

New South Wales Ambulance Pharmacology Practice Exam (Sample)

Study Guide



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SAMPLE

Questions

- 1. Which of the following best describes the pharmacological action of salbutamol?**
 - A. Inhibits mucus production**
 - B. Relaxes bronchial smooth muscle**
 - C. Increases white blood cell count**
 - D. Increases peripheral resistance**
- 2. In prescription contexts, what significant role does Sodium Bicarbonate play in relation to tricyclic antidepressants?**
 - A. Enhances absorption**
 - B. Alters protein binding**
 - C. Increases side effects**
 - D. Decreases metabolism**
- 3. What type of medication is Metoclopramide?**
 - A. Pain reliever**
 - B. Anti-nauseant and anti-emetic**
 - C. Antibiotic**
 - D. Stimulant**
- 4. What effect does Glyceryl Trinitrate have on the blood vessels?**
 - A. It constricts blood vessels**
 - B. It dilates blood vessels**
 - C. It thickens blood**
 - D. It lowers blood viscosity**
- 5. What potential adverse effect can occur with Glucose Gel?**
 - A. Increased heart rate**
 - B. May precipitate Wernicke's Encephalopathy in alcoholics with thiamine deficiency**
 - C. Severe allergic reactions**
 - D. Vision changes**

- 6. What type of drug is Ondansetron categorized as?**
- A. An analgesic**
 - B. An anti-emetic**
 - C. A muscle relaxant**
 - D. A stimulant**
- 7. What type of drug is Midazolam classified as?**
- A. Antidepressant**
 - B. Anticonvulsant**
 - C. Opioid analgesic**
 - D. Antipyretic**
- 8. What is the primary physiological action of Sodium Bicarbonate in treating metabolic acidosis?**
- A. Increases hydrogen ion concentration**
 - B. Buffers hydrogen ions**
 - C. Promotes potassium retention**
 - D. Enhances sodium absorption**
- 9. What can Droperidol potentially do when combined with CNS depressants?**
- A. Reduce their effectiveness**
 - B. Enhance their effects**
 - C. Neutralize their effects**
 - D. Cause increased alertness**
- 10. What therapeutic use of oxygen is indicated during a COPD exacerbation?**
- A. To maintain SpO₂ levels above 90%**
 - B. To provide relief from pain**
 - C. To enhance exercise tolerance**
 - D. To prevent infection**

Answers

SAMPLE

1. B
2. B
3. B
4. B
5. B
6. B
7. B
8. B
9. B
10. A

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Explanations

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1. Which of the following best describes the pharmacological action of salbutamol?

- A. Inhibits mucus production**
- B. Relaxes bronchial smooth muscle**
- C. Increases white blood cell count**
- D. Increases peripheral resistance**

Salbutamol is a selective beta-2 adrenergic agonist, primarily utilized in management of conditions like asthma and chronic obstructive pulmonary disease (COPD). Its primary pharmacological action is to relax bronchial smooth muscle, which leads to bronchodilation. This effect opens up the airways, improving airflow and alleviating symptoms of wheezing and shortness of breath associated with bronchospasm. The other options do not accurately reflect the pharmacological action of salbutamol. Inhibiting mucus production, while potentially beneficial in some contexts, is not a direct action of salbutamol. Increasing white blood cell count and increasing peripheral resistance are actions that are unrelated to the therapeutic effects of salbutamol and correspond more to different types of drugs or physiological responses. The focus of salbutamol's action on the relaxation of bronchial smooth muscle makes it a critical agent in respiratory care.

2. In prescription contexts, what significant role does Sodium Bicarbonate play in relation to tricyclic antidepressants?

- A. Enhances absorption**
- B. Alters protein binding**
- C. Increases side effects**
- D. Decreases metabolism**

Sodium Bicarbonate serves a crucial function when considering the pharmacology of tricyclic antidepressants due to its effect on drug ionization. Tricyclic antidepressants are weak bases, and the ionization of drugs in the body can influence their distribution and efficacy. By increasing the pH of urine, Sodium Bicarbonate can change the ionization of these medications, ultimately leading to alterations in protein binding. In the context of tricyclic antidepressant toxicity or overdose, administering Sodium Bicarbonate can enhance the elimination of the drug from the body by making it less reabsorbable in the renal tubules. This is particularly significant in cases of overdose where the goal is to prevent further systemic uptake of the drug. By altering protein binding in the bloodstream, Sodium Bicarbonate does not necessarily enhance absorption or directly increase side effects, nor does it have a significant role in metabolism. The primary action connects to how the drug interacts with proteins in the blood and how it can be cleared from the system effectively. This understanding is vital for medical professionals in managing cases involving tricyclic antidepressants.

3. What type of medication is Metoclopramide?

- A. Pain reliever
- B. Anti-nauseant and anti-emetic**
- C. Antibiotic
- D. Stimulant

Metoclopramide is classified as an anti-nauseant and anti-emetic medication. It primarily affects the gastrointestinal tract and the central nervous system. By blocking dopamine receptors in the brain, Metoclopramide helps to reduce feelings of nausea and prevent vomiting. It is commonly used in situations where patients are experiencing nausea due to various causes, including chemotherapy, surgery, or gastrointestinal disorders. In addition to its anti-nausea effects, Metoclopramide also has prokinetic properties, meaning it can help stimulate movements in the stomach and intestines, which aids in the treatment of gastroparesis and helps with the management of conditions where gastric emptying is delayed. Other types of medications listed do not provide the same functions as Metoclopramide. Pain relievers are designed specifically to alleviate pain, antibiotics are used to combat bacterial infections, and stimulants increase alertness and energy levels but do not exhibit anti-nauseant properties. Thus, Metoclopramide's classification as an anti-nauseant and anti-emetic is accurate.

4. What effect does Glyceryl Trinitrate have on the blood vessels?

- A. It constricts blood vessels
- B. It dilates blood vessels**
- C. It thickens blood
- D. It lowers blood viscosity

Glyceryl Trinitrate, commonly known as GTN or nitroglycerin, is a medication primarily used as a vasodilator. Its primary mechanism of action involves relaxation of the smooth muscle in the walls of blood vessels, leading to dilation, especially in venous and arterial circulation. This dilation reduces the return of blood to the heart (preload) and decreases the workload on the heart by lowering systemic vascular resistance (afterload). The dilation of blood vessels by GTN serves important therapeutic purposes, particularly in the management of conditions such as angina pectoris and acute heart failure. By decreasing myocardial oxygen demand and improving blood flow through the coronary arteries, it helps alleviate symptoms associated with ischemia and enhances overall cardiac function during periods of stress. In context with other choices, blood vessel constriction would counteract the therapeutic effects of GTN, and a medication that thickens blood or lowers blood viscosity does not reflect the pharmacological properties of glyceryl trinitrate, which is all about dilation and relaxation of the vascular smooth muscle.

5. What potential adverse effect can occur with Glucose Gel?

- A. Increased heart rate
- B. May precipitate Wernicke's Encephalopathy in alcoholics with thiamine deficiency**
- C. Severe allergic reactions
- D. Vision changes

Glucose gel is commonly used in emergency situations to treat hypoglycemia, particularly in patients with diabetes. One significant potential adverse effect associated with the administration of glucose, especially in individuals with chronic alcoholism, is the risk of precipitating Wernicke's Encephalopathy. Wernicke's Encephalopathy is a serious neurological condition caused by thiamine (vitamin B1) deficiency, commonly seen in alcoholics. When these individuals experience hypoglycemia, the administration of glucose without prior thiamine supplementation can exacerbate their condition by increasing the metabolic demand for thiamine in the brain. This can lead to neurological damage if not addressed promptly, highlighting the importance of assessing thiamine levels and administering thiamine prior to or alongside glucose in at-risk patients. Understanding this relationship is key for healthcare providers in preventing potentially life-threatening complications in vulnerable populations, which is why this adverse effect is critical to consider when using glucose gel in such contexts.

6. What type of drug is Ondansetron categorized as?

- A. An analgesic
- B. An anti-emetic**
- C. A muscle relaxant
- D. A stimulant

Ondansetron is categorized as an anti-emetic, which is a class of drugs specifically designed to prevent nausea and vomiting. It acts by blocking the action of serotonin, a neurotransmitter that can trigger nausea, at 5-HT₃ receptors in the central nervous system and gastrointestinal tract. This mechanism is particularly effective in managing symptoms associated with chemotherapy, radiation therapy, and postoperative recovery. The classification of Ondansetron as an anti-emetic is crucial for its clinical use, especially in settings where patients are at a higher risk for nausea and vomiting. Understanding this categorization aids in making informed decisions regarding patient care, as Ondansetron's properties can significantly improve patient comfort and adherence to treatment protocols. Other classifications of medications mentioned, such as analgesics, muscle relaxants, and stimulants, serve different therapeutic purposes and do not encompass the anti-nausea functionality of Ondansetron. Analgesics are primarily for pain relief, muscle relaxants help reduce muscle tension, and stimulants increase activity levels or alertness, none of which directly address the prevention or treatment of nausea and vomiting. This clear distinction emphasizes the specific role that Ondansetron plays in managing therapeutic regimens where nausea is a concern.

7. What type of drug is Midazolam classified as?

- A. Antidepressant**
- B. Anticonvulsant**
- C. Opioid analgesic**
- D. Antipyretic**

Midazolam is classified as an anticonvulsant, which is a type of drug used to prevent and treat seizures. Its primary mechanism of action involves enhancing the effects of the neurotransmitter gamma-aminobutyric acid (GABA) at the GABA-A receptor. This leads to increased inhibition of neuronal firing, thereby helping to control seizures. In the context of emergency medicine and pre-hospital care, Midazolam is often utilized for its rapid onset of action and efficacy in controlling acute seizures. It is particularly valuable in scenarios such as status epilepticus. Understanding its classification as an anticonvulsant is critical for recognizing its therapeutic use in various clinical situations, most notably in the management of seizure disorders. This classification also differentiates Midazolam from other drug categories, such as antidepressants, opioid analgesics, and antipyretics, each of which serves different purposes in treatment protocol.

8. What is the primary physiological action of Sodium Bicarbonate in treating metabolic acidosis?

- A. Increases hydrogen ion concentration**
- B. Buffers hydrogen ions**
- C. Promotes potassium retention**
- D. Enhances sodium absorption**

Sodium Bicarbonate is primarily used in the treatment of metabolic acidosis due to its ability to buffer excess hydrogen ions in the body. When metabolic acidosis occurs, the blood pH decreases due to an increase in hydrogen ion concentration. By administering Sodium Bicarbonate, the bicarbonate ions react with these hydrogen ions, forming carbonic acid, which can then dissociate into carbon dioxide and water. This reaction effectively raises blood pH back towards a more normal level by reducing the concentration of hydrogen ions, thus alleviating the acidosis. The therapeutic action of Sodium Bicarbonate as a buffer is critical in situations where the body's natural buffering capacity is overwhelmed. This mechanism plays a crucial role in maintaining acid-base balance and preventing complications associated with severe acidosis.

9. What can Droperidol potentially do when combined with CNS depressants?

- A. Reduce their effectiveness**
- B. Enhance their effects**
- C. Neutralize their effects**
- D. Cause increased alertness**

Droperidol, when combined with central nervous system (CNS) depressants, has the potential to enhance their effects. This enhancement occurs because Droperidol itself is a butyrophenone antipsychotic that has sedative properties. When it is administered alongside other CNS depressants, such as narcotics, benzodiazepines, or alcohol, the overall level of sedation may be greater than when either agent is used alone. This synergetic effect can increase the risk of profound sedation, respiratory depression, and potentially life-threatening conditions, leading to a heightened state of drowsiness, decreased motor coordination, or even respiratory failure in severe cases. Therefore, it is critical for healthcare professionals to monitor patients closely when Droperidol is used in conjunction with other CNS depressants to manage these enhanced effects safely.

10. What therapeutic use of oxygen is indicated during a COPD exacerbation?

- A. To maintain SpO2 levels above 90%**
- B. To provide relief from pain**
- C. To enhance exercise tolerance**
- D. To prevent infection**

During a COPD exacerbation, the primary therapeutic use of oxygen is to maintain SpO2 levels above 90%. Patients with chronic obstructive pulmonary disease often experience hypoxia, which can lead to significant complications if not addressed. Oxygen therapy is critical in managing their condition, as it helps ensure that the body's tissues receive adequate oxygen, facilitating normal cellular function and preventing further deterioration of the patient's health. Maintaining oxygen saturation levels above 90% is important because lower levels can lead to respiratory distress, confusion, and increased strain on the heart and lungs. Therefore, administering oxygen to achieve and sustain these saturation levels is a central goal in the management of COPD exacerbations. Oxygen does not serve as a pain reliever, enhance exercise tolerance directly, or act as an agent to prevent infections. While improving oxygenation may contribute to better function and ability, the immediate and recognized goal during an exacerbation involves correcting hypoxemia.