1. Please identify your position within the department
   - A. Resident
   - B. CRNA
   - C. Attending

2. In the setting of a patient under controlled mechanical ventilation undergoing an open abdominal procedure, which of the following is the best predictor of fluid responsiveness?
   - 1. Heart Rate
   - 2. Urine Output
   - 3. Stroke Volume Variation
   - 4. Central Venous Pressure
   - 5. Pulmonary Wedge Pressure

3. Which is the most effective primary intervention to improve CO in a patient who has low blood pressure and high stroke volume variation (SVV)?
   - a. A vasopressor will simultaneously get MAP to a target level and “shrink the tank” thereby reducing “relative hypovolemia” and improving SVV.
   - b. A vasopressor because it’s more important to treat hypotension than high SVV.
   - c. Fluids will decrease SVV and increase MAP, potentially preempting the need for vasopressors which could increase afterload and thereby decrease CO.
   - d. Fluids or pressor as along as the MAP is improved to target level

4. Aside from hypovolemia, what other conditions can also increase the variation in stroke volume (SVV):
   - a. Arrhythmia
   - b. Cardiac tamponade
   - c. Induction of anesthetics
   - d. Prone positioning
   - e. All of the above
**5. Giving an inotrope to a hypovolemic patient...**
- a. can be an effective way to improve CO when you require a dry surgical field.
- b. will increase CO by increasing the contractility of the heart, compensating for decreased preload.
- c. will increase CO by causing a big increase in HR.
- d. will have no effect because the increased contractility does not compensate for decreased preload.
- e. None of the above.

**6. A patient can lose up to ____% of their circulating blood volume before you see any changes in blood pressure.**
- a. 10
- b. 15
- c. 20
- d. 30

**7. SVV can be used to predict fluid responsiveness when all of the following have been met except?**
- A. Controlled positive pressure ventilation at 8ml/kg of ideal body weight
- B. Regular cardiac conduction (regular rhythm)
- C. Intact pulmonary pleura
- D. Patient has full muscle relaxation

**8. The definition of fluid responsiveness is a increase of which percentage in stroke volume with a 200ml fluid bolus?**
- a. 10
- b. 20
- c. 30
- d. 40
9. Which is the most effective primary intervention to improve CO in a patient who has an elevated SVV and also a high SVR?
   - a. Fluids, because it will improve preload and CO which will in turn reduce SVR, potentially preempting the need for a vasodilator.
   - b. Vasodilator, because the high SVR (afterload) is impeding cardiac output, and would also counteract the benefits to CO from improving preload with fluids.
   - c. Fluids, and optionally an inotrope, because a vasodilator would make this patient more hypovolemic.
   - d. Both fluids and vasodilator, to simultaneously lower SVV and SVR.
   - e. The answer depends on the clinical objective and the clinician’s school of thought on how to best optimize CO.

10. Administering inotropes, vasodilators or vasopressors are unlikely to have any effect on SVV.
    - a. True
    - b. False

11. Prone positioning causes the following change to SVV:
    - a. Increase in SVV
    - b. Decrease in SVV

12. A passive leg raise (PLR) is a pseudo volume challenge of approximately how many cc/ml of fluid?
    - a. 100cc
    - b. 200cc
    - c. 300-400cc
    - d. 1000cc

13. ScvO2 is affected by what four factors
    - a. Height, Weight, SVR, CO
    - b. CO, Hgb, O2, and O2 consumption
    - c. SVR, CVP, CO, DO2
    - d. None of the above
**14. How does PEEP affect preload**
   - a. PEEP increases intrathoracic pressures which decreases preload via compression on the vena cava.
   - b. PEEP decreases intrathoracic pressure and assists RV filling
   - c. Regarding the left side of the heart only, PEEP increases LA filling
   - d. Regarding the left side of the heart only, PEEP decreases LA filling
   - e. A and C

**15. Regarding the arterial waveform, the upslope of the waveform corresponds to?**
   - A. Systemic Vascular Resistance
   - B. Ventricular Contractility
   - C. Left Ventricular End Diastolic Pressure
   - D. None of the Above

**16. Regarding the arterial waveform, the downslope of the waveform corresponds to?**
   - a. Systemic Vascular Resistance
   - b. Ventricular Contractility
   - c. Left Ventricular End Diastolic Pressure
   - d. None of the Above

**17. A 1mmHG change in CVP when the patient is at the initiation of the stressed preload volume can result in how much of ml/min change in cardiac output?**
   - A. 100 ml/min
   - B. 300 ml/min
   - C. 500 ml/min
   - D. 1000 ml/min

**18. If one has access to dynamic parameters (SVV & CO) and the patient has a stroke volume variation of less 10% and is still hypotensive the next step to decide appropriate treatment would be?**
   - A. Give a vasoactive agent
   - B. Assess the Cardiac output
   - C. Give a fluid bolus
   - D. Give an inotropic agent
**19. What is the target tidal volume one aims for positive pressure ventilation to assure accurate utility of stroke volume variation of >10% to predict fluid responsiveness.**

- a. 4ml/kg
- b. 5ml/kg
- c. 8ml/kg
- d. 10ml/kg

**20. A increase in respiratory rate above a rate of 30 has been shown to cause what to the generation of variation in stroke volume.**

- A. SVV will increase
- B. SVV will Decrease

**21. One’s position on the Frank Starling curve is dependent on all of the following except.**

- a. Ventricular Contractility
- b. Preload
- c. Afterload
- d. All of the above affect the Frank Starling curve