1. The recommended standard endocarditis prophylactic regimen in a patient with bicuspid aortic valve valve and severe aortic stenosis for dental procedures is:

1. Oral amoxicillin: 3 gm 1 hr preprocedure and 1.5 gm 6 hr postprocedure
2. Oral clindamycin: 600 mg preprocedure
3. Oral amoxicillin: 2 gm 1 hr preprocedure
4. Oral azithromycin: 500 mg 1 hr preprocedure
5. No antibiotics
2. 22 year old man is evaluated in the emergency department for a rapid heart rate and lightheadedness. He reports episodes of a racing heart a few times year since his early teens. Today’s episode was different, his pulse started out regular but became erratic. In addition he has never had lightheadedness with the episodes before. He is otherwise healthy and takes no medication. On examination, the patient is diaphoretic. Blood pressure is 73/42. Lungs are clear, cardiac examination reveals irregular rate no murmurs. EKG is shown on next slide:
22 year old with palpitations and lightheadedness
2. What is the therapy of choice in this patient?

1. Intravenous procainamide
2. Direct-current cardioversion
3. Intravenous verapamil
4. Overdrive atrial pacing.
3. 47 y.o obese diabetic woman with hypertension and hyperlipidemia describes increasing weakness, dyspnea over the last several days. On physical examination: Pulse 100 bpm, BP 88/56 mm Hg, RR 26, JVP not visible. Heart: tachycardic, distant S1, S2, no rub or murmur, gallop. Extremities were cool. You obtain the following EKG:
Which of the following is the next step?

1. Discharge home on po furosemide
2. IV hydration, urgent echocardiogram transfer to cardiac cath lab
3. Empiric heparin, CT angio, consider thrombolysis based on findings
4. Aspirin, IV Lopressor, IV heparin, IV nitro, rule out protocol
4. 36. year old man is evaluated for a murmur found on physical exam. Patient has no symptoms but has a sedentary lifestyle. There is a systolic murmur at the left lower sternal border that increases with inspiration. Transthoracic echo reveals demonstrates abnormal left to right atrial flow consistent with a secundum atrial septal defect. The right atrium and right ventricle are moderately enlarged. There is moderate tricuspid regurgitation

Exercise test is performed. Patient exercises 5 minutes on a Bruce protocol. There are no EKG or oxygen saturation changes with exercise.
4. What is the recommended management for this patient?

1. Observation
2. Digoxin and diuretics
3. Endocarditis prophylaxis
4. Anticoagulation
5. Closure of ASD (percutaneously or surgically)
Question 4: Treatment of atrial septal defect

- Not all atrial septal defects need to be treated
- Symptomatic (exercise intolerance, dyspnea) defects should be closed
- Evidence of right sided chamber enlargement (right atrium or right ventricle)
Question 4: Treatment of atrial septal defect

• Secundum atrial defect
  – Percutaneous closure

• Primum atrial septal defect
  – Surgical Closure

• Sinus venosus defect
  – Surgical closure
Amplatzer ASD device
5. All of the following statements with regards to Transcatheter aortic valve replacement (TAVR) are true except?:

1. Currently offered in the U.S. to patients with intermediate or high surgical risk

2. TAVR can be done in a valve in valve procedure for a failed bioprosthetic aortic valve prosthesis

3. TAVR has a higher risk of paravalvular aortic regurgitation than surgical aortic valve replacement (SAVR)

4. Hypertrophic cardiomyopathy with or without obstruction is a relative contraindication for TAVR
6. 64 y.o man sees you prior to having a radical prostatectomy. He had a bileaflet mechanical aortic valve done 2 years ago for severe aortic stenosis. Which perioperative recommendation would you make with regards to his warfarin?

1. Continue warfarin through the surgery
2. Discontinue the warfarin 3-5 days prior to surgery
3. Give SQ Vit K the day of the surgery
4. Admit for IV heparin and discontinue the warfarin
5. Substitute the warfarin with full dose aspirin
Question 6: Issues to consider when considering anticoagulation management

- What position is the valve in?
  - Mitral vs. aortic
  - Mitral valves more thrombogenic

- What type of mechanical valve is it?
  - Bileaflet valve (most common, least thrombogenic)
  - Single tilting leaflet
  - Ball and Cage Valve

- What type of procedure is it? Can operator do procedure without completely corrected INR?
Question 6: The Main Characters

- Mechanical Valves
  - Ball-cage (Starr-Edwards)
  - Tilted-disc (Bjork-Shiley, Medtronic-Hall)

* Note: the convexoconcave version of the Bjork-Shiley valve earned a bad name due to cases of strut fracture and disc embolization

- Bileaflet (St. Jude, Carbomedics)
Question 6: Anticoagulation management in prosthetic valve patients undergoing noncardiac surgery

- Superficial procedures (biopsies)
  - reduce INR to low therapeutic/subtherapeutic
- With aortic prosthesis can stop coumadin several days preop and resume postop (+/- enoxaparin)
- With mitral prosthesis in the setting of major surgery perioperative heparin is recommended
### Updated AHA/ACC Guidelines for Valvular Heart Disease

#### 11.3.2. Medical Therapy: Recommendations

<table>
<thead>
<tr>
<th>Recommendations for Bridging Therapy for Prosthetic Valves</th>
<th>Comment/Reasonable</th>
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<tbody>
<tr>
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See Online Data Supplement 21
7.45 y.o man is seen in the office for a heart murmur. He has no complaints of dyspnea or chest pain but has noticed that his exercise tolerance has decreased over the last 3-6 months. On physical examination BP 124/82 HR 74 lungs: clear; heart: S1, S2, midsystolic click, late peaking apical systolic murmur, radiating to the axilla. Echo reveals: mitral valve prolapse, severe mitral regurgitation. End systolic dimension is 51 mm, ejection fraction is 50%. Pulmonary arterial pressures estimated at 40 mm Hg.
You recommend:

1. Exercise test
2. Mitral valve replacement/repair
3. ACE inhibitor
4. No therapy needed, limit activity
5. No therapy needed, repeat echo in one year
Question 7: Indications for valve repair/replacement in chronic severe mitral regurgitation

• Symptoms
  – Exercise intolerance
  – Dyspnea
  – Is patient truly asymptomatic? Exercise testing without imaging if uncertain
Question 7: Indications for valve repair/replacement in chronic severe mitral regurgitation

• Echo criteria in asymptomatic patients
  – Drop in ejection fraction (<60%)
  – End diastolic dimension (> 60-65 mm)
  – End systolic dimension (> 40-45 mm)

• Other considerations
  – Pulmonary hypertension on echo
  – Atrial fibrillation
8. 55 y.o man comes into the office for a routine physical exam. He has no cardiovascular complaints. He has no significant past medical history. On physical examination his blood pressure was 130/70. You notice his pulse is irregular at 70 bpm. The rest of the exam is normal. The electrocardiogram is shown on the following slide:
8. What is the most appropriate treatment for thromboembolic prophylaxis?

1. No treatment
2. Warfarin
3. Aspirin 325 mg
4. Aspirin 81 mg and warfarin
5. Apixiban
Question 8: Guidelines for anticoagulation: CHADS2

- Congestive Heart Failure: 1 point
- Hypertension: 1 point
- Age: 1 point
- Diabetes: 1 point
- Stroke/TIA/TE: 2 points
Question 8: CHADSVASC

- Congestive Heart Failure 1 point
- Hypertension 1 point
- Age > 75 2 points
- Age 65-74 1 point
- Diabetes 1 point
- Stroke/TIA/TE 2 points
- Vascular Disease 1 point
- Female Gender 1 point
2012 focused update of the ESC Guidelines for the management of atrial fibrillation

Key points

- The efficacy of stroke prevention with aspirin is weak, with a potential for harm, since the risk of major bleeding (and ICH) with aspirin is not significantly different to that of OAC, especially in the elderly.
9. 34 year old man comes to see you for an episode of syncope sprinting 100 yards to catch a bus. He does not recall any symptoms prior to the episode. He denies any medical history and takes no medication. His father died suddenly of an unknown cause at age 35.

On physical examination: BP 125/65; heart 2/6 systolic murmur at LLSB that increases with Valsalva. EKG reveals prominent left ventricular hypertrophy. Echo reveals asymmetric left ventricular hypertrophy with a septal wall thickness of 3.1 cm. Resting left ventricular outflow tract gradient of 100 mm Hg, systolic anterior motion of the mitral valve with mitral regurgitation.
9. Which of the following is the most appropriate next step to prevent sudden cardiac death in this patient?

1. Amiodarone
2. Metoprolol
3. Electrophysiology study
4. Implantable cardioverter-defibrillator
10. 30 y.o woman from Guatemala is evaluated at 30 weeks of pregnancy. She has been experiencing increasing shortness of breath with exertion over the past 2 months. BP is 110/70 mm Hg, pulse is regular at 85 bpm. JVP is normal. Carotid upstrokes are brisk. Lungs: Bibasilar crackles. Cardiac exam. Loud S1. Loud P2. Diastolic low pitched murmur. ? Third heart sound
Question 10: The most likely diagnosis is:

1. Peripartum cardiomyopathy
2. Rheumatic mitral stenosis
3. Congenital aortic stenosis
4. Normal findings of pregnancy
5. Secundum atrial septal defect
Question 10: Echo findings of mitral stenosis
Balloon Mitral Valvuloplasty
11. A 45 y.o man is evaluated for exertional fatigue. He is competitive marathoner but noticed fatigue after 3 miles of running. He previously could run 10 miles without fatigue. He also developed lower extremity edema for the last 3 months. His past history is notable chemotherapy and chest radiation for lymphoma. Physical exam revealed blood pressure 115/70, pulse 72 bpm. Jugular veins distend during inspiration. There is a loud P2. No rubs. Lungs clear. 1+ pedal edema. Echo revealed normal wall thickness, small left ventricular cavity, preserved systolic function. Grade IV diastolic dysfunction (restrictive filling pattern). No respiratory variation in mitral inflow. Moderate pulmonary hypertension. Dilated inferior vena cava.
11. The most likely diagnosis in this patient is?

1. Chemotherapy induced cardiomyopathy
2. Dilated cardiomyopathy
3. Hypertrophic cardiomyopathy
4. Restrictive cardiomyopathy
5. Constrictive pericarditis
Question 11: Restrictive cardiomyopathy

- Exertional fatigue
- History of lymphoma treated with chemotherapy and radiation
- Kussmaul’s sign (elevated JVP with inspiration)
- Prominent P2 (pulmonary hypertension)
- Peripheral edema
Question 11: Echo findings of restrictive cardiomyopathy

- Normal left ventricular ejection fraction (55%)
- Restrictive filling pattern on mitral inflow Doppler
- No respiratory variation of mitral inflow
- Dilated inferior vena cava
Question 11: Restrictive cardiomyopathy vs Constrictive Pericarditis

- **Restriction**
  - No respiratory variation of mitral inflow
  - Significant pulmonary hypertension
  - LVEDP > RVEDP

- **Constriction**
  - Respiratory variation of mitral inflow
  - No significant pulmonary hypertension
  - LVEDP = RVEDP
12. 39 y.o woman presents to the emergency room with left arm numbness and dysarthria that resolved in 30 minutes. She has no cardiovascular disease risk factors. Head MRI reveals an acute cerebral infarction. Carotid ultrasounds are negative. Hypercoagulable workup is negative. What diagnostic study should be performed next?

1. Lower extremity ultrasound
2. Transthoracic echocardiogram
3. Transesophageal echocardiogram
4. Cerebral angiogram
Question 12: Ruling out cardiac source of embolus in cryptogenic stroke

- Patent foramen ovale
- Left atrial thrombus
- Valvular lesions (tumors, endocarditis)
- Treatment of PFO controversial
  - 30% of population have a PFO
  - Closure not recommended in asymptomatic patient
  - Symptomatic patients
Question 12: TEE with contrast of PFO
13. A 65 year old male presents to the emergency room with two days of progressive weakness and fatigue. On arrival, he is lethargic and has a BP of 90/50. Electrocardiogram is shown on the next slide.
The most appropriate treatment would be:

1. Lidocaine 1 mg/kg IV bolus.
2. TPA 100 mg over 90 minutes.
3. Dopamine 10 mcg/kg/min.
4. IV Calcium gluconate 1000 mg.
5. IV Normal Saline 250 cc/hr.
14. All of the following statements about PCSK9 inhibitors are true except:

1. They can reduce LDL cholesterol by 60% in patients already on statin therapy
2. They are given as a subcutaneous injection once a week
3. Neither muscle toxicity or CK elevation have been seen with PCSK9 inhibitors
4. In the FOURIER trial, PCSK9 inhibitors reduced MI and stroke rates in patients with cardiovascular disease already on a statin
5. They work by blocking the degradation of LDL receptors on the hepatocyte
Mechanism of PCSK9 inhibitors

Low PCSK9
- LDL binds to LDLR.
- LDLR recycles to the cell surface.
- LDLR releases cholesterol.

High PCSK9
- LDL binds to LDLR.
- LDLR and LDLR with LDL interact with PCSK9.
- PCSK9 targets LDLR to endosomes/lysosomes.
- PCSK9 is secreted.

Adnectin or inhibitor
- Targets LDLR to endosomes/lysosomes.
- Extracellular pathway.
- Intracellular pathway.

Semanticscholar.org
15. A 32 year old woman comes to your office after an episode of syncope. She has had several syncopal episodes since the age of 13, the most recent one two years ago. One episode was after learning of an uncle dying in a car accident, another was after an IV insertion prior to wisdom teeth extraction. The current episode occurred while riding in a car. She had just eaten, was feeling motion sick, became nauseated and diaphoretic and lost consciousness. She recovered 15 seconds later, alert and oriented. In your office her physical exam and EKG are normal.
Which diagnostic/therapeutic strategy would you recommend?

1. Tilt table test
2. Holter monitor
3. Echocardiogram
4. Reassurance
5. Electrophysiology study
16. You are asked to see a 62 year old man in consultation prior to elective prostatectomy. He is status post an uncomplicated inferior myocardial infarction 4 years ago. He underwent coronary artery bypass surgery (CABG) 2 years ago for progressive angina. He walks 2 miles/day, plays singles tennis on weekends and he has experienced no angina since his CABG. His only medications are Lopressor and aspirin.
Which of the following diagnostic strategies would you recommend before his surgery?

1. Approve for surgery without further diagnostic workup
2. Order an exercise test without thallium
3. Order an exercise test with thallium
4. Order a coronary angiogram
5. Order a dobutamine echocardiogram
Goals for Cardiovascular Consultant

Identify patients at risk for myocardial infarction and death so that appropriate testing and therapeutic measures can be undertaken
ACC/AHA Guideline For Perioperative Cardiovascular Evaluation for Noncardiac Surgery

“The overriding theme of these guidelines is that preoperative intervention is rarely necessary simply to lower the risk of surgery unless such intervention is indicated irrespective of the preoperative context”
Stepwise approach to perioperative cardiac assessment of CAD

Fleisher et al. Circulation 2014;130:2215
17. All of the following are true about oral direct thrombin and Xa inhibitors except:

1. These agents are not safe in patients with mechanical valves
2. These agents are renally cleared and may require dose adjustment
3. Nonvalvular atrial fibrillation is the only approved indication
4. Edoxaban is a Xa inhibitor.
5. Compliance is not as easy to monitor as with warfarin
Coagulation Cascade

**Initiation**

**Propagation**

- **IX**
- **IXa**
- **VIIa/TF**
- **Xa**
- **VIIIa**
- **X**

- **Rivaroxaban/apixiban**
- **Dabigatran**

**Fibrin Formation**

- **II**
- **Va**
- **Ila (Thrombin)**

**Fibrinogen**

**Fibrin**
18. What would be an appropriate initial medical regimen for this woman?

1. Furosemide, captopril and digoxin
2. Spironolactone, metoprolol, isosorbide
3. Furosemide, metoprolol, digoxin
4. Furosemide, isosorbide, hydralazine
19. All of the following statements about dual antiplatelet therapy (DAPT) after coronary stenting are true except:

- 1. Duration of therapy for a drug eluting stent (DES) is generally 6-12 months
- 2. The primary reason for DAPT is to prevent coronary restenosis
- 3. Proton pump inhibitors such as pantoprazole may inhibit the effectiveness of clopidogrel
- 4. Prasugrel and ticagrelor are platelet P2Y₁₂ receptor blockers
20. All of the statements with regards to the COAPT trial are true except:

1. The trial examines whether reducing the severity of mitral regurgitation in patients with CHF is beneficial using a Mitraclip device
2. There was a reduction in all cause mortality with the device
3. There was a reduction in hospitalizations for CHF with the device
4. The rate of device related complications was higher than expected
Findings from the COAPT Trial
Deployment of the Mitaclip