

Critical Thinking

PICU Quiz

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- A 3-year-old child with gram-negative sepsis, renal failure, and liver failure is intubated and sedated in the PICU with morphine 0.3mg/kg/hr and lorazepam 0.3mg/kg/hr. The patient continues to move in the bed. Which of the following neuromuscular agents would be MOST appropriate for paralysis in this patient and why?

 - Vecuronium because its active metabolites are secreted into the gastrointestinal tract via the pancreas
 - Pancuronium because there are no active metabolites
 - Rocuronium because it is short acting
 - Succinylcholine because it is a very short acting agent
 - Atracurium because it is broken down Hoffmann elimination not affected by multiple system organ failure
- Which of the following is LEAST correct about junctional ectopic tachycardia (JET)?

 - Junctional ectopic tachycardia occurs in the early post-operative phase
 - Immediate Cardioversion is the treatment of choice
 - Appropriate therapy includes cooling and sedating the patient
 - IV amiodarone is an effective drug for treating JET
 - The classic ECG finding is a normal QRS with atrial-ventricular dissociation
- Which is the LEAST common clinical occurrence in the adolescent following coarctation of the aorta repair?

 - Rupture of aneurysm of circle of willis
 - Ischemia of the artery of Adamkiewicz during aortic cross clamp time
 - Rebound hypertension
 - Mesenteric arteritis
 - Gradient of 40 mm Hg between upper extremity and lower extremity
- A 4-year-old patient with traumatic brain injury is admitted to the ICU after being involved in a motor vehicle accident. Her mental status is variable and the decision to intubate her is made. Which agent is the BEST in this setting?

 - Succinylcholine
 - Morphine sulfate
 - Ketamine
 - Propofol
 - None of the above
- A 2-year-old patient has been mechanically ventilated in the ICU for 10 days. He has received benzodiazepines and opioids by continuous infusion for sedation. The child is started on methadone as a part of the weaning process. Correct statements regarding this intervention include all of the following EXCEPT:

 - Tolerance to the effects of the opioids has developed
 - Narcotic withdrawal may develop if inadequate treatment is provided
 - Treatment depends on the total opioid exposure in dosage and duration
 - Treatment can begin when withdrawal symptoms become evident
 - Tremors, restlessness, and fever are common signs of opioid withdrawal
- Which of the following conditions is associated with large or cannon a waves on an atrial pressure tracing?

 - Hypovolemia
 - Ebstein anomaly
 - Junctional ectopic tachycardia
 - Tricuspid regurgitation
- A 2-year-old with a seizure disorder is resuscitated from a submersion injury. He develops acute respiratory distress syndrome, and is transitioned from conventional mechanical ventilation to high-frequency oscillatory ventilation (HFOV).

Initial HFOV settings are the following: airway pressure, 24 cm H₂O; FIO₂, 1.0; frequency, 7 Hz; inspiratory time, 33%; and amplitude (delta-P), 55 cm H₂O. The ventilator sounds are equal bilaterally, and the patient demonstrates an equal wiggle down to the level of the mid-abdomen. Chest radiograph shows lung expansion at the level of 9 ribs posteriorly. Arterial blood gas studies reveal pH of 7.08, PaCO₂ of 98 mm Hg, PaO₂ of 95 mm Hg, and bicarbonate level of 27 mEq/L.

Which of the following interventions would worsen ventilation?

- A. Minimally deflating the endotracheal tube cuff, ensuring there is no loss of mean airway pressure
 - B. Increasing the delta-P from 55 to 60 cm H₂O
 - C. Increasing the inspiratory time from 33% to 50%
 - D. Increasing the frequency from 7 to 8 Hz
 - E. Performing a recruitment maneuver
8. Which of the following statements regarding the use of helium-oxygen gas mixtures (heliox) for respiratory distress is incorrect?
- A. Based on its physical properties, heliox can be used with mechanical ventilation, so long as in-line respiratory mechanic monitors and/or ventilators with heliox calibration capabilities are used to correctly determine delivered tidal volume.
 - B. Since heliox has a higher carbon dioxide (CO₂) diffusion coefficient when compared to oxygen, CO₂ elimination will be more efficient.
 - C. The bronchodilatory effect of heliox is significantly higher than that of nebulized salbutamol and heliox is therefore a better agent when used to treat an acute upper airway inflammatory process.
 - D. Based on its physical properties, aerosol delivery with heliox results in a more uniform and improved peripheral deposition of medication into the distal airways.
 - E. As helium has a lower density than that of air and nitrogen, heliox improves gas flow through high-resistance airways thus providing more laminar flow with improved diffusion characteristics.
9. An 8-year-old boy sustains a severe hypoxic-ischemic injury following a prolonged submersion accident. CT of the brain and spine reveals severe cerebral edema with no evidence of cervical spine injury. The physical examination (performed with no recent administration of sedatives, analgesics, or paralytics) is significant for temperature of 34.5°C (94.1°F), pulse rate of 78/min, BP of 110/74 mm Hg (while on IV epinephrine, 1.5 µg/kg/min), and RR, 20/min breathing only at set ventilator rate. Pupils are fixed and dilated with no response to light. There are no corneal reflexes or spontaneous eye movements. When the head is turned side to side, the eyes do not turn with the head and appear to remain fixated on a single point (positive doll's eye sign). Although there is no cough or gag reflex, during suctioning the patient raises his arms and places them across his chest. There are no spontaneous respiratory efforts and the apnea test is positive. The neurologist has told the family that the prognosis is poor, with a significant negative impact on the patient's quality of life. After discussion with family members, the parents approach you regarding brain death and organ donation. In your discussion with them regarding their son's meeting brain death criteria, which of the following statements is most appropriate?
- A. The patient needs to be rewarmed to 37°C (98.5°F) before consideration of the diagnosis of brain death.
 - B. The presence of positive doll's eye sign precludes pronouncing brain death.
 - C. The patient's movements during the apnea test indicate higher neurologic function, so he is not brain dead.
 - D. A radionuclide brain scan must document absent brain blood flow before consideration of the diagnosis of brain death.
 - E. The patient meets all necessary criteria for brain death, and it is reasonable to proceed with organ donation evaluation at this time.
10. A 4-year-old patient is admitted to the pediatric ICU after being involved in a motor vehicle collision. The patient is comatose, intubated, and receiving inotropic support. An external ventricular drain is placed to aid with

management of the closed head injury. On the third day of hospitalization, the patient has an HR of 156/min, BP of 81/34 mm Hg, and central venous pressure of 6 cm H₂O. Capillary refill is 5 seconds. Urine output is 5 mL/kg/h for the past 5 hours. Laboratory tests revealed the following: sodium, 121mEq/L; potassium, 3.1 mEq/L; chloride, 110 mEq/L; bicarbonate, 16 mEq/L; blood urea nitrogen, 20 mg/dL; glucose, 122 mg/dL. The patient's condition is most consistent with which of the following diagnoses?

- A. Syndrome of inappropriate antidiuretic hormone
- B. Central diabetes insipidus
- C. Acute renal failure
- D. Cerebral salt-wasting syndrome
- E. Nephrogenic diabetes insipidus

Answers

- 1. Ans E
- 2. Ans B
- 3. Ans E
- 4. Ans D
- 5. Ans D
- 6. Ans B
- 7. Ans D
- 8. Ans C
- 9. Ans A
- 10. Ans D