent vasoconstrictive effects.

Epinephrine binds directly to alpha-1 adrenergic receptors of the blood vessels, resulting in direct vasoconstriction, which causes improved perfusion pressure to the heart and brain. It also improves cardiac output.

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Epinephrine can be administered via endotracheal tube when intravenous access is not available. Epinephrine should be used with caution in patients suffering from acute myocardial infarction because it increases the heart rate and raises blood pressure. This can place an increased demand for oxygen on the heart and worsen cardiac ischemia. The appropriate dose for epinephrine in the treatment of a second-degree heart block type II is 2 to 10 mcg/minute, not 10 to 20 mcg/minute.

### Question: 19

In neuromuscular monitoring modalities, how many Hertz does a train-of-four deliver?

- A. 1 Hz
- B. 2 Hz
- C. 50 Hz
- D. 100 Hz

**Answer: B**

Explanation:

Correct answer: 2 Hz

A train-of-four delivers four twitches in 2 seconds of 2 Hz each, each 0.2 milliseconds long, separated by a half second.

Tetanus typically consists of rapid delivery of a 30, 50, or 100 Hz delivery stimulus for 5 seconds. Post-tetanic count consists of 50 Hz tetanus for 5 seconds, a 3-second pause, then single twitches of 1 Hz.

### Question: 20

Which of the following statements is true related to a DDD pacemaker?

- A. It is an asynchronous atrial-ventricular pacemaker.
- B. It is a fixed-rate ventricular pacemaker.
- C. It is a fixed-rate atrial-ventricular pacemaker.
- D. It senses and paces in both the atria and ventricle.

**Answer: D**

Explanation:

Correct answer: It senses and paces in both the atria and ventricle.

The first letter (D) signifies the chamber paced—in this case, "dual," meaning it senses in both the atria and the ventricle. The second letter (D) signifies the chamber paced. In this case, it is again "dual" for pacing in both the atria and the ventricle. The third letter is for the response to pacing. "D" signifies that it is "dual," meaning that it is triggered and inhibited, or synchronous, rather than asynchronous.

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