**Supplemental Figure 1.** **Sample Stem and Grading Template of the American Board of Anesthesiology’s Standardized Oral Examination (session 1)**

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| **Case Stem**  A 52 y.o., 130 kg, 5’7” man (BMI = 45) is scheduled for coronary artery bypass grafting and mitral valve replacement.  **HPI:** The patient developed myocardial ischemia complicated by acute congestive heart failure and mitral valve regurgitation 6 hours prior to surgery. Cardiac catheterization revealed 3-vessel coronary artery disease and a left ventricle ejection fraction of 50%, and severe mitral regurgitation. An intra-aortic balloon pump was placed in the cardiac catheterization lab and dobutamine infusion was initiated.  **PMH:** The patient’s medical history is significant for hypertension and gastroesophageal reflux.  **Pre-Hospitalization MEDS:** Losartan, hydrochlorothiazide, ranitidine.  **Current MEDS:** Dobutamine and heparin infusions, morphine sulfate, aspirin, and ranitidine  **PHYS:** Augmented BP 85/55 (mean 68); HR 85; RR 14; T 37°C.  **EXAM:** HEENT: Thick beard and mustache. Neck circumference 44 cm. Mallampati 4 airway. Full range of neck motion. 6 cm thyromental distance.  Chest: Auscultation reveals bibasilar rales and an S3 gallop with a 3/6 systolic murmur radiating to the axilla.  **CXR:** Enlarged cardiac silhouette, mild pulmonary edema. Intra-aortic balloon pump tip noted in proximal descending aorta.  **ECG:** Sinus tachycardia, inferior ST segment depression.  **LABS:** Hgb 13.5 gm/dl; glucose 150 mg/dl; serum K+ 3.3 mEq/L; ABG on face mask oxygen with FiO2 0.5 is pH 7.43; PaCO2 33; PaO2 71; creatinine 1.8 mg/dl.  Patient arrives in the OR with two 20 gauge peripheral IVs, a left internal jugular vein ScvO2 triple lumen central venous catheter, and a left radial arterial catheter. He reports mild chest pain. | | | | | | | |
| **A. INTRAOPERATIVE MANAGEMENT** | | | | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Induction of anesthesia:*** Why might the patient’s serum potassium be low? Would you attempt to replace the patient’s serum potassium prior to induction of anesthesia? Why? Assume BP falls to 80/40 during induction of anesthesia. How would you evaluate the cause? Assume transthoracic echocardiogram suggests adequate intravascular volume and LVEF approximately 50% (unchanged relative to the preoperative evaluation). Rx? IV fluids? Administer phenylephrine? Change the rate of dobutamine infusion? Administer epinephrine? Change the IABP setting? Why? | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Intubation:*** Assume your intervention effectively raised the BP. Would you expect intubation of the trachea to be difficult for this patient? Why? How would you increase the likelihood of a successful intubation? Assume mask ventilation is easily maintained and cricoid pressure has been applied. Intubation attempt using a videolaryngoscope is unsuccessful. How would you secure the airway? Assume attempted intubation using a fiberoptic bronchoscope is unsuccessful. Patient is now difficult to mask ventilate and SpO2 falls to 85%. How would you proceed? Assume LMA placement allows effective ventilation. How would you intubate the trachea? | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Antithrombin III Deficiency:*** Assume patient is successfully intubated using an intubating LMA. Patient receives heparin prior to initiation of cardiopulmonary bypass. What ACT would you require for initiation of CPB? Why? Assume ACT does not meet your criteria for initiating CPB. What would you do? Administer add’l heparin? Why? How much? Administer FFP or recombinant antithrombin III? Why? If using FFP, how much? | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Low CO post CPB:*** After separation from CPB, thermodilution CO is measured as 3 L/min, PAP is 75/35, BP is 80/40, and ScvO2 is 52% with IABP set at 1:1. DDx? How evaluate valve and myocardial fxn? Valve fxn normal but LVEF now appears to be 25%. Why? How would you Rx? Continue dobutamine? Other inotrope? Calcium? Phenylephrine? Assume first intervention is ineffective. Next intervention? | | | | |
| ① Consistently ② Often ③ Occasionally ④ Rarely | | | | | | | |
| **B. POSTOPERATIVE CARE** | | | | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Postop ventilatory support:*** Assume pulmonary hypertension and poor LV function is effectively managed. Patient becomes hemodynamically stable off CPB and is transferred to the ICU. What ventilator mode would you select for the patient? Volume assist control? SIMV? Pressure control? Would you add PEEP? Why? How much? Would you convert the patient to pressure support mode for the ventilator wean? Why? How would you determine when it was appropriate to extubate the trachea and discontinue mechanical ventilation? | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Coagulopathy:*** Over first 2 hrs in the ICU, 450 ml of chest tube drainage is measured. Possible causes of bleeding? INR 1.8 and platelet count 95,000 platelets per ml. Could these results explain the bleeding? Assuming normal ACT at end of surgery, why might the INR be elevated 2 hours later? Would you request any other tests? TEG? Other laboratory studies? Which? Why? How would you Rx the coagulopathy? Protamine administration? Platelet transfusion? FFP? Other intervention? Why? Assume Hct is 24%. Would you administer PRBCs? | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Cardiac tamponade:*** 6 hrs postop, BP falls to 80/40 mm Hg, CVP rises to 22 mm Hg, ScvO2 decreases to 45%, and there is minimal UO. DDx? How would you evaluate? Assume TTE demonstrates evidence of cardiac tamponade. Plan is for surgical intervention in the ICU. BP falls to 70/30. How would you increase BP and cardiac output in the ICU prior to arrival of surgeon? Administer IV fluids? Which? How much? Administer inotropic agents? Which? Other intervention? Explain. | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Hyperglycemia:*** Assume tamponade effectively treated. Blood glucose measured at 460 mg/dL. Is this a concern? Why? Patient does not respond to sliding insulin scale ordered by the surgeon. Is insulin infusion indicated? At what rate? What would be your target blood glucose? Why? | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Vocal cord paralysis:*** POD#2. Patient extubated and hoarseness noted. Possible etiologies? Indirect laryngoscopy reveals paralyzed left vocal cord. What are possible etiologies of the vocal cord paralysis? What would you tell the patient and his family? Does the vocal cord paralysis increase his risk of aspiration? If so, how would you mitigate that risk? | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Intraop recall:*** Patient informs you that he believes he heard conversations during the surgery. Request add’l info? He denies pain during episodes of awareness but admits to being very anxious and frightened since the surgery. What would you tell him? How would you Rx his anxiety? The family asks if there are monitors that can detect awareness during general anesthesia. What would you tell them? | | | | |
| ① Consistently ② Often ③ Occasionally ④ Rarely | | | | | | | |
| 1. **ADDITIONAL TOPICS** | | | | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Pre-eclampsia:*** A 28 y.o., 85 kg, G1P0 woman presents in labor. Gestational age is 39 weeks. She is scheduled for emergent C-delivery due to late fetal heart rate decelerations. She has pregnancy-induced hypertension with proteinuria as well as 2+ bilateral lower extremity edema. HR 84; BP 190/110. What anesthetic technique would you recommend? GA? Regional? What information would you need to decide? Assume coagulation profile and platelet count are normal, but the obstetrician determines that C-delivery must be performed immediately and requests GA. What do you consider the greatest risks of GA for this patient? How would you mitigate these risks? How would you evaluate the patient’s intravascular volume status after induction of anesthesia? | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Pediatric pain mgmt:*** A 10 y.o. girl with cystic fibrosis is scheduled to undergo a fundoplication and gastrostomy tube placement for the mgmt of gastroesophageal reflux and malnutrition. Vital capacity is 75% predicted and stable. How would you Rx her pain postop? Intravenous opioids? Which? Would you suggest using PCA? Why? Which adjunctive agents would you recommend? Gabapentin? Acetaminophen? NSAIDs? Lidocaine patches? Ketamine infusion? Why? Would epidural analgesia be an appropriate strategy for this child? Advantages/disadvantages? | | | | |
| ⓎⓂⓃⒾ |  |  | 1. ***Hypothermia:*** A 68 y.o. man with a history of coronary artery disease is emerging from anesthesia following colon resection for treatment of adenocarcinoma. He received sevoflurane, hydromorphone, and rocuronium after induction of anesthesia using propofol. Rocuronium was reversed with sugammadex. How would you determine when to extubate the patient? If esophageal T is 34ºC, how would that impact your decision? What are the risks of hypothermia in the postoperative period for this patient? At what temperature would consider it safe to extubate this patient? Why? Would you actively warm the patient? Why? How? | | | | |
| ① Consistently ② Often ③ Occasionally ④ Rarely | | | | | | | |
| **Deficient Attributes** | | | | | | | |
| **No Deficient Attributes** | | | | | | | |
|  | | | | **Major** | **Minor** | **Not Deficient** |  |
| **Application** | | | | (Max 3) |  |  |  |
| Ineffectively Analyzed Clinical Situations | | | |  |  |  |  |
| Inability to Synthesize Factual Knowledge | | | |  |  |  |  |
| **Adaptability** | | | |  |  |  |  |
| Inappropriately Applied Information | | | |  |  |  |  |
| Unable to Adapt: Changing Clinical Scenario | | | |  |  |  |  |
| **Judgment** | | | |  |  |  |  |
| Displayed Lack of Judgment | | | |  |  |  |  |
| Inappropriate Choices for Patient Mgmt | | | |  |  |  |  |
| **Organization/Presentation** | | | |  |  |  |  |
| Disorganized/Unclear Presentation | | | |  |  |  |  |
| Provided Inadequate Information | | | |  |  |  |  |
| **Module Evaluation**  **Please rate the content of the exam scenario (Modules A & B)**   * Excellent * Good * Acceptable * Marginal   **Please rate the difficulty of the exam scenario**   * Too difficult * Appropriate level of difficulty * Too easy | | | | | | | |