

Ventilator Questions for Capstone 2018 (Koo)

1. Ventilators, in contrast with spontaneous respiration, deliver volume by which of the following mechanism?
 - a. Generate negative pressure
 - b. Apply positive end-expiratory pressure
 - c. Generate negative and positive pressure
 - d. Generate positive pressure
 - e. Apply negative end-expiratory pressure

2. There are 2 components of respiration that ventilators assist with in an intubated patient. What are they?
 - a. Ventilation and correction of acidemia
 - b. Ventilation and oxygenation
 - c. Oxygenation and positive end-expiratory pressure
 - d. Flow and oxygenation
 - e. Bicarbonate excretion and ventilation

3. Minute volume or ventilation is calculated by the following equation:
 - a. $F_iO_2 \times$ positive end-expiratory pressure
 - b. $F_iO_2/\text{positive end-expiratory pressure}$
 - c. Tidal volume/respiratory rate
 - d. Tidal volume \times respiratory rate
 - e. Tidal volume \times pressure

4. A 72-year-old man presents to the emergency department with a congestive heart failure exacerbation. He is awake and alert but in distress. He is using accessory respiratory muscles and says it is hard to breathe. Vitals signs are: heart rate 120 beats/min, blood pressure 120/80 mm Hg, respiratory rate 34 breaths/min, and oxygen saturation 90% on 8 liters of oxygen by simple face mask. Physical examination reveals bilateral lower extremity edema and crackles in the posterior lung fields. A chest radiograph demonstrates bilateral fluffy infiltrates consistent with pulmonary edema. Arterial blood gas analysis demonstrates: pH 7.30, PCO_2 50 mm Hg, and PO_2 64 mm Hg. In addition to diuresis, which of the following is the best next step in management?
 - a. Intubated and initiate invasive mechanical ventilation
 - b. Initiate noninvasive positive pressure ventilation
 - c. Switch to nonrebreather oxygen mask
 - d. Switch to high-flow, high-humidity oxygen
 - e. Remove mask and allow the patient to breathe room air

5. Which of the following conditions require a higher PEEP to be applied in recruiting collapsed alveoli?
 - a. Asthma
 - b. Bronchiectasis
 - c. Congestive heart failure
 - d. Acute respiratory distress syndrome
 - e. Emphysema

6. 41-year-old man is admitted to the surgical ICU following operative debridement of bilateral lower extremities for necrotizing soft tissue infection. He is intubated on assist control ventilation. Vital signs are: temperature 39°C (102.2°F), heart rate 116 beats/min, respiratory rate 16 breaths/min, blood pressure 92/46 mm Hg. Arterial blood gas analysis reveals: pH 7.23, P_{CO2} 38 mm Hg, P_{aO2} 133 mm Hg. Chemistry results are: sodium 139 mEq/L, potassium 3.7 mEq/L, chloride 102 mEq/L, bicarbonate 16 mEq/L, lactic acid 4.0 mg/dL. Which of the following is the most appropriate intervention for this patient?
 - a. Increase tidal volume on ventilator to correct acute respiratory acidosis
 - b. Continue resuscitation to correct acute uncompensated anion gap metabolic acidosis
 - c. Decrease respiratory rate on ventilator to compensate for acute metabolic acidosis
 - d. Administer IV sodium bicarbonate to correct acute metabolic alkalosis
 - e. Increase positive end-expiratory pressure to improve oxygenation

7. In patients with acute respiratory distress syndrome (ARDS), which of the following have been shown to improve survival?
 - a. High positive end-expiratory pressure
 - b. High tidal volume ventilation
 - c. Low respiratory rate
 - d. Low tidal volume ventilation
 - e. High frequency oscillation ventilation

8. A 45-year-old man is on invasive ventilatory support for acute respiratory distress syndrome due to massive aspiration. He is sedated, paralyzed, and ventilated with assist control volume control mode with FIO₂ 1.0, tidal volume 5 mL/kg predicted body weight, respiratory rate 20 breaths/min, and positive end-expiratory pressure (PEEP) 22 cm H₂O. On these settings, arterial blood gas analysis shows: pH 7.34, P_{CO2} 38 mm Hg, and P_{O2} 88 mm Hg. Peak airway pressure is 40 cm H₂O, plateau pressure 35 cm H₂O, and mean airway pressure 22 cm H₂O. To reduce plateau pressure, his clinicians decide to reduce his PEEP to 18 cm H₂O. Which of the following is the most likely adverse consequence of this setting change?

- a. Decreased PaO₂
 - b. Decreased pH
 - c. Decreased PaCO₂
 - d. Decreased expiratory time
 - e. Increased tidal volume
9. The respiratory rate is set. The patient triggers the ventilator for a breath, and the ventilator delivers the volume that is set by the provider. What is this mode of ventilation?
- a. Pressure support ventilation
 - b. Airway pressure release ventilation
 - c. Volume assist ventilation
 - d. Continuous positive airway pressure
 - e. Volume assist-control ventilation
10. The pressure is set to reduce the work of breathing by overcoming the resistance of the endotracheal tube and airways. The patient is allowed to trigger the ventilator and determine his/her own respiratory rate. However, the breath is not assisted by the ventilator. What is this ventilation mode?
- a. Mandatory mechanical ventilation
 - b. Pressure regulated volume control
 - c. Pressure support
 - d. T-tube ventilation
 - e. Synchronized intermittent mandatory ventilation