

# Final Exam

## Questions

1. Why is the initial blood pressure goal >65 mm Hg?
  - a. Because it is a nice round number
  - b. Dogs overall did better in a study
  - c. A large study showed that patients had significant renal and myocardial injury when higher than 65 mm Hg
  - d. A large study showed that it is more harmful to the kidney and cardiac muscle when higher than 70 mm Hg
2. Which receptor causes smooth muscle vasoconstriction?
  - a. Alpha 1
  - b. Alpha 2
  - c. Beta 1
  - d. Beta 2
  - e. D1
3. Why is tachycardia and diaphoresis dangerous in the setting of increased work of breathing?
  - a. Likely to have a metabolic acidosis
  - b. Not really concerning
  - c. High concern for drug withdrawal
  - d. High catecholamine surge
4. Which type of tachypnea is more worrisome?
  - a. Rapid and shallow
  - b. Rapid and deep
5. Is exhalation an active or passive process?
  - a. Active
  - b. Passive
6. Which medications are inopressors?
  - a. Phenylephrine, vasopressin
  - b. Norepinephrine, dobutamine, epinephrine
  - c. Epinephrine, dopamine
  - d. Norepinephrine, epinephrine, dopamine
7. Which mode of ventilation allows more control over the minute ventilation?
  - a. Volume breath
  - b. Pressure breath
8. Can you use dobutamine as a first line agent in septic shock?
  - a. Yes
  - b. No
9. What is the calculation of oxygen delivery?
  - a. Heart rate x stroke volume x (1/ hematocrit)
  - b.  $[(1.32 \times \text{hemoglobin} \times \text{SaO}_2) \times \text{cardiac output}] + (0.003 \times \text{PaO}_2)$
  - c.  $[\text{cardiac output} \times (1/ \text{hematocrit}) \times (\text{SVR})] - (0.003 \times \text{PaO}_2)$
  - d.  $[(1.5 \times \text{hemoglobin} \times \text{SaO}_2) \times \text{heart rate} \times (\text{PVR}-\text{SVR})] + (0.03 \times \text{PaO}_2)$
10. Which is better for cardiogenic shock: norepinephrine vs dopamine?
  - a. Norepinephrine
  - b. Dopamine
11. Which drug is best in pediatric septic shock?
  - a. Vasopressin
  - b. Epinephrine
  - c. Norepinephrine
  - d. Phenylephrine
12. Which medications are pure vasopressors?
  - a. Phenylephrine, vasopressin
  - b. Norepinephrine, vasopressin, epinephrine
  - c. Epinephrine, phenylephrine

- d. Norepinephrine, and epinephrine
13. What does inotropic mean?
- a. Increase heart rate
  - b. Increase diastolic filling time
  - c. Increase contractility
  - d. Increase conduction velocity
14. Vasopressin works on which receptors?
- a. V1 only
  - b. V1 at low doses and then  $V2 > V1$  at high doses
  - c. V2 at low doses and then  $V1 > V2$  at high doses
  - d. V1 and V2
  - e. V2 only
15. Can someone fake being diaphoretic?
- a. Yes
  - b. No
16. What type of breath requires no work by the patient, as the frequency/rate of the breath and the amount of gas delivered is fully dependent on the ventilator?
- a. Controlled
  - b. Assisted
  - c. Manual
  - d. Supported
17. Activation of this receptor is important in septic and obstructive shock by norepinephrine due to increased \_\_\_\_\_?
- a. Alpha 1 – vasoconstriction
  - b. Beta 1- increased inotropy
  - c. Beta 2- bronchodilation
  - d. Alpha 2- vasodilation
18. What are signs of poor perfusion?
- a. Mental status change, increase in heart rate, increase in lactic acid, decrease in urine output, increased capillary refill time
  - b. Mental status change, increase in lactic acid, increase in urine output, decreased capillary refill time, hemoconcentration
  - c. Decrease in urine output, decreased capillary refill time, mottled extremities
  - d. Mottled extremities increase in heart rate, increase in lactic acid, decrease in urine output, increased capillary refill time
19. Which receptor causes bronchodilation?
- a. Alpha 1
  - b. Alpha 2
  - c. Beta 1
  - d. Beta 2
  - e. D1
20. What is the underlying problem with shunt physiology?
- a. Something in the alveoli that prevents adequate gas exchange
  - b. Something in the alveoli that prevents them from expanding
  - c. Poor perfusion of the alveoli
  - d. Fatigue from poor compliance
21. What is vasopressin?
- a. A catecholamine
  - b. A combination of a catecholamine and hormone
  - c. A hormone
22. Which pressor is more known to be the most arrhythmogenic?
- a. Dopamine
  - b. Epinephrine
  - c. Norepinephrine
  - d. Phenylephrine
  - e. Dobutamine

23. What is the main goal in treating septic shock?
  - a. To get the MAP greater than 65 mm Hg
  - b. To perfuse the brain, and cardiac muscle
  - c. To allow / facilitate with antibiotic circulation
  - d. To have a balance between perfusing organs and cellular death
24. What happens to the intrathoracic pressure/volume when you exhale?
  - a. ↑ intra-thoracic pressure: ↑intra-thoracic volume
  - b. ↑ intra-thoracic pressure: ↓intra-thoracic volume
  - c. ↓ intra-thoracic pressure: ↑intra-thoracic volume
  - d. ↓ intra-thoracic pressure: ↓intra-thoracic volume
25. Activation of this/these receptor(s) by norepinephrine can cause arrhythmias?
  - a. Alpha 1
  - b. Beta 1
  - c. Alpha 1 + Beta 1
  - d. Alpha 1 + Beta 2
  - e. Beta 1 + Beta 2
26. What happens to the ratio of carbon dioxide to oxygen when a patient is apneic?
  - a. ↑ Carbon dioxide: ↑Oxygen
  - b. ↑ Carbon dioxide: ↓ Oxygen
  - c. ↓ Carbon dioxide: ↑ Oxygen
  - d. ↓ Carbon dioxide: ↓ Oxygen
27. Why does positive pressure ventilation help with shunt physiology?
  - a. Greater oxygen delivery
  - b. Better carbon dioxide removal
  - c. Increase surface area for gas exchange
  - d. Helps with patient fatigue
28. What is the normal I:E ratio?
  - a. Inspiration is longer than expiration
  - b. Expiration is longer than inspiration
  - c. Inspiration and expiration are equal
29. What correlates with diastolic blood pressure?
  - a. Cardiac output
  - b. End diastolic volume
  - c. Stroke volume
  - d. Peripheral vascular resistance
30. What percentage of alveoli are involved in shunt physiology to have refractory hypoxia?
  - a. >30%
  - b. >40%
  - c. >50%
  - d. >55%
31. Which is not a class of increased work of breathing causing respiratory distress?
  - a. Opiate overdose
  - b. Bronchospasms
  - c. Increased metabolic demands
  - d. Worsening compliance
32. Why is phenylephrine harmful in right heart failure?
  - a. Increased pulmonary vascular resistance
  - b. Increased cardiac preload due to venous vasoconstriction
  - c. Reflex bradycardia
  - d. All of the above
  - e. None of the above
33. What is the duration of push dose epinephrine?
  - a. 5-10 minutes
  - b. <30 seconds
  - c. 10-20 minutes
  - d. 1-2 minute

34. Why is lactate produced during shock?
- Purely due to anaerobic metabolism of pyruvate to lactate from cell hypoxia
  - Combination of anaerobic metabolism and epinephrine cause glycolysis
  - Krebs cycle malfunction due to ischemia
  - Mitochondrial increased demand from glycogen to glucose and glycolysis from beta 2 stimulation
35. Which medication is a phosphodiesterase 3 inhibitor?
- Dobutamine
  - Norepinephrine
  - Milrinone
  - Selepressin
36. Are arrhythmias common with milrinone?
- Yes
  - No
37. How do you check the plateau pressure (PPlat), on a pressure mode?
- Inspiratory pause
  - Expiratory pause
  - Same as the peak inspiratory pressure (PIP)
  - Ask the respiratory therapist
38. In which mode of ventilation is a pre-set amount of gas delivered to the patient?
- Volume breath
  - Pressure Breath
  - Both
  - Neither
39. What receptor(s) are activated by phenylephrine?
- Alpha 1
  - Beta 1
  - Alpha 1 + Beta 1
  - Alpha 1 + Beta 2
  - Beta 1 + Beta 2
40. In severe metabolic acidosis, why are the patients breathing rapidly?
- To stay awake
  - Increased metabolic supply
  - To overcome shunt physiology
  - To get rid of CO<sub>2</sub>
41. Which drug is a hormone?
- Milrinone
  - Dobutamine
  - Norepinephrine
  - Vasopressin
42. What does it mean when there is increased peak inspiratory pressure (PIP) and low plateau pressure (PPlat)?
- High resistance in the circuit or patient
  - Decreased compliance
  - Poor pulmonary perfusion
  - Need to change the ventilator mode
43. How does vasopressin cause vasodilation?
- Inhibits nitric oxide production
  - Activates beta 2
  - Inhibits alpha 1
  - Activates alpha 1
44. What is the reversal agent for benzodiazepine overdose?
- Naloxone
  - Flumazenil
  - Naltrexone
  - Disulfiram

45. What does inopressor mean?
- increases heart rate and causes arterial vasoconstriction
  - increases cardiac contractility and induces vasoconstriction
  - induces venous vasoconstriction and arterial vasodilation
  - increases cardiac contractility and induces vasodilation
46. What is a feature of vasopressin?
- Increases sensitivity to catecholamines
  - Increases sensitivity to endogenous vasopressin
  - Doesn't work very much on V2 receptors in the kidney during shock
  - Tolerated better than norepinephrine in liver patients
47. Which of the following is not the main goal of mechanical ventilation in the ICU?
- Optimize patient comfort
  - Optimize exchange of carbon dioxide and oxygen
  - Get them through surgery with less discomfort
  - Decrease work of breathing
48. What are ways to maximize patient comfort on the ventilator?
- Optimize ventilation settings
  - Sedation
  - Paralytics
  - All of the above
49. What is the optimal type of breath?
- Spontaneous
  - Controlled
  - Assisted
  - None of the above
50. Will all patients have perfect carbon dioxide and oxygen levels?
- Yes
  - No
51. What should the carbon dioxide goal be with traumatic brain injury?
- High to allow increased cerebral blood flow
  - High to prevent increased cerebral blood flow
  - Normal to prevent increased cerebral blood flow
  - Normal to allow increased cerebral blood flow
52. Which of the following is not a toxicity with mechanical intubation?
- Hypercarbia
  - Barotrauma
  - Volutrauma
  - Atelactotrauma
  - Oxygen toxicity
53. What percent of oxygen can lead to oxygen toxicity (even if only a short period of time)?
- >50 %
  - >60%
  - >70%
  - >80%
54. What is the volume of gas in the lungs at the end of expiration, but prior to inhalation?
- Inspiratory Capacity
  - Expiratory Capacity
  - Vital Capacity
  - Tidal Volume
  - Functional Residual Capacity
55. Is inhalation an active or passive process?
- Active
  - Passive
56. What the flow pattern of a pressure delivered breath?
- Constant
  - Accelerating

- c. Decelerating
  - d. Variable
57. What is the reversal agent for opiate overdose?
- a. Naloxone
  - b. Flumazenil
  - c. Naltrexone
  - d. Disulfiram
58. What happens to the intrathoracic pressure/ volume when you inhale?
- a. ↑ intra-thoracic pressure: ↑intra-thoracic volume
  - b. ↑ intra-thoracic pressure: ↓intra-thoracic volume
  - c. ↓ intra-thoracic pressure: ↑intra-thoracic volume
  - d. ↓ intra-thoracic pressure: ↓intra-thoracic volume
59. When does exhalation become an active process?
- a. With restrictive lung disease
  - b. After you run a mile
  - c. With obstructive lung disease
60. Mechanical ventilation works by\_\_\_\_\_?
- a. Positive pressure- pushing air into the lungs
  - b. Negative pressure- pulling out the chest wall
61. Which of the following is not a way to improve oxygenation?
- a. FiO<sub>2</sub>
  - b. PEEP
  - c. Inspiratory time
  - d. Respiratory rate
62. What is mean airway pressure?
- a. Average pressure that alveoli are exposed to during inspiration
  - b. Average pressure that the lungs are exposed to during expiration
  - c. Average pressure the lung is exposed to during mechanical ventilation
63. Which is the lung injury due to oxygen production of free radicals?
- a. Barotrauma
  - b. Volumtrauma
  - c. Atelectotrauma
  - d. Biotrauma
  - e. Oxygen toxicity
64. What happens if you intubate a patient with RV failure?
- a. Nothing with rapid sequence intubation technique
  - b. Improved pre-load to the RV
  - c. RV collapse and cardiac arrest
  - d. Increased ejection fraction of the right ventricle
65. What happens to blood return with spontaneous breathing?
- a. Positive intrathoracic pressure that causes less resistance and assists in venous return
  - b. Negative intrathoracic pressure that causes increased resistance and impedes in adequate venous return
  - c. Positive intrathoracic pressure that causes increased resistance and impedes venous return
  - d. Negative intrathoracic pressure that causes less resistance and assists in venous return
66. What is removal of carbon dioxide from the body called?
- a. Hypercarbia
  - b. Hypocarbia
  - c. Ventilation
  - d. Tidal Volume
67. What is the equation for minute ventilation?
- a. Respiratory Rate X PEEP
  - b. Respiratory Rate X Tidal Volume
  - c. Tidal Volume X Expiratory Time
  - d. Expiratory Time X Respiratory Rate

68. What is dead space ventilation?
- Carbon dioxide in the unventilated alveoli
  - Carbon dioxide delivered to the patient if the patient isn't on 100% oxygen
  - Carbon dioxide that is unable to diffuse out of the capillaries
  - Carbon dioxide still in the airway at expiration
69. How does increasing the tidal volume allow more CO<sub>2</sub> removal?
- Allows more surface area for the transfer of CO<sub>2</sub>
  - Increases the mean airway pressure
  - Allows the alveoli to remain open longer for gas exchange
  - Improves compliance
70. Since tidal volume is limited, what else can we adjust to improve minute ventilation?
- Inspiratory time
  - FiO<sub>2</sub>
  - Respiratory Rate
  - Expiratory time
71. Why is rapid and shallow breathing worse?
- Low CO<sub>2</sub>
  - Easily tired
  - Low tidal volumes
72. Why do patients with obstructive lung disease need a shorter respiratory rate?
- Gives the patients time to rest
  - Shorter respiratory rate allows a longer expiratory time as they have trouble with air removal
  - Shorter respiratory rate allows for less positive end expiratory pressure
  - Shorter respiratory rate allows for longer inspiratory time to improve oxygenation
73. What does it mean when there is an increase in FiO<sub>2</sub> without an increase in PaO<sub>2</sub>?
- Inadequate amount of oxygen
  - Mostly mouth breathing
  - Need to change from NC to non-rebreather
  - No gas exchange due to shunt physiology
74. What is the injury to the alveoli caused by excessive pressure from the ventilator called?
- Barotrauma
  - Volumtrauma
  - Atelectotrauma
  - Biotrauma
  - Oxygen toxicity
75. Where do you mainly want dobutamine to work in cardiogenic shock?
- Alpha 1
  - Alpha 2
  - Beta 1
  - Beta 2
76. How can you help improve venous return in a patient on positive pressure ventilation?
- If the patient has decreased intravascular volume, a fluid bolus will help
  - Higher levels of positive end expiratory pressure (PEEP)
  - Increase the volume/pressure breath (depends on the mode)
  - Trial of bronchodilators to decrease afterload
77. What is the injury from over distension of the alveoli from excessive tidal volume?
- Barotrauma
  - Volumtrauma
  - Atelectotrauma
  - Biotrauma
  - Oxygen toxicity
78. In which situation would phenylephrine be harmful to the patient?
- Adult Septic Shock
  - Pediatric Septic Shock
  - Hemorrhagic shock



- d. Cardiogenic shock
79. What is the injury from repetitively opening and closing lung units (a type of sheering stress to the lung) called?
- a. Barotrauma
  - b. Volumtrauma
  - c. Atelectotrauma
  - d. Biotrauma
  - e. Oxygen toxicity
80. Which is not a cause of increased peak inspiratory pressure (PIP) and low plateau pressure (PPlat)?
- a. Endotracheal tube occlusion
  - b. Mucous plugging
  - c. Pulmonary embolism
  - d. Bronchospasms
81. Is positive pressure good or bad with heart failure? Why?
- a. Bad; increases afterload and decreases cardiac output
  - b. Good; decreases preload and increases cardiac output
  - c. Bad; decreases preload and decreases cardiac output
  - d. Good; decreases the LV afterload and allows more cardiac output
  - e. Depends on the type an etiology of heart failure
82. Which is the lung injury resulting from inflammatory mediators?
- a. Barotrauma
  - b. Volumtrauma
  - c. Atelectotrauma
  - d. Biotrauma
  - e. Oxygen toxicity
83. What is the equation for cardiac output?
- a. Heart rate x Stroke Volume
  - b. (Preload – after load) X contractility
  - c. Stroke volume – peripheral vascular resistance
  - d. LOVT area X LVOT velocity
84. What happens with inadequate PEEP?
- a. Alveoli collapse and develop atelectasis
  - b. Poor compliance
  - c. Inadequate minute ventilation
  - d. Higher oxygen requirements leading to oxygen toxicity
85. What happens with adequate PEEP?
- a. Better driving pressure
  - b. Less pressure is needed to re-expand the alveoli at the end of expiration
  - c. Improved minute ventilation
  - d. Lower oxygen requirements thus decreasing risk of barotrauma
86. What is the difference between the plateau pressure (PPlat) and the positive end expiratory pressure (PEEP)?
- a. Driving pressure
  - b. Static pressure
  - c. Dynamic Pressure
  - d. Compliance
87. At 1 mg dose or greater, what receptor is more activated by epinephrine (alpha or beta) & which is more harmful?
- a. Alpha 1 > Beta 1; Alpha 1
  - b. Alpha 1 > Beta 1; Beta 1
  - c. Alpha 1 < Beta 1; Alpha 1
  - d. Alpha 1 < Beta 1; Beta 1
88. What happens to blood return to the right atrium with positive pressure ventilation?
- a. Positive intrathoracic pressure that causes less resistance and assists in venous return

- b. Negative intrathoracic pressure that causes increased resistance and impedes in adequate venous return
  - c. Positive intrathoracic pressure that causes increased resistance and impedes venous return
  - d. Negative intrathoracic pressure that causes less resistance and assists in venous return
89. What is a static pressure that the alveoli see?
- a. Positive end expiratory pressure (PEEP)
  - b. Driving pressure
  - c. Plateau pressure (PPlat)
  - d. Peak Inspiratory Pressure (PIP)
90. What happens to the pulse pressure in cold shock?
- a. Increases
  - b. Stays the same
  - c. Decreases
  - d. Depends on the cause of cold shock
91. What is one indication that a patient is unable to protect his airway and would benefit from intubation?
- a. Pooling of secretions in the airway
  - b. Frequent lethargy and unable to carry on a conversation
  - c. Poor cough
  - d. Recent stroke
92. What are the components of stroke volume?
- a. Preload, afterload, and heart rate
  - b. Preload, contractility, and systemic vascular resistance
  - c. Preload, afterload and contractility
  - d. Afterload and contractility
93. What is the definition of shock?
- a. Systolic blood pressure < 65 mm Hg
  - b. Lactic acid production due to anaerobic metabolism
  - c. Metabolic supply to tissues does not meet demand
  - d. When you are scared of something
94. What is warm shock?
- a. Decrease in cardiac output
  - b. Increase in systemic vascular resistance leading to bradycardia
  - c. Increase in afterload
  - d. Decrease in stroke volume leading with decreased systemic vascular resistance
95. Which one of the following is not a class of respiratory failure?
- a. Refractory hypoxemia
  - b. Increased work of breathing
  - c. Airway protection
  - d. Mountain sickness
96. When giving a pressure breath, how much volume of gas will be delivered to a patient?
- a. Depends on compliance
  - b. 6-8 ml / kg of ideal body weight
  - c. Depends on the respiratory rate
  - d. Depends on the flow and inspiratory time
97. What should be checked on every patient, as it is easily reversible and can avoid intubation?
- a. Recent use of benzodiazepines
  - b. Cough
  - c. Nothing, just intubate and then evaluate
  - d. Blood glucose
98. How is lactate cleared?
- a. It is metabolized by the brain
  - b. Cleared by kidneys and liver
  - c. It is changed back into pyruvate to go into the Krebs cycle
  - d. Hoffman degradation

99. Cold shock is defined by...?
- Decreased effective intravascular volume
  - Increased systemic vascular resistance
  - Decreased or inadequate stroke volume
  - Vasoconstriction (both venous and arterial)
100. What is the next step if an increase in heart rate is inadequate to maintain cardiac output?
- More increased heart rate
  - Decreased urine output
  - Increase systemic vascular resistance
  - Increased contractility
101. Warm shock is defined by... ?
- Decreased afterload
  - Increased preload
  - Narrow pulse pressure
  - Decreased systemic vascular resistance
102. What are the two pathways that pyruvate can take?
- Krebs cycle or gluconeogenesis
  - Lactate production or glycolysis
  - Krebs cycle or lactate production
  - Lactate production or gluconeogenesis
103. Which one does not cause increased afterload?
- Hypertensive emergency
  - Left Ventricular outflow obstruction
  - Increased vasodilation
  - Aortic stenosis
104. What correlates with systolic blood pressure?
- Cardiac output
  - End diastolic volume
  - Stroke volume
  - Peripheral vascular resistance
105. Which one does not cause a decrease in preload?
- Hemorrhage
  - Myocarditis
  - GI bleed
  - Vasodilation
106. What is the first compensation for a decrease in stroke volume to maintain cardiac output?
- Increase heart rate
  - Increase peripheral vascular resistance
  - Epinephrine
  - Decreased urine output
107. What type of shock is tamponade?
- Cardiogenic
  - Obstructive
  - Hypovolemic
108. What is cold shock?
- Decrease in cardiac output
  - Increased in systemic vascular resistance leading to bradycardia
  - Increase in afterload
  - Decrease in stroke volume leading to increased systemic vascular resistance
109. What is the Glasgow coma score that is a general rule of thumb for intubation?
- Three
  - Less than 10
  - Less than 8
  - Less than 11

110. Which one does not cause a decrease in contractility?
- Aortic stenosis
  - Cardiac ischemia
  - Myocarditis
  - Congenital heart disease
111. What type of distributive shock has bradycardia?
- Septic
  - Obstructive
  - Neurogenic
  - Cardiogenic
112. What are the three types of cold shock?
- Cardiogenic, hypovolemic, obstructive
  - Hypovolemic, septic, neurogenic
  - Cardiogenic, obstructive, neurogenic
  - Hypovolemic, neurogenic, septic
113. Why does shock have increased lactic acid production (besides anaerobic metabolism)?
- Epinephrine activation of beta 2 receptors
  - All of it is from anaerobic metabolism from tissue ischemia
  - Epinephrine activation of alpha 2 receptors
  - Decreased clearance so no increased production
114. What happens to the pulse pressure in warm shock?
- Increases
  - Stays the same
  - Decreases
115. What is another name of warm shock?
- Distributive shock
  - Sepsis
  - Hypovolemic
116. How does vasopressin help a patient with a pulmonary embolism?
- Decrease preload, decrease cardiac afterload
  - Restore mean arterial blood pressure, decrease pulmonary vascular resistance
  - Decrease cardiac afterload, decrease pulmonary vascular resistance
  - Decrease preload, restore mean arterial blood pressure
117. What was the major unwanted effect by epinephrine in the SOAP II trial?
- Tachycardia
  - Ischemia
  - Hyperglycemia
  - Hyperthermia
118. What happens to the right ventricle with positive pressure ventilation?
- Decreased right ventricular afterload
  - Increased right ventricular preload
  - No significant changes to the right ventricle
  - Increased right ventricular afterload
119. What is the dosage of push dose phenylephrine that should be administered to a patient?
- 100-300 mcg every 5-10 minutes
  - 100-200 mcg every 5-10 minutes
  - 80-200 mcg every 2- 4 minutes
  - 150-200 mcg every 2-4 minutes
120. What does inodilator mean?
- increases heart rate and causes arterial vasoconstriction
  - increases cardiac contractility and induces vasoconstriction
  - induces venous vasoconstriction and arterial vasodilation
  - increases cardiac contractility and induces vasodilation
121. Which medications are inodilators?
- Dobutamine, milrinone, dopamine
  - Milrinone, dobutamine, epinephrine

- c. Epinephrine, dopamine, milrinone
  - d. isoproterenol, dobutamine, milrinone
122. What does chronotropic mean?
- a. Increase heart rate
  - b. Increase diastolic filling time
  - c. Increase contractility
  - d. Increase conduction velocity
123. At low doses, what receptor(s) are activated by epinephrine?
- a. Alpha 1
  - b. Beta 1
  - c. Alpha 1 + Beta 1
  - d. Alpha 1 + Beta 2
  - e. Beta 1 + Beta 2
124. Which drug is best with anaphylactic shock?
- a. Vasopressin
  - b. Epinephrine
  - c. Norepinephrine
  - d. Phenylephrine
125. At 5-10 mcg/kg/min, what receptor(s) are primarily activated by dopamine?
- a. Alpha 1
  - b. Beta 1
  - c. Alpha 1 + Beta 1
  - d. Alpha 1 + Beta 2
  - e. Beta 1 + Beta 2
126. What does chronotropic mean?
- a. Increase heart rate
  - b. Increase diastolic filling time
  - c. Increase contractility
  - d. Increase conduction velocity
127. How do you check the plateau pressure (P<sub>Plat</sub>), on a volume mode?
- a. Inspiratory pause
  - b. Expiratory pause
  - c. Same as the peak inspiratory pressure (PIP)
  - d. Ask the respiratory therapist
128. At >10 mcg/kg/min, what receptor(s) are more activated by dopamine?
- a. Alpha 1 = Beta 1
  - b. Alpha 1 > Beta 1
  - c. Alpha 1 < Beta 2
  - d. Beta 1 > Beta 2
  - e. Beta 1 < Beta 2
129. What is the onset of push dose phenylephrine?
- a. 30 seconds
  - b. 2 minutes
  - c. 10 seconds
  - d. 1 minute
130. What is the dosage of push dose epinephrine that should be administered to a patient?
- a. 5-10 mcg every 5-10 minutes
  - b. 15-20 mcg every 5-10 minutes
  - c. 8-20 mcg every 2- 5 minutes
  - d. 10-20 mcg every 2-5 minutes
131. What happens to the left ventricle with positive pressure ventilation?
- a. Increased stroke volume and increased cardiac output
  - b. Decreased stroke volume and decreased cardiac output
  - c. Increased heart rate and increased cardiac output
  - d. Decreased heart rate and decreased cardiac output
132. Where does dobutamine work?

- a. Alpha 1
  - b. Beta 1
  - c. Alpha 1 + Beta 1
  - d. Alpha 1 + Beta 2
  - e. Beta 1 + Beta 2
133. When giving a volume breath, what is the relationship between compliance and pressure?
- a. Higher the pressure, higher the compliance needed
  - b. Lower the compliance, higher the pressure needed
  - c. Lower the pressure, lower the compliance needed
  - d. Higher the compliance, higher the pressure needed
134. What is lusitropy?
- a. Increased ventricular filling
  - b. Contraction of the ventricles
  - c. Increased heart rate
  - d. Diastolic relaxation
135. Are arrhythmias common with milrinone?
- a. Yes
  - b. No
136. What is synchronized intermittent mandatory ventilation (SIMV)?
- a. A combination of a controlled/assisted breathing with a spontaneous breath
  - b. A way for the ventilator to assist/ augment the efforts of the patient
  - c. A controlled form of ventilation where the ventilator controls the rate and the amount of gas
  - d. A combination of controlled and assisted breath
137. Why is milrinone good in obstructive shock?
- a. Decrease preload
  - b. Decreased pulmonary vascular resistance
  - c. Bronchodilator
  - d. Decreased afterload
138. In which mode of ventilation will a pre-set pressure deliver gas to the patient?
- a. Volume breath
  - b. Pressure Breath
  - c. Both
  - d. Neither
139. What receptor(s) are activated by norepinephrine?
- a. Alpha 1
  - b. Beta 1
  - c. Alpha 1 + Beta 1
  - d. Alpha 1 + Beta 2
  - e. Beta 1 + Beta 2
140. What does it mean when there is increased peak inspiratory pressure (PIP) and increased plateau pressure (PPlat)?
- a. High resistance in the circuit or patient
  - b. Poor pulmonary perfusion
  - c. Need to change the ventilator mode
  - d. Decreased compliance
141. What does inopressor mean?
- a. increases heart rate and causes arterial vasoconstriction
  - b. increases cardiac contractility and induces vasoconstriction
  - c. induces venous vasoconstriction and arterial vasodilation
  - d. increases cardiac contractility and induces vasodilation
142. What receptor causes free water reabsorption in the kidney?
- a. V1
  - b. V2
  - c. V1 and V2

143. Which of the following is not a type of breath that can be delivered by a ventilator?
- Controlled
  - Assisted
  - Manuel
  - Spontaneous
144. What are the two types of breath delivery?
- FiO<sub>2</sub>, PEEP
  - Volume, pressure
  - Flow, volume
  - Respiratory rate and tidal volume
145. Describe the type of breath when the patient starts the process (aka triggers a breath), but the ventilator takes over.
- Controlled
  - Assisted
  - Manuel
  - Supported
146. With what type of breath does the patient do most/all of the work, and the ventilator gives only minimal assistance, if needed?
- Controlled
  - Assisted
  - Manuel
  - Supported
147. What is controlled mandatory ventilation (CMV)?
- A combination of a controlled/assisted breathing with a spontaneous breath
  - A way for the ventilator to assist/ augment the efforts of the patient
  - A controlled form of ventilation where the ventilator controls the rate and the amount of gas
  - A combination of controlled and assisted breath
148. What is pressure support?
- A combination of a controlled/assisted breathing with a spontaneous breath
  - A way for the ventilator to assist/ augment the efforts of the patient
  - A controlled form of ventilation where the ventilator controls the rate and the amount of gas
  - A combination of controlled and assisted breath
149. How does increasing the inspiratory time lead to improved oxygenation?
- It increases mean airway pressure
  - It decreases expiration time
  - It improves PEEP
  - It increases the tidal volume
150. What is assist controlled ventilation (ACV)?
- A combination of a controlled/assisted breathing with a spontaneous breath
  - A way for the ventilator to assist/ augment the efforts of the patient
  - A controlled form of ventilation where the ventilator controls the rate and the amount of gas
  - A combination of controlled and assisted breath
151. When giving a volume breath, at what pressure will the gas be delivered?
- Depends on compliance
  - 6-8 ml / kg of ideal body weight
  - Depends on the respiratory rate
  - Depends on the flow and inspiratory time
152. When giving a pressure breath, what is the relationship between compliance and volume?
- Lower compliance, the less volume delivered
  - Lower compliance, the more volume delivered
  - Higher volume, the higher the compliance needed
  - Lower volume, the higher the compliance needed

153. Which is a dynamic pressure needed to fully inflate the lungs and overcome the resistive forces and elastic forces of the lungs?
- Peak Inspiratory Pressure (PIP)
  - Positive end expiratory pressure (PEEP)
  - Plateau pressure (PPlat)
  - End Expiratory Pressure
154. What is the normal peak inspiratory pressure (PIP)?
- Variable depending on body habitus
  - >20 cm of water pressure
  - <10 cm of water pressure
  - <20 cm of water pressure
155. What is meant by a static pressure vs dynamic pressure?
- Dynamic is seen during an inspiratory hold, whereas static is the same as the Peak inspiratory pressure (PIP)
  - Static has no air movement, dynamic pressure has air movement
  - Same thing: static pressure is used with volume mode and dynamic pressure with pressure mode
  - Same thing: static pressure is used with pressure mode and dynamic pressure with volume mode
156. What is the main disadvantage of a pressure delivered breath?
- Not as well known to clinicians
  - No control over minute ventilation
  - Constantly pay attention to pressures to make sure adequate tidal volume
  - All of the above
157. What should you consider before giving flumazenil for a benzodiazepine overdose?
- A higher dose is going to be needed if the patient is chronically on benzodiazepines
  - Consider a drip due to the short half-life of flumazenil
  - Add naloxone because of the likely use of opiates also
  - Avoid if patient is on chronic benzodiazepines as they can go into withdrawal
158. Which is not a cause of increased peak inspiratory pressure (PIP) and increased plateau pressure (PPlat)?
- Pulmonary edema
  - Bronchospasms
  - Pneumothorax
  - Abdominal compartment syndrome
  - ARDS
159. Which receptor causes increased chronotropy and inotropy?
- Alpha 1
  - Alpha 2
  - Beta 1
  - Beta 2
  - D1
160. What happens as compliance decreases in a volume breath?
- Less oxygen delivery and hypoxia
  - Higher peak inspiratory pressures (PIP) leading to barotrauma
  - Higher FiO<sub>2</sub> and oxygen toxicity
  - Decrease in the minute ventilation leading to decreased PEEP and atelectasis
161. What is the normal flow pattern of a volume breath?
- Constant
  - Accelerating
  - Decelerating
  - Variable
162. How is the peak inspiratory pressure (PIP) and the mean airway pressure of a pressure breath in comparison to a volume breath?
- ↑ peak airway pressure + ↓ mean airway pressure
  - ↑ peak airway pressure + ↑ mean airway pressure



- c. ↓ peak airway pressure + ↑ mean airway pressure
  - d. ↓ peak airway pressure + ↓ mean airway pressure
163. What is meant by shunt physiology?
- a. Inadequate ventilation with adequate perfusion
  - b. Inadequate ventilation with inadequate perfusion
  - c. Adequate ventilation with inadequate perfusion
  - d. Adequate ventilation with adequate perfusion

## Questions and Answers

1. Why is the initial blood pressure goal >65 mm Hg?
  - a. Because it is a nice round number
  - b. Dogs overall did better in a study
  - c. A large study showed that patients had significant renal and myocardial injury when higher than 65 mm Hg
  - d. A large study showed that it is more harmful to the kidney and cardiac muscle when higher than 70 mm Hg
2. Which receptor causes smooth muscle vasoconstriction?
  - a. Alpha 1
  - b. Alpha 2
  - c. Beta 1
  - d. Beta 2
  - e. D1
3. Why is tachycardia and diaphoresis dangerous in the setting of increased work of breathing?
  - a. Likely to have a metabolic acidosis
  - b. Not really concerning
  - c. High concern for drug withdrawal
  - d. High catecholamine surge
4. Which type of tachypnea is more worrisome?
  - a. Rapid and shallow
  - b. Rapid and deep
5. Is exhalation an active or passive process?
  - a. Active
  - b. Passive
6. Which medications are inopressors?
  - a. Phenylephrine, vasopressin
  - b. Norepinephrine, dobutamine, epinephrine
  - c. Epinephrine, dopamine
  - d. Norepinephrine, epinephrine, dopamine
7. Which mode of ventilation allows more control over the minute ventilation?
  - a. Volume breath
  - b. Pressure breath
8. Can you use dobutamine as a first line agent in septic shock?
  - a. Yes
  - b. No
9. What is the calculation of oxygen delivery?
  - a. Heart rate x stroke volume x (1/ hematocrit)
  - b.  $[(1.32 \times \text{hemoglobin} \times \text{SaO}_2) \times \text{cardiac output}] + (0.003 \times \text{PaO}_2)$
  - c.  $[\text{cardiac output} \times (1/ \text{hematocrit}) \times (\text{SVR})] - (0.003 \times \text{PaO}_2)$
  - d.  $[(1.5 \times \text{hemoglobin} \times \text{SaO}_2) \times \text{heart rate} \times (\text{PVR}-\text{SVR})] + (0.03 \times \text{PaO}_2)$
10. Which is better for cardiogenic shock: norepinephrine vs dopamine?
  - a. Norepinephrine
  - b. Dopamine
11. Which drug is best in pediatric septic shock?
  - a. Vasopressin
  - b. Epinephrine
  - c. Norepinephrine
  - d. Phenylephrine
12. Which medications are pure vasopressors?
  - a. Phenylephrine, vasopressin
  - b. Norepinephrine, vasopressin, epinephrine
  - c. Epinephrine, phenylephrine
  - d. Norepinephrine, and epinephrine

13. What does inotropic mean?
  - a. Increase heart rate
  - b. Increase diastolic filling time
  - c. Increase contractility
  - d. Increase conduction velocity
14. Vasopressin works on which receptors?
  - a. V1 only
  - b. V1 at low doses and then  $V2 > V1$  at high doses
  - c. V2 at low doses and then  $V1 > V2$  at high doses
  - d. V1 and V2
  - e. V2 only
15. Can someone fake being diaphoretic?
  - a. Yes
  - b. No
16. What type of breath requires no work by the patient, as the frequency/rate of the breath and the amount of gas delivered is fully dependent on the ventilator?
  - a. Controlled
  - b. Assisted
  - c. Manual
  - d. Supported
17. Activation of this receptor is important in septic and obstructive shock by norepinephrine due to increased \_\_\_\_\_?
  - a. Alpha 1 – vasoconstriction
  - b. Beta 1- increased inotropy
  - c. Beta 2- bronchodilation
  - d. Alpha 2- vasodilation
18. What are signs of poor perfusion?
  - a. Mental status change, increase in heart rate, increase in lactic acid, decrease in urine output, increased capillary refill time
  - b. Mental status change, increase in lactic acid, increase in urine output, decreased capillary refill time, hemoconcentration
  - c. Decrease in urine output, decreased capillary refill time, mottled extremities
  - d. Mottled extremities increase in heart rate, increase in lactic acid, decrease in urine output, increased capillary refill time
19. Which receptor causes bronchodilation?
  - a. Alpha 1
  - b. Alpha 2
  - c. Beta 1
  - d. Beta 2
  - e. D1
20. What is the underlying problem with shunt physiology?
  - a. Something in the alveoli that prevents adequate gas exchange
  - b. Something in the alveoli that prevents them from expanding
  - c. Poor perfusion of the alveoli
  - d. Fatigue from poor compliance
21. What is vasopressin?
  - a. A catecholamine
  - b. A combination of a catecholamine and hormone
  - c. A hormone
22. Which pressor is more known to be the most arrhythmogenic?
  - a. Dopamine
  - b. Epinephrine
  - c. Norepinephrine
  - d. Phenylephrine
  - e. Dobutamine
23. What is the main goal in treating septic shock?

- a. To get the MAP greater than 65 mm Hg
  - b. To perfuse the brain, and cardiac muscle
  - c. To allow / facilitate with antibiotic circulation
  - d. To have a balance between perfusing organs and cellular death
24. What happens to the intrathoracic pressure/volume when you exhale?
- a. ↑ intra-thoracic pressure: ↑intra-thoracic volume
  - b. ↑ intra-thoracic pressure: ↓intra-thoracic volume
  - c. ↓ intra-thoracic pressure: ↑intra-thoracic volume
  - d. ↓ intra-thoracic pressure: ↓intra-thoracic volume
25. Activation of this/these receptor(s) by norepinephrine can cause arrhythmias?
- a. Alpha 1
  - b. Beta 1
  - c. Alpha 1 + Beta 1
  - d. Alpha 1 + Beta 2
  - e. Beta 1 + Beta 2
26. What happens to the ratio of carbon dioxide to oxygen when a patient is apneic?
- a. ↑ Carbon dioxide: ↑Oxygen
  - b. ↑ Carbon dioxide: ↓ Oxygen
  - c. ↓ Carbon dioxide: ↑ Oxygen
  - d. ↓ Carbon dioxide: ↓ Oxygen
27. Why does positive pressure ventilation help with shunt physiology?
- a. Greater oxygen delivery
  - b. Better carbon dioxide removal
  - c. Increase surface area for gas exchange
  - d. Helps with patient fatigue
28. What is the normal I:E ratio?
- a. Inspiration is longer than expiration
  - b. Expiration is longer than inspiration
  - c. Inspiration and expiration are equal
29. What correlates with diastolic blood pressure?
- a. Cardiac output
  - b. End diastolic volume
  - c. Stroke volume
  - d. Peripheral vascular resistance
30. What percentage of alveoli are involved in shunt physiology to have refractory hypoxia?
- a. >30%
  - b. >40%
  - c. >50%
  - d. >55%
31. Which is not a class of increased work of breathing causing respiratory distress?
- a. Opiate overdose
  - b. Bronchospasms
  - c. Increased metabolic demands
  - d. Worsening compliance
32. Why is phenylephrine harmful in right heart failure?
- a. Increased pulmonary vascular resistance
  - b. Increased cardiac preload due to venous vasoconstriction
  - c. Reflex bradycardia
  - d. All of the above
  - e. None of the above
33. What is the duration of push dose epinephrine?
- a. 5-10 minutes
  - b. <30 seconds
  - c. 10-20 minutes
  - d. 1-2 minute
34. Why is lactate produced during shock?

- a. Purely due to anaerobic metabolism of pyruvate to lactate from cell hypoxia
  - b. Combination of anaerobic metabolism and epinephrine cause glycolysis
  - c. Krebs cycle malfunction due to ischemia
  - d. Mitochondrial increased demand from glycogen to glucose and glycolysis from beta 2 stimulation
35. Which medication is a phosphodiesterase 3 inhibitor?
- a. Dobutamine
  - b. Norepinephrine
  - c. Milrinone
  - d. Selepressin
36. Are arrhythmias common with milrinone?
- a. Yes
  - b. No
37. How do you check the plateau pressure (PPlat), on a pressure mode?
- a. Inspiratory pause
  - b. Expiratory pause
  - c. Same as the peak inspiratory pressure (PIP)
  - d. Ask the respiratory therapist
38. In which mode of ventilation is a pre-set amount of gas delivered to the patient?
- a. Volume breath
  - b. Pressure Breath
  - c. Both
  - d. Neither
39. What receptor(s) are activated by phenylephrine?
- a. Alpha 1
  - b. Beta 1
  - c. Alpha 1 + Beta 1
  - d. Alpha 1 + Beta 2
  - e. Beta 1 + Beta 2
40. In severe metabolic acidosis, why are the patients breathing rapidly?
- a. To stay awake
  - b. Increased metabolic supply
  - c. To overcome shunt physiology
  - d. To get rid of CO<sub>2</sub>
41. Which drug is a hormone?
- a. Milrinone
  - b. Dobutamine
  - c. Norepinephrine
  - d. Vasopressin
42. What does it mean when there is increased peak inspiratory pressure (PIP) and low plateau pressure (PPlat)?
- a. High resistance in the circuit or patient
  - b. Decreased compliance
  - c. Poor pulmonary perfusion
  - d. Need to change the ventilator mode
43. How does vasopressin cause vasodilation?
- a. Inhibits nitric oxide production
  - b. Activates beta 2
  - c. Inhibits alpha 1
  - d. Activates alpha 1
44. What is the reversal agent for benzodiazepine overdose?
- a. Naloxone
  - b. Flumazenil
  - c. Naltrexone
  - d. Disulfiram
45. What does inopressor mean?

- a. increases heart rate and causes arterial vasoconstriction
  - b. increases cardiac contractility and induces vasoconstriction**
  - c. induces venous vasoconstriction and arterial vasodilation
  - d. increases cardiac contractility and induces vasodilation
46. What is a feature of vasopressin?
- a. Increases sensitivity to catecholamines**
  - b. Increases sensitivity to endogenous vasopressin
  - c. Doesn't work very much on V2 receptors in the kidney during shock
  - d. Tolerated better than norepinephrine in liver patients
47. Which of the following is not the main goal of mechanical ventilation in the ICU?
- a. Optimize patient comfort
  - b. Optimize exchange of carbon dioxide and oxygen
  - c. Get them through surgery with less discomfort**
  - d. Decrease work of breathing
48. What are ways to maximize patient comfort on the ventilator?
- a. Optimize ventilation settings
  - b. Sedation
  - c. Paralytics
  - d. All of the above**
49. What is the optimal type of breath?
- a. Spontaneous**
  - b. Controlled
  - c. Assisted
  - d. None of the above
50. Will all patients have perfect carbon dioxide and oxygen levels?
- a. Yes
  - b. No**
51. What should the carbon dioxide goal be with traumatic brain injury?
- a. High to allow increased cerebral blood flow
  - b. High to prevent increased cerebral blood flow
  - c. Normal to prevent increased cerebral blood flow**
  - d. Normal to allow increased cerebral blood flow
52. Which of the following is not a toxicity with mechanical intubation?
- a. Hypercarbia**
  - b. Barotrauma
  - c. Volutrauma
  - d. Atelactotrauma
  - e. Oxygen toxicity
53. What percent of oxygen can lead to oxygen toxicity (even if only a short period of time)?
- a. >50 %
  - b. >60%**
  - c. >70%
  - d. >80%
54. What is the volume of gas in the lungs at the end of expiration, but prior to inhalation?
- a. Inspiratory Capacity
  - b. Expiratory Capacity
  - c. Vital Capacity
  - d. Tidal Volume
  - e. Functional Residual Capacity**
55. Is inhalation an active or passive process?
- a. Active**
  - b. Passive
56. What the flow pattern of a pressure delivered breath?
- a. Constant
  - b. Accelerating
  - c. Decelerating**

- d. Variable
- 57. What is the reversal agent for opiate overdose?
  - a. Naloxone
  - b. Flumazenil
  - c. Naltrexone
  - d. Disulfiram
- 58. What happens to the intrathoracic pressure/ volume when you inhale?
  - a. ↑ intra-thoracic pressure: ↑intra-thoracic volume
  - b. ↑ intra-thoracic pressure: ↓intra-thoracic volume
  - c. ↓ intra-thoracic pressure: ↑intra-thoracic volume
  - d. ↓ intra-thoracic pressure: ↓intra-thoracic volume
- 59. When does exhalation become an active process?
  - a. With restrictive lung disease
  - b. After you run a mile
  - c. With obstructive lung disease
- 60. Mechanical ventilation works by \_\_\_\_\_?
  - a. Positive pressure- pushing air into the lungs
  - b. Negative pressure- pulling out the chest wall
- 61. Which of the following is not a way to improve oxygenation?
  - a. FiO<sub>2</sub>
  - b. PEEP
  - c. Inspiratory time
  - d. Respiratory rate
- 62. What is mean airway pressure?
  - a. Average pressure that alveoli are exposed to during inspiration
  - b. Average pressure that the lungs are exposed to during expiration
  - c. Average pressure the lung is exposed to during mechanical ventilation
- 63. Which is the lung injury due to oxygen production of free radicals?
  - a. Barotrauma
  - b. Volumtrauma
  - c. Atelectotrauma
  - d. Biotrauma
  - e. Oxygen toxicity
- 64. What happens if you intubate a patient with RV failure?
  - a. Nothing with rapid sequence intubation technique
  - b. Improved pre-load to the RV
  - c. RV collapse and cardiac arrest
  - d. Increased ejection fraction of the right ventricle
- 65. What happens to blood return with spontaneous breathing?
  - a. Positive intrathoracic pressure that causes less resistance and assists in venous return
  - b. Negative intrathoracic pressure that causes increased resistance and impedes in adequate venous return
  - c. Positive intrathoracic pressure that causes increased resistance and impedes venous return
  - d. Negative intrathoracic pressure that causes less resistance and assists in venous return
- 66. What is removal of carbon dioxide from the body called?
  - a. Hypercarbia
  - b. Hypocarbia
  - c. Ventilation
  - d. Tidal Volume
- 67. What is the equation for minute ventilation?
  - a. Respiratory Rate X PEEP
  - b. Respiratory Rate X Tidal Volume
  - c. Tidal Volume X Expiratory Time
  - d. Expiratory Time X Respiratory Rate
- 68. What is dead space ventilation?

- a. Carbon dioxide in the unventilated alveoli
  - b. Carbon dioxide delivered to the patient if the patient isn't on 100% oxygen
  - c. Carbon dioxide that is unable to diffuse out of the capillaries
  - d. Carbon dioxide still in the airway at expiration
69. How does increasing the tidal volume allow more CO<sub>2</sub> removal?
- a. Allows more surface area for the transfer of CO<sub>2</sub>
  - b. Increases the mean airway pressure
  - c. Allows the alveoli to remain open longer for gas exchange
  - d. Improves compliance
70. Since tidal volume is limited, what else can we adjust to improve minute ventilation?
- a. Inspiratory time
  - b. FiO<sub>2</sub>
  - c. Respiratory Rate
  - d. Expiratory time
71. Why is rapid and shallow breathing worse?
- a. Low CO<sub>2</sub>
  - b. Easily tired
  - c. Low tidal volumes
72. Why do patients with obstructive lung disease need a shorter respiratory rate?
- a. Gives the patients time to rest
  - b. Shorter respiratory rate allows a longer expiratory time as they have trouble with air removal
  - c. Shorter respiratory rate allows for less positive end expiratory pressure
  - d. Shorter respiratory rate allows for longer inspiratory time to improve oxygenation
73. What does it mean when there is an increase in FiO<sub>2</sub> without an increase in PaO<sub>2</sub>?
- a. Inadequate amount of oxygen
  - b. Mostly mouth breathing
  - c. Need to change from NC to non-rebreather
  - d. No gas exchange due to shunt physiology
74. What is the injury to the alveoli caused by excessive pressure from the ventilator called?
- a. Barotrauma
  - b. Volumtrauma
  - c. Atelectotrauma
  - d. Biotrauma
  - e. Oxygen toxicity
75. Where do you mainly want dobutamine to work in cardiogenic shock?
- a. Alpha 1
  - b. Alpha 2
  - c. Beta 1
  - d. Beta 2
76. How can you help improve venous return in a patient on positive pressure ventilation?
- a. If the patient has decreased intravascular volume, a fluid bolus will help
  - b. Higher levels of positive end expiratory pressure (PEEP)
  - c. Increase the volume/pressure breath (depends on the mode)
  - d. Trial of bronchodilators to decrease afterload
77. What is the injury from over distension of the alveoli from excessive tidal volume?
- a. Barotrauma
  - b. Volumtrauma
  - c. Atelectotrauma
  - d. Biotrauma
  - e. Oxygen toxicity
78. In which situation would phenylephrine be harmful to the patient?
- a. Adult septic shock
  - b. Pediatric septic shock
  - c. Hemorrhagic shock
  - d. Cardiogenic shock



79. What is the injury from repetitively opening and closing lung units (a type of sheering stress to the lung) called?
- Barotrauma
  - Volumtrauma
  - Atelectotrauma**
  - Biotrauma
  - Oxygen toxicity
80. Which is not a cause of increased peak inspiratory pressure (PIP) and low plateau pressure (PPlat)?
- Endotracheal tube occlusion
  - Mucous plugging
  - Pulmonary embolism**
  - Bronchospasms
81. Is positive pressure good or bad with heart failure? Why?
- Bad; increases afterload and decreases cardiac output
  - Good; decreases preload and increases cardiac output
  - Bad; decreases preload and decreases cardiac output
  - Good; decreases the LV afterload and allows more cardiac output**
  - Depends on the type an etiology of heart failure
82. Which is the lung injury resulting from inflammatory mediators?
- Barotrauma
  - Volumtrauma
  - Atelectotrauma
  - Biotrauma**
  - Oxygen toxicity
83. What is the equation for cardiac output?
- Heart rate x Stroke Volume**
  - (Preload – after load) X contractility
  - Stroke volume – peripheral vascular resistance
  - LOVT area X LVOT velocity
84. What happens with inadequate PEEP?
- Alveoli collapse and develop atelectasis**
  - Poor compliance
  - Inadequate minute ventilation
  - Higher oxygen requirements leading to oxygen toxicity
85. What happens with adequate PEEP?
- Better driving pressure
  - Less pressure is needed to re-expand the alveoli at the end of expiration**
  - Improved minute ventilation
  - Lower oxygen requirements thus decreasing risk of barotrauma
86. What is the difference between the plateau pressure (PPlat) and the positive end expiratory pressure (PEEP)?
- Driving pressure**
  - Static pressure
  - Dynamic Pressure
  - Compliance
87. At 1 mg dose or greater, what receptor is more activated by epinephrine (alpha or beta) & which is more harmful?
- Alpha 1 > Beta 1; Alpha 1
  - Alpha 1 > Beta 1; Beta 1**
  - Alpha 1 < Beta 1; Alpha 1
  - Alpha 1 < Beta 1; Beta 1
88. What happens to blood return to the right atrium with positive pressure ventilation?
- Positive intrathoracic pressure that causes less resistance and assists in venous return
  - Negative intrathoracic pressure that causes increased resistance and impedes in adequate venous return

- c. Positive intrathoracic pressure that causes increased resistance and impedes venous return
  - d. Negative intrathoracic pressure that causes less resistance and assists in venous return
89. What is a static pressure that the alveoli see?
- a. Positive end expiratory pressure (PEEP)
  - b. Driving pressure
  - c. Plateau pressure (P<sub>Plat</sub>)
  - d. Peak Inspiratory Pressure (PIP)
90. What happens to the pulse pressure in cold shock?
- a. Increases
  - b. Stays the same
  - c. Decreases
  - d. Depends on the cause of cold shock
91. What is one indication that a patient is unable to protect his airway and would benefit from intubation?
- a. Pooling of secretions in the airway
  - b. Frequent lethargy and unable to carry on a conversation
  - c. Poor cough
  - d. Recent stroke
92. What are the components of stroke volume?
- a. Preload, afterload, and heart rate
  - b. Preload, contractility, and systemic vascular resistance
  - c. Preload, afterload and contractility
  - d. Afterload and contractility
93. What is the definition of shock?
- a. Systolic blood pressure < 65 mm Hg
  - b. Lactic acid production due to anaerobic metabolism
  - c. Metabolic supply to tissues does not meet demand
  - d. When you are scared of something
94. What is warm shock?
- a. Decrease in cardiac output
  - b. Increase in systemic vascular resistance leading to bradycardia
  - c. Increase in afterload
  - d. Decrease in stroke volume leading with decreased systemic vascular resistance
95. Which one of the following is not a class of respiratory failure?
- a. Refractory hypoxemia
  - b. Increased work of breathing
  - c. Airway protection
  - d. Mountain sickness
96. When giving a pressure breath, how much volume of gas will be delivered to a patient?
- a. Depends on compliance
  - b. 6-8 ml / kg of ideal body weight
  - c. Depends on the respiratory rate
  - d. Depends on the flow and inspiratory time
97. What should be checked on every patient, as it is easily reversible and can avoid intubation?
- a. Recent use of benzodiazepines
  - b. Cough
  - c. Nothing, just intubate and then evaluate
  - d. Blood glucose
98. How is lactate cleared?
- a. It is metabolized by the brain
  - b. Cleared by kidneys and liver
  - c. It is changed back into pyruvate to go into the Krebs cycle
  - d. Hoffman degradation
99. Cold shock is defined by...?
- a. Decreased effective intravascular volume

- b. Increased systemic vascular resistance
  - c. Decreased or inadequate stroke volume
  - d. Vasoconstriction (both venous and arterial)
100. What is the next step if an increase in heart rate is inadequate to maintain cardiac output?
- a. More increased heart rate
  - b. Decreased urine output
  - c. Increase systemic vascular resistance
  - d. Increased contractility
101. Warm shock is defined by... ?
- a. Decreased afterload
  - b. Increased preload
  - c. Narrow pulse pressure
  - d. Decreased systemic vascular resistance
102. What are the two pathways that pyruvate can take?
- a. Krebs cycle or gluconeogenesis
  - b. Lactate production or glycolysis
  - c. Krebs cycle or lactate production
  - d. Lactate production or gluconeogenesis
103. Which one does not cause increased afterload?
- a. Hypertensive emergency
  - b. Left Ventricular outflow obstruction
  - c. Increased vasodilation
  - d. Aortic stenosis
104. What correlates with systolic blood pressure?
- a. Cardiac output
  - b. End diastolic volume
  - c. Stroke volume
  - d. Peripheral vascular resistance
105. Which one does not cause a decrease in preload?
- a. Hemorrhage
  - b. Myocarditis
  - c. GI bleed
  - d. Vasodilation
106. What is the first compensation for a decrease in stroke volume to maintain cardiac output?
- a. Increase heart rate
  - b. Increase peripheral vascular resistance
  - c. Epinephrine
  - d. Decreased urine output
107. What type of shock is tamponade?
- a. Cardiogenic
  - b. Obstructive
  - c. Hypovolemic
108. What is cold shock?
- a. Decrease in cardiac output
  - b. Increased in systemic vascular resistance leading to bradycardia
  - c. Increase in afterload
  - d. Decrease in stroke volume leading to increased systemic vascular resistance
109. What is the Glasgow coma score that is a general rule of thumb for intubation?
- a. Three
  - b. Less than 10
  - c. Less than 8
  - d. Less than 11
110. Which one does not cause a decrease in contractility?
- a. Aortic stenosis

- b. Cardiac ischemia
  - c. Myocarditis
  - d. Congenital heart disease
111. What type of distributive shock has bradycardia?
- a. Septic
  - b. Obstructive
  - c. Neurogenic
  - d. Cardiogenic
112. What are the three types of cold shock?
- a. Cardiogenic, hypovolemic, obstructive
  - b. Hypovolemic, septic, neurogenic
  - c. Cardiogenic, obstructive, neurogenic
  - d. Hypovolemic, neurogenic, septic
113. Why does shock have increased lactic acid production (besides anaerobic metabolism)?
- a. Epinephrine activation of beta 2 receptors
  - b. All of it is from anaerobic metabolism from tissue ischemia
  - c. Epinephrine activation of alpha 2 receptors
  - d. Decreased clearance so no increased production
114. What happens to the pulse pressure in warm shock?
- a. Increases
  - b. Stays the same
  - c. Decreases
115. What is another name of warm shock?
- a. Distributive shock
  - b. Sepsis
  - c. Hypovolemic
116. How does vasopressin help a patient with a pulmonary embolism?
- a. Decrease preload, decrease cardiac afterload
  - b. Restore mean arterial blood pressure, decrease pulmonary vascular resistance
  - c. Decrease cardiac afterload, decrease pulmonary vascular resistance
  - d. Decrease preload, restore mean arterial blood pressure
117. What was the major unwanted effect by epinephrine in the SOAP II trial?
- a. Tachycardia
  - b. Ischemia
  - c. Hyperglycemia
  - d. Hyperthermia
118. What happens to the right ventricle with positive pressure ventilation?
- a. Decreased right ventricular afterload
  - b. Increased right ventricular preload
  - c. No significant changes to the right ventricle
  - d. Increased right ventricular afterload
119. What is the dosage of push dose phenylephrine that should be administered to a patient?
- a. 100-300 mcg every 5-10 minutes
  - b. 100-200 mcg every 5-10 minutes
  - c. 80-200 mcg every 2- 4 minutes
  - d. 150-200 mcg every 2-4 minutes
120. What does inodilator mean?
- a. increases heart rate and causes arterial vasoconstriction
  - b. increases cardiac contractility and induces vasoconstriction
  - c. induces venous vasoconstriction and arterial vasodilation
  - d. increases cardiac contractility and induces vasodilation
121. Which medications are inodilators?
- a. Dobutamine, milrinone, dopamine
  - b. Milrinone, dobutamine, epinephrine
  - c. Epinephrine, dopamine, milrinone
  - d. isoproterenol, dobutamine, milrinone

122. What does chronotropic mean?
- Increase heart rate**
  - Increase diastolic filling time
  - Increase contractility
  - Increase conduction velocity
123. At low doses, what receptor(s) are activated by epinephrine?
- Alpha 1
  - Beta 1**
  - Alpha 1 + Beta 1
  - Alpha 1 + Beta 2
  - Beta 1 + Beta 2
124. Which drug is best with anaphylactic shock?
- Vasopressin
  - Epinephrine**
  - Norepinephrine
  - Phenylephrine
125. At 5-10 mcg/kg/min, what receptor(s) are primarily activated by dopamine?
- Alpha 1
  - Beta 1**
  - Alpha 1 + Beta 1
  - Alpha 1 + Beta 2
  - Beta 1 + Beta 2
126. What does chronotropic mean?
- Increase heart rate**
  - Increase diastolic filling time
  - Increase contractility
  - Increase conduction velocity
127. How do you check the plateau pressure (PPlat), on a volume mode?
- Inspiratory pause**
  - Expiratory pause
  - Same as the peak inspiratory pressure (PIP)
  - Ask the respiratory therapist
128. At >10 mcg/kg/min, what receptor(s) are more activated by dopamine?
- Alpha 1 = Beta 1
  - Alpha 1 > Beta 1**
  - Alpha 1 < Beta 2
  - Beta 1 > Beta 2
  - Beta 1 < Beta 2
129. What is the onset of push dose phenylephrine?
- 30 seconds
  - 2 minutes
  - 10 seconds
  - 1 minute**
130. What is the dosage of push dose epinephrine that should be administered to a patient?
- 5-10 mcg every 5-10 minutes
  - 15-20 mcg every 5-10 minutes
  - 8-20 mcg every 2- 5 minutes
  - 10-20 mcg every 2-5 minutes**
131. What happens to the left ventricle with positive pressure ventilation?
- Increased stroke volume and increased cardiac output**
  - Decreased stroke volume and decreased cardiac output
  - Increased heart rate and increased cardiac output
  - Decreased heart rate and decreased cardiac output
132. Where does dobutamine work?
- Alpha 1
  - Beta 1

- c. Alpha 1 + Beta 1
  - d. Alpha 1 + Beta 2
  - e. **Beta 1 + Beta 2**
133. When giving a volume breath, what is the relationship between compliance and pressure?
- a. Higher the pressure, higher the compliance needed
  - b. **Lower the compliance, higher the pressure needed**
  - c. Lower the pressure, lower the compliance needed
  - d. Higher the compliance, higher the pressure needed
134. What is lusitropy?
- a. Increased ventricular filling
  - b. Contraction of the ventricles
  - c. Increased heart rate
  - d. **Diastolic relaxation**
135. Are arrhythmias common with milrinone?
- a. Yes
  - b. **No**
136. What is synchronized intermittent mandatory ventilation (SIMV)?
- a. **A combination of a controlled/assisted breathing with a spontaneous breath**
  - b. A way for the ventilator to assist/ augment the efforts of the patient
  - c. A controlled form of ventilation where the ventilator controls the rate and the amount of gas
  - d. A combination of controlled and assisted breath
137. Why is milrinone good in obstructive shock?
- a. Decrease preload
  - b. **Decreased pulmonary vascular resistance**
  - c. Bronchodilator
  - d. Decreased afterload
138. In which mode of ventilation will a pre-set pressure deliver gas to the patient?
- a. Volume breath
  - b. **Pressure Breath**
  - c. Both
  - d. Neither
139. What receptor(s) are activated by norepinephrine?
- a. Alpha 1
  - b. Beta 1
  - c. **Alpha 1 + Beta 1**
  - d. Alpha 1 + Beta 2
  - e. Beta 1 + Beta 2
140. What does it mean when there is increased peak inspiratory pressure (PIP) and increased plateau pressure (PPlat)?
- a. High resistance in the circuit or patient
  - b. Poor pulmonary perfusion
  - c. Need to change the ventilator mode
  - d. **Decreased compliance**
141. What does inopressor mean?
- a. increases heart rate and causes arterial vasoconstriction
  - b. **increases cardiac contractility and induces vasoconstriction**
  - c. induces venous vasoconstriction and arterial vasodilation
  - d. increases cardiac contractility and induces vasodilation
142. What receptor causes free water reabsorption in the kidney?
- a. V1
  - b. **V2**
  - c. V1 and V2
143. Which of the following is not a type of breath that can be delivered by a ventilator?
- a. Controlled

- b. Assisted
  - c. Manuel**
  - d. Spontaneous
144. What are the two types of breath delivery?
- a. FiO<sub>2</sub>, PEEP
  - b. Volume, pressure**
  - c. Flow, volume
  - d. Respiratory rate and tidal volume
145. Describe the type of breath when the patient starts the process (aka triggers a breath), but the ventilator takes over.
- a. Controlled
  - b. Assisted**
  - c. Manuel
  - d. Supported
146. With what type of breath does the patient do most/all of the work, and the ventilator gives only minimal assistance, if needed?
- a. Controlled
  - b. Assisted
  - c. Manuel
  - d. Supported**
147. What is controlled mandatory ventilation (CMV)?
- a. A combination of a controlled/assisted breathing with a spontaneous breath
  - b. A way for the ventilator to assist/ augment the efforts of the patient
  - c. A controlled form of ventilation where the ventilator controls the rate and the amount of gas**
  - d. A combination of controlled and assisted breath
148. What is pressure support?
- a. A combination of a controlled/assisted breathing with a spontaneous breath
  - b. A way for the ventilator to assist/ augment the efforts of the patient**
  - c. A controlled form of ventilation where the ventilator controls the rate and the amount of gas
  - d. A combination of controlled and assisted breath
149. How does increasing the inspiratory time lead to improved oxygenation?
- a. It increases mean airway pressure**
  - b. It decreases expiration time
  - c. It improves PEEP
  - d. It increases the tidal volume
150. What is assist controlled ventilation (ACV)?
- a. A combination of a controlled/assisted breathing with a spontaneous breath
  - b. A way for the ventilator to assist/ augment the efforts of the patient
  - c. A controlled form of ventilation where the ventilator controls the rate and the amount of gas
  - d. A combination of controlled and assisted breath**
151. When giving a volume breath, at what pressure will the gas be delivered?
- a. Depends on compliance**
  - b. 6-8 ml / kg of ideal body weight
  - c. Depends on the respiratory rate
  - d. Depends on the flow and inspiratory time
152. When giving a pressure breath, what is the relationship between compliance and volume?
- a. Lower compliance, the less volume delivered**
  - b. Lower compliance, the more volume delivered
  - c. Higher volume, the higher the compliance needed
  - d. Lower volume, the higher the compliance needed
153. Which is a dynamic pressure needed to fully inflate the lungs and overcome the resistive forces and elastic forces of the lungs?

- a. Peak Inspiratory Pressure (PIP)
  - b. Positive end expiratory pressure (PEEP)
  - c. Plateau pressure (PPlat)
  - d. End Expiratory Pressure
154. What is the normal peak inspiratory pressure (PIP)?
- a. Variable depending on body habitus
  - b. >20 cm of water pressure
  - c. <10 cm of water pressure
  - d. <20 cm of water pressure
155. What is meant by a static pressure vs dynamic pressure?
- a. Dynamic is seen during an inspiratory hold, whereas static is the same as the Peak inspiratory pressure (PIP)
  - b. Static has no air movement, dynamic pressure has air movement
  - c. Same thing: static pressure is used with volume mode and dynamic pressure with pressure mode
  - d. Same thing: static pressure is used with pressure mode and dynamic pressure with volume mode
156. What is the main disadvantage of a pressure delivered breath?
- a. Not as well known to clinicians
  - b. No control over minute ventilation
  - c. Constantly pay attention to pressures to make sure adequate tidal volume
  - d. All of the above
157. What should you consider before giving flumazenil for a benzodiazepine overdose?
- a. A higher dose is going to be needed if the patient is chronically on benzodiazepines
  - b. Consider a drip due to the short half-life of flumazenil
  - c. Add naloxone because of the likely use of opiates also
  - d. Avoid if patient is on chronic benzodiazepines as they can go into withdrawal
158. Which is not a cause of increased peak inspiratory pressure (PIP) and increased plateau pressure (PPlat)?
- a. Pulmonary edema
  - b. Bronchospasms
  - c. Pneumothorax
  - d. Abdominal compartment syndrome
  - e. ARDS
159. Which receptor causes increased chronotropy and inotropy?
- a. Alpha 1
  - b. Alpha 2
  - c. Beta 1
  - d. Beta 2
  - e. D1
160. What happens as compliance decreases in a volume breath?
- a. Less oxygen delivery and hypoxia
  - b. Higher peak inspiratory pressures (PIP) leading to barotrauma
  - c. Higher FiO<sub>2</sub> and oxygen toxicity
  - d. Decrease in the minute ventilation leading to decreased PEEP and atelectasis
161. What is the normal flow pattern of a volume breath?
- a. Constant
  - b. Accelerating
  - c. Decelerating
  - d. Variable
162. How is the peak inspiratory pressure (PIP) and the mean airway pressure of a pressure breath in comparison to a volume breath?
- a. ↑ peak airway pressure + ↓ mean airway pressure
  - b. ↑ peak airway pressure + ↑ mean airway pressure
  - c. ↓ peak airway pressure + ↑ mean airway pressure
  - d. ↓ peak airway pressure + ↓ mean airway pressure



163. What is meant by shunt physiology?
- a. Inadequate ventilation with adequate perfusion
  - b. Inadequate ventilation with inadequate perfusion
  - c. Adequate ventilation with inadequate perfusion
  - d. Adequate ventilation with adequate perfusion