

Medical Consultation/Perioperative Assessment and
Management for MSM Residents:
Current guidelines
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Acknowledgements

- Thanks LORD, for my calling.
- Thanks Kayode, Ayodeji and Tamilore for all you are to me.
- My resources for the Guidelines and Standards of Care outlined in this manual are: The SPAQI conference held in March 2011, The John Hopkins Consultative Medicine Essentials for Hospitalists, Up To Date, Cleveland Clinic Journal of Medicine and MKSAP15 – all evidence based. By all means review these resources yourself or page me at **404 278 8412** if you have questions.
- Finally, thanks Nadene Fair, MD for introducing me to Perioperative Medicine and encouraging me to join SPAQI; it has fast become my passion.

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General Overview

- Internists are often called to “clear” patients for surgery – either in our capacity as primary care physicians or as Hospitalists; also, we get consulted for medical management perioperatively.
- This syllabus aims to make this less challenging by preparing our residents to provide quality and well informed perioperative risk assessment/stratification as well as perioperative management based on current guidelines.
- Please attempt the 18 Needs Assessment questions from MKSAP15; an answer sheet will be provided to you at your first visit to the Pre operative clinic and we will review the correct answers and why they are correct during your second.

Module A

Needs Assessment
Preoperative Evaluation/Assessment

Objectives

1. Tailor the perioperative evaluation based on the risk and urgency of the procedure
- 2 Determine if there are red flag issues that may necessitate delaying non emergent surgery having a knowledge of the patient's Metabolic Equivalents
- 3 Recommend appropriate Risk Reduction Strategies and communicate these to the requesting physician

Please **DO NOT** write on the question booklet.
Write the corresponding letter to the correct answer (in **CAPITALS**) on the
answer sheet provided

Question 1

- A 60-year-old man is evaluated before undergoing a colectomy for colon cancer under general anesthesia. Medical history is significant for chronic obstructive pulmonary disease (for which he was last hospitalized 1 year ago), hypertension, and obesity. The patient has a 45-pack-year smoking history and stopped smoking 5 years ago. He has dyspnea on exertion after walking three blocks or climbing one flight of stairs. There is no history of coronary artery disease or heart failure, and he does not have chest pain. Current medications are hydrochlorothiazide, albuterol, ipratropium, and a corticosteroid inhaler.
- On physical examination, temperature is 36.7 ° C (98.0 ° F), blood pressure is 140/85 mm Hg, pulse rate is 84/min, and respiration rate is 16/min. BMI is 32. Examination of the chest discloses coarse breath sounds without wheezing. There are no cardiac murmurs or gallops and no lower-extremity edema.
- A chest radiograph shows hyperinflation but no pulmonary infiltrates.
- Which of the following is most likely to reduce this patient's risk of developing postoperative pulmonary complications?
- **A** Incentive spirometry
- **B** Postoperative nasogastric decompression
- **C** Prophylactic systemic corticosteroids
- **D** Right heart catheterization
- **E** Routine intravenous nutritional support

Question 2

- A 70-year-old man with severe disability due to claudication in his right leg and a 2-month history of increasingly frequent chest pain undergoes preoperative cardiovascular evaluation prior to elective right femoropopliteal bypass graft surgery. The patient can only walk one block because of claudication and chest pain despite adequate medical treatment. Medical history is significant for coronary artery disease, a myocardial infarction 4 years ago, hypertension, and type 2 diabetes mellitus. The patient underwent left femoropopliteal bypass graft surgery 2 years ago under general anesthesia without complications. He has a 55 pack-year smoking history but stopped smoking 2 years ago. Current medications are metoprolol, atorvastatin, amlodipine, fosinopril, isosorbide mononitrate, insulin glargine, insulin aspart, and aspirin.
- Vital signs are normal. There is no jugular venous distention. Cardiopulmonary examination is normal. Pulses in the right calf are decreased. There is no calf tenderness and no peripheral edema. An electrocardiogram shows Q waves in the inferior leads.
- Which of the following is the best preoperative management?
- **A** Coronary angiography
- **B** Dipyridamole nuclear imaging stress testing
- **C** Dobutamine stress echocardiography
- **D** Two-dimensional echocardiography
- **E** No testing needed
-

Question 3

- A 65-year-old man with a 2-year history of severe osteoarthritis of the right knee is evaluated before undergoing total knee replacement surgery. Until 1 month ago, the patient was able to walk four or more blocks and four flights of stairs but now can only walk one block because of severe knee pain. He has a 3-year history of occasional chest pain that occurs less than once each month and develops only after walking too quickly. There has been no change in the severity or frequency of the chest pain and no dyspnea. Medical history is significant for a myocardial infarction 4 years ago, type 2 diabetes mellitus, and hypertension. Current medications are metoprolol, fosinopril, atorvastatin, insulin glargine, metformin, and aspirin.
- Blood pressure is 140/80 mm Hg, pulse rate is 60/min. BMI is 30. There is no jugular venous distention. The lungs are clear. There are no murmurs or gallops. Serum creatinine is 1.5 mg/dL (132.6 μ mol/L). An electrocardiogram shows normal sinus rhythm with Q waves in leads II, III, and aVF; nonspecific ST-T wave changes; and left ventricular hypertrophy. A chest radiograph is normal.
- Which of the following is the most appropriate preoperative cardiac testing?
- **A** Coronary angiography
- **B** Dobutamine stress echocardiography
- **C** Exercise (treadmill) thallium imaging
- **D** Resting two-dimensional echocardiography
- **E** No additional testing is indicated

Question 4

- A 70-year-old woman is evaluated before undergoing cystoscopy for microscopic hematuria. She is currently asymptomatic. Medical history is significant for hypertension, type 2 diabetes mellitus, cholecystectomy, and appendectomy. Both surgical procedures were uncomplicated, and the patient has no history of easy bruising or bleeding disorders. Current medications are hydrochlorothiazide, glyburide, and aspirin. She does not drink alcohol and has never smoked cigarettes. An electrocardiogram 6 months ago was normal. The most recent hemoglobin A1c measurement was 6.5%.
- Vital signs are normal, and the remainder of the physical examination is unremarkable.
- Which of the following preoperative studies should be done next?
 - **A** Chest radiograph
 - **B** Complete blood count
 - **C** Electrocardiogram
 - **D** Prothrombin time, activated partial thromboplastin time, and INR
 - **E** No additional diagnostic studies are needed

Question 5

- A 65-year-old woman undergoes preoperative evaluation prior to elective cholecystectomy. Medical history is significant for chronic obstructive pulmonary disease, hypertension, and type 2 diabetes mellitus. Current medications are albuterol, ipratropium, and corticosteroid inhalers; chlorthalidone; metformin; and aspirin. The patient is a current smoker with a 40-pack-year smoking history. She does not have chest pain, dyspnea, or cough.
 - On physical examination, temperature is 37.0 ° C (98.6 ° F), blood pressure is 130/85 mm Hg, pulse rate is 80/min, and respiration rate is 14/min. BMI is 34. The lungs are clear; no wheezing is heard. A chest radiograph shows no active pulmonary disease.
 - Which of the following preoperative interventions is most likely to reduce the risk of postoperative pulmonary complications in this patient?
-
- A Intravenous aminophylline
 - B Intravenous corticosteroids
 - C Preoperative spirometry (pulmonary function testing)
 - D Prophylactic antibiotics
 - E Smoking cessation

Question 6

- A 60-year-old woman is evaluated before undergoing a lumpectomy for breast cancer tomorrow. Medical history is significant for hypertension, type 2 diabetes mellitus, chronic kidney disease, a myocardial infarction 2 years ago, and a stroke 1 year ago with residual right-sided hemiparesis. The patient does not have chest pain or shortness of breath and is otherwise asymptomatic. She uses a walker to ambulate. Current medications are metoprolol, simvastatin, furosemide, losartan, nifedipine, insulin glargine, insulin aspart, and aspirin.
- On physical examination, temperature is 36.8 ° C (98.3 ° F), blood pressure is 160/90 mm Hg, pulse rate is 66/min, and respiration rate is 14/min. Examination is normal except for right-sided hemiparesis and mild bilateral pedal edema. Pertinent laboratory results: blood urea nitrogen, 35 mg/dL (12.5 mmol/L); creatinine, 2.2 mg/dL (194.5 µmol/L); random glucose, 180 mg/dL (9.99 mmol/L); hemoglobin A1c, 8.1%.
- An electrocardiogram shows normal sinus rhythm, left ventricular hypertrophy, first-degree atrioventricular block, and nonspecific ST-T wave changes.
- Which of the following is the most appropriate preoperative management?
- **A** Postpone surgery until blood pressure is below 140/90 mm Hg
- **B** Postpone surgery until dobutamine stress echocardiography is obtained
- **C** Postpone surgery until fasting glucose is below 110 mg/dL (6.11 mmol/L)
- **D** Proceed with surgery

Question 7

- A 60-year-old man is hospitalized because of lower gastrointestinal bleeding secondary to diverticular disease diagnosed by colonoscopy. The bleeding stops after blood transfusions are given. This is his third episode of bleeding, and the patient is being considered for possible hemicolectomy. He has cirrhosis secondary to a 25-year history of alcohol abuse, and his last drink was 1 week ago. The patient has no known allergies and takes no medications.
- On physical examination, temperature is 36.7 ° C (98.0 ° F), blood pressure is 110/60 mm Hg, pulse rate is 96/min, and respiration rate is 14/min. The patient is alert and oriented. There is no scleral icterus. Gynecomastia is present. Abdominal examination shows mild ascites. There is no tremor, and neurologic examination is normal.
- His Child-Turcotte-Pugh score is calculated as class C and his Model for End-stage Liver Disease (MELD) score is 23.
- Which of the following is the best recommendation regarding elective surgery?
 - **A** Delay surgery for 7 to 10 days
 - **B** Delay surgery indefinitely until risk improves
 - **C** Proceed with surgery at any time
 - **D** Recommend against elective surgery at any time

Question 8

- A 60-year-old man who requires hemodialysis because of chronic kidney disease is evaluated before undergoing revision of his nonfunctioning arteriovenous fistula. Medical history is significant for hypertension and type 2 diabetes mellitus. The patient does not have chest pain or dyspnea. Current medications are nifedipine, sevelamer, clonidine, aspirin, and regular and NPH insulin.
- On physical examination, temperature is 36.8 ° C (98.3 ° F), blood pressure is 160/95 mm Hg, pulse rate is 80/min, and respiration rate is 14/min. There is no evidence of jugular venous distention, extracardiac sounds, pulmonary crackles, or peripheral edema. The remainder of the examination is normal. Post-dialysis laboratory studies are shown.
- **Laboratory studies:** Hemoglobin 11.0 g/dL (110 g/L) Blood urea nitrogen 40 mg/dL (14.3 mmol/L) (usual pre-dialysis result: 60 mg/dL [21.4 mmol/L]) Creatinine 4.8 mg/dL (424.3 µmol/L) (usual pre-dialysis result: 7.0 mg/dL [618.8 µmol/L]) Potassium 3.3 meq/L (3.3 mmol/L) (usual pre-dialysis result: 4.8 meq/L [4.8 mmol/L]) Glucose 120 mg/dL (6.66 mmol/L)
- An electrocardiogram shows normal sinus rhythm and left ventricular hypertrophy.
- Which of the following is most appropriate to optimize this patient's medical management and minimize surgical risk before graft revision?
- **A** Administer erythropoietin
- **B** Administer potassium supplements
- **C** Postpone surgery until blood pressure is less than 130/80 mm Hg
- **D** Schedule hemodialysis the day before surgery

Question 9

- A 65-year-old woman comes for a preoperative evaluation before elective right knee arthroplasty. The patient has severe pain and disability due to osteoarthritis of the right knee. She had a myocardial infarction 4 months ago and required a percutaneous coronary intervention with placement of a paclitaxel drug-eluting stent in the left anterior descending coronary artery. The patient also has hypertension and type 2 diabetes mellitus. She currently has no chest pain or dyspnea but can only walk two blocks and climb one flight of stairs because of the osteoarthritis. Current medications are clopidogrel, metoprolol, atorvastatin, losartan, metformin, aspirin, acetaminophen, and tramadol.
- Vital signs are normal. Other than evidence of bony hypertrophy of the knees and a small effusion in the right knee, the remainder of the examination is unremarkable.
- An electrocardiogram shows normal sinus rhythm; Q waves in leads II, III, and aVF; and left ventricular hypertrophy.
- Which of the following is the best preoperative management?
- **A** Postpone surgery for 6 months after stent was placed
- **B** Postpone surgery for 12 months after stent was placed
- **C** Proceed with surgery; continue aspirin but temporarily stop the clopidogrel
- **D** Proceed with surgery; continue both aspirin and clopidogrel
- **E** Proceed with surgery; temporarily discontinue aspirin and clopidogrel

Question 10

- An 82-year-old woman is evaluated at the hospital after tripping and falling. She has sustained a right hip fracture and needs urgent hip replacement. She reports no angina, chest discomfort, syncope, or presyncope. She has had no signs or symptoms of heart failure. Prior to her fall, she was active and walked daily.
 - On physical examination, temperature is normal, blood pressure is 164/82 mm Hg, and pulse is 96/min. BMI is 26. Point of maximal impulse is undisplaced. There is a normal S1 and a single S2. There is a grade 3/6 systolic ejection murmur on examination heard at the right upper sternal border that radiates to the left carotid artery. Carotid pulses are delayed.
 - Transthoracic echocardiogram demonstrates severe aortic stenosis and normal left ventricular size and function. Pulmonary pressures are normal.
 - Which of the following is the best perioperative management option?
-
- **A** Aortic balloon valvuloplasty
 - **B** Aortic valve replacement
 - **C** Intra-aortic balloon placement
 - **D** Intravenous afterload reduction (nitroprusside)
 - **E** Proceed directly to hip replacement

Question 11

- A 65-year-old man is being evaluated for clearance to undergo an elective repair of an abdominal aortic aneurysm. The patient has a 5-year history of moderate chronic obstructive pulmonary disease with chronic cough productive of mucoid sputum. He smokes a half pack of cigarettes a day. His medical history also includes hypertension, and he is adherent to therapy with albuterol as needed, an inhaled corticosteroid, salmeterol, and lisinopril.
- On physical examination, vital signs are normal; BMI is 22. The chest is normal with no wheezes or rhonchi; there is no jugular venous distention or edema. Spirometry done 6 months ago showed an FEV1 of 55% of predicted and an FEV1/FVC ratio of 55%. Spirometry done 1 week ago showed minimal change but no response to a bronchodilator. Surgery is scheduled for next week.
- Which of the following would most effectively reduce the patient's risk for postoperative pulmonary complications?
- **A** Incentive spirometry
- **B** Leukocyte-depleted blood transfusions
- **C** Preoperative systemic corticosteroids
- **D** Right-heart catheterization
- **E** Smoking cessation
-

Question 12

- A 78-year-old woman with a history of aortic stenosis presents for evaluation after undergoing aortic valve replacement with a bileaflet mechanical prosthesis 2 years ago. At the time of valve replacement she had diagnostic coronary angiography, which showed no significant coronary artery disease. She did well during her postoperative course, returning to her normal preoperative level of activity within 2 to 3 months. She now has symptomatic cholelithiasis and is scheduled for elective cholecystectomy. The patient reports no palpitations or syncope. There are no signs or symptoms of heart failure. She has had no chest discomfort and has been able to maintain a normal level of daily activity. She currently takes warfarin, atorvastatin, and atenolol.
- On physical examination, temperature is normal, blood pressure is 138/84 mm Hg, and pulse is 76/min. Cardiac examination reveals a mechanical S2 and a normal S1 without an S3 or S4. There is a nonradiating, midpeaking grade 2/6 early systolic murmur heard at the upper left sternal border. The rest of the physical examination is unremarkable.
- In addition to withholding warfarin 5 days prior to surgery, which of the following is the best preoperative management option?
- **A** Inpatient intravenous unfractionated heparin
- **B** Oral vitamin K reversal
- **C** Outpatient oral clopidogrel
- **D** No other intervention prior to surgery

Question 13

- A 57-year-old man is evaluated after a chest radiograph taken in a preoperative assessment for a knee replacement showed a 1.0-cm nodule in the right lower lobe of the lung. The patient lives in Montana and has not traveled recently. He does not recall ever having been exposed to tuberculosis or having been tested for the disease. His most recent chest radiograph was 10 years ago; the result was normal, and the radiograph is no longer available. About 6 months ago he had abdominal pain that was evaluated with an abdominal CT scan, and the pain has since resolved. The patient has a 20-pack-year history of cigarette smoking but quit 10 years ago. He is otherwise healthy.
- On physical examination, vital signs are normal, lungs are clear, and there is no lymphadenopathy.
- Which of the following is the most appropriate next step in the management of this patient?
- **A** 18F-fluorodeoxyglucose and positron emission tomography scan (FDG-PET)
- **B** MRI of the chest
- **C** Repeat CT scan in 3 months
- **D** Review of lung images from CT scan of the abdomen
- **E** Thin-section CT scan of the chest

Question 14

- A 76-year-old woman residing in an independent living facility is evaluated during a routine examination. She ambulates well, using a cane because of hip pain, but does not exercise regularly and takes public transportation to complete her daily shopping. She does not have exertional chest discomfort, dizziness, palpitations, dyspnea, or fatigue. She has hypertension. There is no known history of coronary artery disease. She does not smoke. Medications are hydrochlorothiazide and low-dose aspirin.
 - On physical examination, temperature is normal and blood pressure is 150/80 mm Hg. BMI is 22. Cardiac examination reveals a sustained apical impulse; normal S1; and a single, soft S2. An S4 is present. There is a grade 3/6 early-onset systolic, late-peaking murmur that is heard best at the right upper sternal border and radiates to the left carotid artery. Carotid pulses are delayed. There is trace pedal edema.
 - Transthoracic echocardiography demonstrates severe aortic stenosis. No other valvular abnormalities are seen. Biventricular function is normal. There is concentric left ventricular hypertrophy. Pulmonary pressures are at the upper limits of normal.
 - Which of the following is the most appropriate test to perform next?
-
- **A** Cardiac CT angiography
 - **B** Coronary angiography
 - **C** Exercise treadmill stress testing
 - **D** Transesophageal echocardiography
 - **E** No diagnostic testing at this time

Question 15

- A 55-year-old man with recently diagnosed pheochromocytoma is evaluated prior to surgical removal in 10 days. His only medication is amlodipine.
 - On physical examination, the patient appears anxious. Temperature is 36.0 ° C (96.8 ° F), blood pressure is 172/96 mm Hg, pulse rate is 98/min, respiration rate is 16/min, and BMI is 23. Results of fundoscopic, cardiovascular, and neurologic examinations are normal.
 - An electrocardiogram shows sinus rhythm at a rate of 100/min. There is no evidence of ischemia.
 - Which of the following is the most appropriate next step in management?
-
- **A** Add chlorthalidone
 - **B** Add metoprolol
 - **C** Add prazosin
 - **D** Hospitalize and begin intravenous phentolamine
 - **E** Hospitalize and begin intravenous sodium nitroprusside

Question 16

- A 76-year-old man comes for a preoperative evaluation before total joint arthroplasty of the right knee. He has a 24-year history of rheumatoid arthritis. His disease has been stable, but he has had progressive pain and loss of range of motion of the right knee. He has no other medical problems and has never been admitted to the hospital. Medications are methotrexate, a folic acid supplement, hydroxychloroquine, and prednisone.
- On physical examination, temperature is 37.2 ° C (99.0 ° F), blood pressure is 136/80 mm Hg, pulse rate is 90/min, and respiration rate 18/min. BMI is 23. Cardiopulmonary examination is normal. There is mild puffiness of the metacarpophalangeal joints bilaterally. He also has bilateral ulnar deviation and swan neck deformities involving the third digit of the right hand and the fourth digit of the left hand. Extension of the cervical spine is painful and decreased. There is a bony deformity of the right knee. Extension of the right knee is decreased by 10 degrees and flexion is limited to 110 degrees. Neurologic examination is unremarkable.
- Laboratory studies are normal, including the complete blood count and serum creatinine level. Chest radiograph and electrocardiogram are normal.
- Which of the following preoperative diagnostic studies should be performed in this patient?
- **A** B-type natriuretic peptide hormone
- **B** Cervical spine radiograph
- **C** Spirometry
- **D** Urinalysis

Question 17

- A 58-year-old man is evaluated for preoperative clearance prior to elective hernia surgery after a prolonged activated partial thromboplastin time (aPTT) is found on laboratory studies. Personal and family history of abnormal bleeding is negative. Medical history is otherwise noncontributory, and the patient takes no medications.
 - The vital signs and general screening examination are normal.
 - The inhibitor mixing study corrects the prolonged aPTT, and factor assays indicate an isolated factor XI deficiency with a value of 47% of normal (normal, 70% to 120%).
 - Which of the following is the most appropriate management?
-
- **A** Cancel surgery
 - **B** Proceed to surgery with no preoperative treatment
 - **C** Treat with factor VIII concentrate preoperatively
 - **D** Treat with cryoprecipitate preoperatively
 - **E** Treat with fresh frozen plasma therapy preoperatively

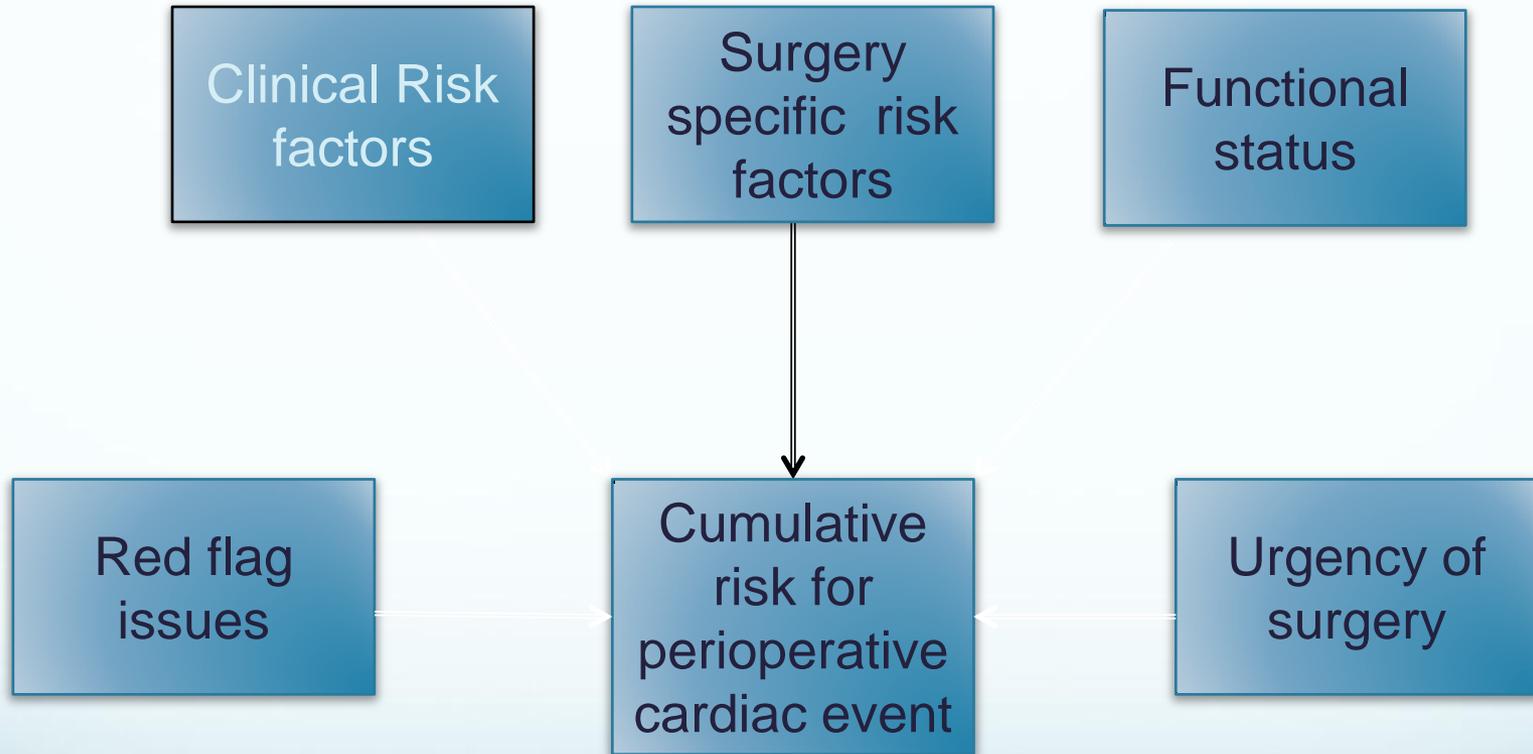
Question 18

- A 72-year-old man undergoes preoperative evaluation 2 weeks prior to colonoscopy and polypectomy for a growth detected during an earlier procedure. Medical history is significant for a mechanical mitral valve. Medications include warfarin, metoprolol, and lisinopril.
- Physical examination, including vital signs, is normal.
- Which of the following is the most appropriate management of this patient?
- **A** Continue with procedure without stopping warfarin
- **B** Stop warfarin and begin low-molecular-weight-heparin preoperatively and resume both agents postoperatively
- **C** Stop warfarin preoperatively and resume postoperatively
- **D** Stop warfarin preoperatively, use fresh frozen plasma intraoperatively, and resume warfarin postoperatively
- **E** Stop warfarin preoperatively, use vitamin K intraoperatively, and resume warfarin postoperatively

Role of the Medical Consultant Perioperatively

- Assess and minimize cardiovascular risk from **non cardiac surgery** by evaluating the patient's medical problems
- Optimize medical management
- Recommend risk reduction strategies
 - Answer specific question being asked, do NOT clear
 - Recommendations should be specific, limited and focused on central issue being asked
 - Communication and follow up

Factors leading to Cumulative Risk for Perioperative Cardiac Event



The Preop Clinic

1. Obtaining a detailed HPI and thorough Physical Examination
2. Review of old records
3. The Preop Evaluation : Type of patient vs Type of surgery
4. Medication Reconciliation and Periop Medication management
5. Ordering specific and appropriate Preop testing
6. Writing risk reduction strategies and recommendations
7. Follow up

Obtaining a detailed HPI and Physical Exam

- The resident must take a detailed history which seeks to identify serious cardiac conditions such as UA, recent MI, decompensated CHF, significant arrhythmias, severe VHD.
- Also determine if patient has prior history of PM, AICD,
- If patient has established cardiac history, ascertain if patient has had any change in symptoms including fatigue and syncope
- Careful PE should include conjunctiva/sclera for palor and/or icterus, blood pressure measurement in both arms, carotid pulse contour and bruits, JVP and pulsations, auscultation of the lungs, precordial palpation and auscultation, abdominal palpation and examination of the extremities for edema and vascular integrity

Type of Patient

Patient specific risk factors for perioperative cardiac event

A 45-year-old male with a history of non ischemic cardiomyopathy attributed to his past cocaine use presents to his primary care clinic with complaints of shortness of breath 2 days before a planned inguinal hernia repair surgery. Before you start your interview, you note on the nursing sheet a temperature of 36.5° C, blood pressure 145/88 mm Hg, heart rate of 85 bpm, a respiratory rate of 18 breaths per minute, and a 15-lb weight gain since the previous visit 1 month ago. His physical examination reveals an S3, elevated jugular venous pressure, and pitting edema to his thighs. What is the most reasonable next step to assess this patient's cardiac risk?

- A.** Order an echocardiogram. If it is not significantly changed, proceed with the surgery.
- B.** Inquire about the patient's functional status. If the patient is able to perform the equivalent of 4 METs or more, proceed with the surgery.
- C.** Obtain a stress electrocardiogram (ECG) to assess his METs and to evaluate for new ischemia. If he is able to perform at least 4 METs of activity without ischemic changes, proceed with the surgery.
- D.** Ask the patient about heart failure symptoms. Postpone the surgery if you believe the patient has decompensated heart failure.

ASA Physical classification

- **ASA Physical Status 1** - A normal healthy patient
- **ASA Physical Status 2** - A patient with mild systemic disease
- **ASA Physical Status 3** - A patient with severe systemic disease
- **ASA Physical Status 4** - A patient with severe systemic disease that is a constant threat to life
- **ASA Physical Status 5** - A moribund patient who is not expected to survive without the operation
- **ASA Physical Status 6** - A declared brain-dead patient whose organs are being removed for donor purposes

Patient's functional Capacity

Table 3. Measures of Functional Status

<4 METs

- Eat, dress, and use the toilet
- Walk indoors around the house
- Walk 1 or 2 blocks slowly (2-3 mph)
- Do light work around the house

≥4 METs

- Walk 4 mph or faster on level ground
- Climb a flight of stairs
- Walk up a hill
- Run a short distance
- Do heavy work around the house
- Golf
- Doubles tennis

MET = metabolic equivalent.

ACC/AHA guidelines for estimating perioperative risk

- No active cardiac problems + low risk surgery + MET \geq 4 = EKG
- Poor/unknown functional capacity/potential cardiac symptoms + intermediate risk/vascular surgery = manage according to number of clinical risk factors + HR control with beta blockade
- 1-2 clinical risk factors + intermediate surgery = proceed to surgery
- \geq 3 clinical risk factors + intermediate risk surgery = proceed to surgery unless testing will change management
- \geq 3 clinical risk factors + vascular surgery = non invasive testing if it will change management

Cardiovascular risk assessment prior to non cardiac surgery

The ACC/AHA recommends a five step approach to assessing cardiovascular risk prior to non cardiac surgery

1. Urgency of the surgery
2. Presence of active cardiac conditions
3. Risk of surgery
4. Patient's functional capacity, and;
5. Presence of other clinical risk predictors as defined by the revised cardiac risk index (RCRI)

Overriding theme is that testing should only be done if the results will affect management

Revised Cardiac Risk Index

Figure 9. Lee RCRI Cardiac Risk Factors and Risk Stratification

Cardiac risk factors based on the Lee RCRI:

- High-risk surgery
- CAD
- CHF
- CVA
- Chronic renal failure with creatinine >2 mg/dL
- Insulin dependent diabetes mellitus

CAD = coronary artery disease; CHF = congestive heart failure; CVA = cerebrovascular accident; RCRI = revised cardiac risk index.

Revised Cardiac Risk Index

- High risk surgical procedures include intraperitoneal, intrathoracic and suprainguinal vascular
- History of ischemic heart disease includes history of MI, previous positive stress test, current complain of chest pain considered secondary to MI, use of nitrates, pathological Q waves on ECG
- History of CHF or CHF as evidenced by Pulmonary edema, PNH, bilateral rales or S₃ gallop or CXR showing pulmonary vascular congestion
- History of cerebrovascular disease
- Preoperative treatment with Insulin
- Preoperative serum creatinine ≥ 2.0 mg/dl

Interpretation of the RCRI

- 0 point = 0.4% risk of having major Cardiac event
- 1 point = 1% risk of having major cardiac event peri operatively
- 2 points = 6.6% risk of having major cardiac event
- ≥ 3 points = 11% risk of major cardiac event

- Major cardiac event includes MI, Acute Pulmonary Edema, Primary Cardiac arrest and complete heart block.

Type Of Surgery

Surgical Risk

Classification of surgical risk

- **This indicates risk of MI and cardiac death 30 days after surgery**

Low <1%	Intermediate 1-5%	High 6-10%
• Breast	Abdominal	Aortic
• Dental	Carotid	Major Vascular Surgery
• Endocrine	Peripheral Arterial Angioplasty	Peripheral Vascular
• Eye	Head and Neck	
• Gynecology	Neurological/Ortho	
• Reconstructive	Pulmonary, Renal, Liver	
• Orthopedic	Transplant	
• Urological	Major Urological	

Module B

Perioperative Management of Medications
Preoperative Testing

A 60-year-old female is seen in the perioperative clinic 4 months before an elective right knee replacement. The patient has a medical history significant for coronary artery disease with a myocardial infarction (MI) 4 weeks ago. She had single-vessel disease noted on cardiac catheterization and had a drug-eluting stent (DES) placed. Now she can go up a flight of stairs without any symptoms. Her current medications include atorvastatin, clopidogrel, aspirin, metoprolol, and lisinopril. What is the most appropriate recommendation to give her on her upcoming surgery?

A. The patient may proceed to surgery, but she will need to discontinue the clopidogrel for 5 days before surgery. She should continue the aspirin if possible.

B. The patient may proceed to surgery, but she will need to discontinue the aspirin 1 week before surgery. She should continue the clopidogrel if possible.

C. The patient may proceed to surgery, but she will need to continue both the aspirin and clopidogrel before surgery if possible.

D. The patient should not have elective surgery until 1 year after the DES was placed.

- Reconcile ALL medications, including OTC and herbal preparations- this is an important safety measure:
 - Effect on disease process if stopped or continued or withdrawn
 - Pharmacokinetics
 - Risk of adverse effects and drug interactions especially with anesthesia

Medications to be discontinued or modified before surgery include antiplatelet agents, anticoagulants, hypoglycemic drugs and corticosteroids

Table 3. Summary of Cardiovascular Medications

Current Medication	Preoperative Recommendation
β blockers	Continue (dangerous to withhold)
Clonidine	Continue (likely dangerous to withhold)
Calcium channel blockers	Continue
Diuretic	Discontinue
ACEI or ARB	Controversial
Antianginal	Continue
Antiarrhythmic	Continue
Statins	Continue (possibly dangerous to withhold)
Cholestyramine	Discontinue
Gemfibrozil	Discontinue

ACEI = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker.

Diabetes Medications

- Discontinue all oral hypoglycemics 24 hours preop, especially metformin because of Lactic acidosis

How to calculate Insulin TDD

Insulin Sensitive - type 1, lean, malnourished, early or AKD =
0.3u/kg/day

- Insulin Resistant (obese) or receiving high dose steroids =
0.5units/kg/day

- Neither sensitive nor resistant = 0.4units/kg/day

*Give half of TDD as a Bolus

*Half as a basal (nutritional)dose with meals

*Cover with sliding scale (correctional)

- **Cardiac and Antihypertensives**

- .Continue all on am of surgery with sip of water especially clonidine
- .Continue ASA if recent MI (6 weeks)
- . Hold diuretics day before surgery
- .Consider indication for ACE/ARB and hold if possible RF/Hypotension

Thyroid Diseases

Hypothyroidism

- .continue newly diagnosed and chronic pts on po levothyroxine throughout the perioperative period
- .Decrease IV dose to 80% of po dose

- **Hyperthyroidism**

- *Delay surgery*
- Continue PTU, Methimazole and potassium iodide
- Corticosteroids to stop T4 conversion to T3
- Beta blockers to block peripheral effects

Psychotropic Agents

- TCA, Lithium, Valproic acid- continue
- SSRI alter platelet aggregation, weigh risks and benefits
- MAO - d/c 2 weeks preop can cause severe HTN with some anesthetic agents
- **Herbals**
- D/c ALL 7 days before surgery
- Ginseng, Garlic and Ginkgo biloba inhibit platelet aggregation
- Ephedra can cause MI, CVA
- St John's wort – induction of cyp 450 enzymes
- Echinacea activates cell mediated immunity

- **Glucocorticoids**

If < 3 weeks or has taken alternate day steroids – same dose perioperatively

If 5-20mg/day for ≥ 3 then test or give empiric coverage

If >20mg/day for 3 weeks or have cushinoid appearance then increase dose of corticosteroids- stress dose hydrocortisone

Oral Contraceptives/ post menopausal HRT

Risk of VTE increases within 4 months of starting OCP and decreases within 3 months of stopping

D/c 4-6 weeks prior

Balance risk of unwanted pregnancy

Selective Estrogen Receptor Modulator (SERM)

D/c if for primary prevention of osteoporosis/breast ca

Consult oncologist if being used for cancer treatment

Suggestion is to d/c 4-6 weeks before surgery

Alendronate d/c on am of surgery

NSAIDS d/c three days before, ?celebrex

Top Five Things to know about Periop Beta Blockade

- Based on **POISE** trial:
- 1. There is evidence that Beta blockers confer cardio protection with reduction in MI
- 2. Patients already on Beta blockers should be maintained on the same throughout the perioperative period, withdrawal will cause increase risk of adverse cardiac events
- 3. There **associated increase risk** of stroke and patient disability if started hours perioperatively
- 4. If recognized risk-proven high risk for CAD then start four weeks before surgery
- 5. Avoid Anemia (Hb <7mg/dl)
 - British Journal of Anesthesia/ SPAQI 2011

- **Perioperative Management of Anticoagulation**

Objective

- Manage antiplatelet agents in the perioperative period in patients at risk for ATE
- Formulate a plan for perioperative management of anticoagulation; taking into account:
 - 1. Patient's risk for ATE or VTE or Pulmonary Embolism
 - 2. Patients with mechanical valves

Needs Assessment

- **Which of the following patients is at highest risk for thrombosis when anticoagulation is stopped?**
- **A.** A 52-year-old man with a prosthetic mitral valve (ball-in-cage type)
- **B.** A 60-year-old woman with AF and an ejection fraction of 35%
- **C.** A 55-year-old man with a St. Jude aortic valve
- **D.** A 45-year-old woman with a DVT 4 months prior
- **E.** A 70-year-old man with 2 prior transient ischemic attacks

- **Which of the following statements about low-molecular weight heparin (LMWH) is FALSE?**
- **A.** LMWH has a lower rate of heparin induced thrombocytopenia than intravenous unfractionated heparin (UFH).
- **B.** LMWH preparations are more expensive than UFH.
- **C.** Although no randomized controlled trials have been completed, results of numerous studies of LMWH protocols for bridging patients on oral anticoagulants perioperatively have been favorable in terms of the risk-benefit profiles.
- **D.** LMWH is approved for use in preventing valve thrombosis, particularly in pregnant women who are unable to take warfarin in pregnancy because of the teratogenic effects.
- **E.** LMWH can be self administered at home by reliable patients, with normal renal function, weight <150 kg, who are without evidence of recent gastrointestinal bleed or stroke.

Which of the following patients has the strongest indication for postoperative bridging therapy with heparin?

- A.** A 50-year-old man with DVT 3 weeks prior
- B.** A 64-year-old woman with AF and a normal ejection fraction
- C.** A 40-year-old man with St. Jude aortic valve
- D.** A 71-year-old woman with a history of transient ischemic attack
- E.** A 52-year-old man with AF and diabetes

- **Indications**
- Atrial fibrillation- valvular or non valvular
- Valvular heart Disease
- Venous thromboembolism
- **Who needs DVT prophylaxis – (ACCP)**
 - higher/ more frequent dosing or combined therapy recommended for knee/hip athroplasty or hip repair, abdominal surgery for cancer major trauma, Spinal cord injury
 - Effective VTE prophylaxis can be achieved with LMWH, VKA or fundaparinux
 - Continue prophylaxis beyond hospitalization because of increased risk in post op weeks

Coronary stents

- BMS –continue Plavix/ASA in the Periop period if urgent surgery 4-6 weeks after placement;
- DES – Delay surgery x 1 year or continue ASA/Plavix in the periop period
- If urgent surgery/ life threatening bleeding then transfuse platelets

Remove indwelling epidural catheters 2 hours before starting LMWH

WHO NEEDS BRIDGING ANTICOAGULATION IN THE PERI OPERATIVE PERIOD?

High risk for thromboembolism: bridging advised:

- Known hypercoagulable state as documented by a thromboembolic event and 1 of the following: Protein C deficiency
Protein S deficiency
Antithrombin III deficiency
- Homozygous factor V Leiden mutation
- Antiphospholipid antibody syndrome

- Hypercoagulable state suggested by
- recurrent (≥ 2) arterial or idiopathic venous thromboembolic events (not including primary atherosclerotic events, such as stroke or myocardial infarction because of intrinsic cerebrovascular or coronary disease)
- Venous or arterial thromboembolism within the preceding 1–3 mos
- Rheumatic AF Acute intracardiac thrombus visualized by echocardiogra

- AF plus mechanical heart valve in any position
- Older mechanical valve model (single-disk or ball-in-cage) in mitral position
- Recently placed mechanical valve (<3 mos)
- AF with history of cardioembolism

- **Intermediate risk for thromboembolism: bridging on a case-by-case basis**

Cerebrovascular disease with multiple (≥ 2) strokes or TIAs without risk factors for cardiac embolism

Newer mechanical valve model (eg, St. Jude) in mitral position

Older mechanical valve model in aortic position

AF without a history of cardiac embolism but with multiple risks for cardiac embolism (ejection fraction $< 40\%$, diabetes, hypertension, non rheumatic valvular heart disease, or transmural myocardial infarction within preceding month)

- VTE $> 3-6$ mos ago*

- **Low risk for thromboembolism: bridging not advised**
- One remote VTE (>6 mos ago)*
- Intrinsic cerebrovascular disease (such as carotid atherosclerosis) without recurrent strokes or TIAs
- AF without multiple risks for cardiac embolism Newer-model prosthetic valve in aortic position

Instructions regarding warfarin use:

- 1. Stop warfarin ≥ 5 days before surgery
- 2. Check INR 1 day before surgery

If < 1.5 , proceed with surgery, If $1.5\text{--}1.8$, consider low-level reversal with vitamin K, If > 1.8 , recommend reversal with vitamin K (either 1 mg SC or 2.5 mg PO)

- 3. Recheck INR the day of surgery
- 4. Restart maintenance dose of warfarin the evening of surgery
- 5. Daily INR until in therapeutic range (> 1.9)

Instructions regarding IV UFH use:

- 1. Should start ≥ 2 days before surgery at therapeutic dose using a validated, aPTT-adjusted, weight-based nomogram (ie, 80 U/kg bolus dose IV followed by a maintenance dose of 18 U/kg/h IV)
- 2. Discontinue 6 h before surgery
- 3. Restart no less than 12 h postoperatively at the previous maintenance dose once hemostasis is achieved
- 4. HIT screening on days 3 and 7
- 5. Discontinue IV UFH when INR is in therapeutic range (>1.9)

Instructions regarding LMWH use:

- 1. Should start ≥ 2 days before surgery at BID therapeutic dose (ie, enoxaparin 1 mg/kg SC BID or dalteparin 100 IU/kg SC BID)
- 2. Discontinue ≥ 24 h before surgery (if surgery is in early morning consider holding previous morning dose)
- 3. Restart usual therapeutic dose within 12–24 h after surgery once hemostasis is achieved
- 4. Discontinue LMWH when INR is in therapeutic range (>1.9)
- 5. LMWH should be used in patients undergoing spinal or epidural anesthesia using ASRA guidelines

Appropriate Preoperative Testing

Objective

- Perform cost effective, evidence based preoperative testing .

A 60-year-old woman is evaluated before undergoing a lumpectomy for breast cancer tomorrow. Medical history is significant for hypertension, type 2 diabetes mellitus, chronic kidney disease, a myocardial infarction 2 years ago, and a stroke 1 year ago with residual right-sided hemiparesis. The patient does not have chest pain or shortness of breath and is otherwise asymptomatic. She uses a walker to ambulate. Current medications are metoprolol, simvastatin, furosemide, losartan, nifedipine, insulin glargine, insulin aspart, and aspirin.

On physical examination, temperature is 36.8 ° C (98.3 ° F), blood pressure is 160/90 mm Hg, pulse rate is 66/min, and respiration rate is 14/min. Examination is normal except for right-sided hemiparesis and mild bilateral pedal edema. Pertinent laboratory results: blood urea nitrogen, 35 mg/dL (12.5 mmol/L); creatinine, 2.2 mg/dL (194.5 µmol/L); random glucose, 180 mg/dL (9.99 mmol/L); hemoglobin A1c, 8.1%.

An electrocardiogram shows normal sinus rhythm, left ventricular hypertrophy, first-degree atrioventricular block, and nonspecific ST-T wave changes.

Which of the following is the most appropriate preoperative management?

A Postpone surgery until blood pressure is below 140/90 mm Hg

B Postpone surgery until dobutamine stress echocardiography is obtained

C Postpone surgery until fasting glucose is below 110 mg/dL (6.11 mmol/L)

D Proceed with surgery

Evidence based testing

- **Diagnostic efficacy**

Does the test correctly identify abnormalities?

Diagnostic effectiveness

Does the test change your diagnosis

Therapeutic Efficacy

Does the test change your management

Therapeutic Effectiveness

Does the test change the patient's outcome

Appropriate Preoperative Testing

- There is NO Preop risk assessment or testing for emergency surgery.
- Do NOT repeat lab tests if normal in a healthy pt within 4 months
- If a test is unlikely to effect posttest probability of poor outcome, it is an unnecessary component of preoperative risk assessment.
- Low-risk patients can proceed to surgery, high-risk patients may need to reconsider their surgical options .
- Intermediate-risk category are the patients who are most likely to benefit from further testing. the American College of Cardiology (ACC) and the American College of Physicians (ACP) have developed guidelines regarding which patients should be referred for noninvasive cardiac evaluation

Who should get what Test?

- CBC
- Serum BUN and Electrolytes
 - Age > 40, hypotension or use of nephrotoxic drugs is anticipated
- Plain CXR
- Liver Enzymes
- 12 Lead ECG
 - Risk factors for abnormal ECG include age ≥ 65 (do not repeat if normal 30 days prior to assessment), chf, hyperlipidemia
- Hemostasis
- Urinalysis
- Pregnancy test –
 - all women of childbearing age / stopped OCP preoperatively

Who should get what continued...

- Echocardiogram
 - Assess LV function in patients with current or prior heart failure with worsening dyspnea or those with dyspnea of unknown etiology
- Lung function tests/Arterial Blood gasses

ACC/AHA guidelines for ordering/performing Non invasive Cardiac testing for Non Cardiac Surgery

NO stress testing

Low risk surgery regardless of the number of clinical risk factors

Intermediate risk surgery with no clinical risk factor

Consider stress testing if:

1. Intermediate risk or non cardiac vascular surgery with 1-2 clinical risk factors and < 4 METS
2. Vascular surgery with 1-2 clinical risk factors and moderate functional capacity ≥ 4 METS

Module C

Perioperative management of Medical Problems

After completing your initial risk assessment of a 75-year-old man who is to undergo hemiarthroplasty after fracturing his hip, you wonder how best to communicate your recommendations to the surgeon. Which of the following strategies is most likely to increase the chance that the referring physician will follow your recommendations?

A. Write the recommendations at the beginning of the consult report.

B. Discuss your recommendations with the referring provider personally.

C. Make fewer than 3 recommendations.

D. Make diagnostic recommendations.

A 72-year-old man with a history of chronic obstructive pulmonary disease and type 2 diabetes presents to the hospital with cough and dyspnea. He is obtunded and tachypneic, and is intubated for impending respiratory failure. Chest X ray shows a multilobar pneumonia. At home, the patient is treated with glargine insulin, 45 units at bedtime. His current blood glucose is 331 mg/dL. Which of the following insulin regimens would be most supported by the evidence base?

- A.** Subcutaneous insulin, titrated to a target glucose of 80 to 110 mg/dL
- B.** Subcutaneous insulin, titrated to a target glucose of less than 180 mg/dL
- C.** Intravenous (IV) insulin, titrated to a target glucose of 80 to 110 mg/dL
- D.** IV insulin, titrated to a target glucose of less than 180 mg/dL

- Surgery/ Anesthesia are stressors and will induce production of counter regulatory hormones.
- Hyperglycemia with BG (≥ 200 mg/dl) is associated with increased morbidity and mortality

Based on NICE SUGAR study:

- Intensive blood sugar control (≤ 110 mg/dl) increases mortality, BG 140 – 180 is optimal; 110-140 is acceptable.
- Obtain HbA1c on admission
- D/c oral hypoglycemics night before surgery
- Start both Type 1 and Type 2 on Insulin –Basal bolus is better (RABBIT -2 trial) as this reduces the risk of hypoglycemia

- **Type 1**

- Continue basal @0.3units/kg/day
- Accucheck q4hrly while NPO
- Reassess insulin regimen if $BG \leq 70\text{mg/dl}$

Type 2

- Hold oral agents night before
- start basal at 0.25units/kg/day

Sliding scale insulin

Double basal dose to predict total daily insulin requirement

IV Insulin

In ICU, replace both basal and prandial

Superior/best efficacy and safety

- **Transitioning to oral agents**
- HbA1c on target? Continue preadmission regimen
- If HbA1c not at goal (≥ 7) then continue preadmission oral dose + basal insulin + supplementary insulin

Pulmonary Perioperative Medicine

- Pulmonary risk stratification and management to prevent
 - Pneumonia
 - Respiratory failure
 - Atelectasis
 - Bronchospasm
 - COPD exacerbation
- Type, site and duration of surgery (≥ 3 hours) are most important surgery predictors
- Age and ASA related classification are most important patient-related risk factors
- See also use of NGT, long acting anesthetic agents
- Intrathoracic and Intra abdominal carry highest risk

- ACP guidelines for reducing risk of pulmonary periop complications:
 - Smoking cessation
 - Lung expansion Maneuvers
 - Optimize perop control of medications
- **Pickwickian/OSA patient**
- Overnight pulse ox AND polysomnograph
- Screening tool for OSA –SLAPS vs Berlin (gold standard)
 - Snore loudly
 - Tired
 - Observed apnea
 - Pressure (elevated blood pressure)

Renal perioperative Medicine

- CKD is a predictor of increased postop cardiopulmonary complications and worsening post op renal function. Dialyze patients day before surgery, consult Nephrologist
- Preop factors predisposing to post op ARF
 - Age \geq 59
 - Emergency/high risk surgery
 - Liver disease
 - PAD
 - BMI \geq 32
 - COPD requiring BD therapy
 - Intraoperative diuretics/vasopressor use

Hepatic Periop Medicine

- General Anesthesia/surgery may cause decreased blood flow
- Delay elective surgery in patients with acute viral or alcoholic hepatitis **not** compensated chronic liver disease.
- Stable chronic hepatitis does not increase surgical risk
- Use Child Turcotte Pugh or MELD score to assess periop risk
 - CTP A= 10%
 - CTP B= 30%
 - CTP C = 80%
- Treat encephalopathy, ascites and coagulopathy to decrease risk

Neurology Perioperative Medicine

- Asymptomatic bruits are not correlated with risk of postop stroke
- Most post op strokes are embolic
- Risk factors include CABG, carotid end arterectomy
- Post pone elective surgery for ≥ 2 weeks after stroke
- Evidence shows periop statins decrease stroke risk

- Manage post op delirium by;
 - treating precipitating cause, quiet environment
 - Quiet environment
 - Remove restraints
 - Use Haloperidol, alternative drugs include olanzapine and risperidone

- **Periop Management of Anemia**
- No evidence to support Hb ≥ 10 ; keep above 8mg/dl

Medical and perioperative Management of the Obstetrics/Gynecology patient

for Hospitalists

John Hopkins Medicine Essentials

Objectives

- Diagnose and manage common medical complications of pregnancy.
- Employ an appropriate, evidence-based approach to prescribing medications in pregnant patient

A 34-year-old Caucasian patient, with a 26-week gestation pregnancy, is referred to you after she is found to have gestational diabetes based on oral glucose tolerance testing. Despite lifestyle modifications, she continues to have elevated blood glucoses (150–200 mg/dL) and seeks your recommendations on further treatment. What is the best advice for her?

- A.** Avoid all oral hypoglycemics during pregnancy.
- B.** We will add medications for diabetes based on your after-meal glucose levels.
- **C.** Your glucose levels are fine. You do not need to do anything differently.
- **D.** We need to avoid treating you with all insulins except for regular insulin.

Table 1. Cardiovascular Physiology Changes

- Systolic BP ↓ 10–20 mm Hg (nadir at 20 wks)
- Diastolic BP ↓ 10 mm Hg (nadir at 20 wks)
- HR ↑ 10%
- HR measured when seated can be lower than when lying on the left side, especially if the BMI is >30¹

BMI = body mass index; BP = blood pressure.

Data from Carson et al.¹

Table 2. Typical Murmur of Pregnancy

- Grade I-II early systolic murmur that decreases with inspiration
- Present in 96% of pregnant women

Other Typical Cardiovascular Examination Findings

- Nonsustained S3
- Pre-existing murmurs increase in intensity due to increased cardiac output and blood volume
- Thirty-three percent of women will have lower extremity edema

Table 3. Pathologic Findings

- Sudden changes in edema (preeclampsia) or asymmetric edema (venous thrombosis)
- Facial or hand edema
- Diastolic murmurs
- Sustained S3 or S4

HTN in pregnancy

BP should be checked in the seated position, and if elevated, should be confirmed at least 6 hours later.

Hypertension in pregnancy can be categorized as follows:

- Preeclampsia/eclampsia
- Chronic HTN
- Preeclampsia/eclampsia superimposed on chronic HTN
- Transient or late HTN
-

Table 7. Symptoms and Signs of Preeclampsia

- Headache
- Visual changes
- RUQ abdominal pain
- Hand/face edema
- New LE edema
- Retinal vasospasm
- Clonus
- Placental insufficiency (fetal growth <10th percentile, oligohydramnios)

LE = lower extremity; RUQ = right upper quadrant.

Table 8. Laboratory Evaluation in Preeclampsia

- CBC (anemia and thrombocytopenia—HELLP)
- Creatinine & LFTs separate lines
 - Creatinine (end-organ damage)
 - LFTs (end-organ damage)
 - Uric acid (elevation may indicate greater potential for eclampsia)
- Urinalysis (proteinuria)
- 24-hour urine for protein/creatinine clearance

CBC = complete blood count; HELLP = Hemolysis, Elevated Liver enzymes and Low Platelets; LFT = liver function test.

Eclampsia is defined as seizure activity without other medical cause occurring in the setting of preeclampsia.

- Labetalol and hydralazine can be given intravenously (IV). Both have a relatively rapid onset and can be titrated quickly.
- Labetalol: Give 10 mg IV. Wait 10 minutes and give 20 mg if necessary. Wait 10 minutes and give 30 to 40 mg as necessary.
- Hydralazine: Give 10 mg IV. Wait 10 minutes and give 20 mg if necessary. Wait 10 minutes and give 30 to 40 mg as necessary.



- When possible, give an oral medication at the same time so that the IV medications can act as a bridge until the oral medication becomes effective.
- Enalapril can be used postpartum.
- Enalaprilat 0.625 mg IV is used for the first dose. Enalapril 5 to 10 mg orally twice a day can be initiated at the same time.
-
- Avoid once-daily medications because they may take too long to produce an effect.
-

Table 14. Hypertension Medications

BEST	Labetalol α -methyldopa Metoprolol
OK	Nifedipine Diltiazem Hydralazine Thiazide diuretics Atenolol
CONTRA-INDICATED	ACE inhibitors ARBs Aldosterone antagonists
ACE = angiotensin-converting enzyme; ARB = angiotensin receptor blocker. Data from Briggs et al. ¹⁶	

- Generally accepted goals for initial treatment are:

SBP <165 mm Hg

DBP <95 mm Hg.

- If a patient is symptomatic (neurological symptoms, visual disturbances, pulmonary edema due to capillary leak or myocardial dysfunction), then aim for SBP <140 mm Hg and DBP <80 mm Hg.

Diabetes In Pregnancy

- During pregnancy, target blood glucose is Fasting 95mg/dl and postprandial 120mg/dl
- Oral hypoglycemics are safe in those refusing insulin, glyburide is DOC
- Control of Post prandial blood glucose has been shown to decrease fetal complications so treat based on values

Acute Venous Thromboembolism

Pregnant patients are at increased risk of VTE due to the following:

Venous stasis

Decreased protein S levels

Functional resistance to activated protein C (APC)

- All the usual tests can be obtained to diagnose DVT or PE.
- Pulmonary computed tomography (CT) angiography and V/Q scans should be obtained when indicated.
- Lower extremity duplex ultrasonography is the test of choice to exclude DVT.

D-dimer has a higher false-positive rate during pregnancy, but a negative D-dimer can be a reasonable way to exclude DVT.

Acute treatment: low-molecular-weight heparin (LMWH) or unfractionated heparin (UFH) Treatment for acute venous thromboembolism (VTE) is 6 months, followed by prophylactic treatment until at least 6 weeks postpartum.

- **Warfarin should be discontinued as soon as pregnancy is documented.** Convert to subcutaneous UFH twice a day with dosing adjusted by mid-interval PTT or weight-adjusted LMWH. Discontinue UFH and LMWH at least 24 hours prior to elective induction of labor.

Module D

Writing recommendations

Follow up

Evaluation

- Be courteous and Professional no matter the consult, even if you think it is unnecessary.
- Recommendations should be clear, concise and should answer the specific questions asked by the requesting physician
- Your recommendations are most likely to be followed if you:
 1. Communicate directly with the requesting team
 2. Write them down at the beginning of your consult note specifically and outline them with the rationale behind them
 3. If need be, put in orders yourself and make sure these are not duplicates – again by communicating verbally with the requesting team

- Request follow up appointments for patients at The Preop Clinic with the nature and timing of the tests you ordered in mind.
- Always follow up hospitalized patients daily unless you have signed out with your Attending's permission.
- Evaluation Questionnaire is in a separate booklet.
- Please feel free to call me anytime you have a question or you need some clarifications

IAO

Pager 404 278 8412