1. A 45-year-old male is diagnosed with hypertension. A kidney biopsy is performed, which shows nodules of pink hyaline material in the glomerular capillary loops. Which of the following medications is considered to be the management of the choice based on comorbidities?
   a. hydrochlorothiazide
   b. enalapril
   c. terazosin
   d. metoprolol
   e. verapamil

2. A 45-year-old male presents to the emergency room. On physical examination, his skin is warm and flushed. There is decreased systemic vascular resistance. The patient has the following vital signs:
   Blood pressure 119/50 mmHg
   Temperature: 99.9o F
   Respiratory rate: 30/min
   Pulse: 120 beats per minute with bounding peripheral arterial pulses, capillary refill <2 seconds

   Which of the following is the most likely diagnosis?
   a. hypovolemic shock
   b. obstructive shock
   c. cardiogenic shock
   d. hemorrhagic shock
   e. septic shock

3. A 50-year old male presents to the emergency room with 10/10 chest pain that is ripping and knife-like. On cardiac examination, there are no murmurs present. On physical exam, there is a decreased left-sided femoral pulse compared to the right side and blood pressure in the right arm is 160/120 compared to 110/90 in the left arm. Which of the following radiologic findings would be most likely present in this patient?
   a. cardiomegaly
   b. widening of the mediastinum
   c. rib notching and a “3 sign” of the aorta
   d. Kerley-B lines
   e. Batwing appearance of the hilum
4. In evaluating a patient with progressive dyspnea, an echocardiogram is obtained, showing inadequate relaxation of the heart, a thickened pericardium and diastolic dysfunction. On physical examination, there is increased jugular venous distention, especially with inspiration. Which of the following is most consistent with the suspected diagnosis?
   a. pericardial knock
   b. bilateral atrial enlargement
   c. speckled myocardium
   d. vegetation on the mitral valve
   e. diastolic collapse of the cardiac chambers

5. An 11-year old previously healthy patient with a recent history of myalgias and runny nose presents with a 3 week onset of gradual increase in exercise intolerance, abdominal pain and shortness of breath. He has no recent travel history. On physical examination, rales are heard as well as a third heart sound. There is no periorbital edema or skin lesion. A chest radiograph is obtained and it shows cardiomegaly. An examination of fresh anticoagulated blood and buffy coat is negative for motile parasites. A biopsy of the cardiac tissue shows infiltration of lymphocyte with myocardial tissue necrosis. Which of the following is the most likely cause of the symptoms?
   a. herpes simplex virus
   b. enterovirus
   c. adenovirus
   d. influenza virus
   e. trypanosoma cruzi

6. A 43-year-old otherwise healthy male has been having recurrent episodes of episodic dull chest pain that usually occurs at rest or awakens the patient at night. The patient denies any pain currently and is asymptomatic. Chest radiology shows no acute cardiopulmonary disease. A 12 lead electrocardiogram shows normal sinus rhythm at 88 beats per minute with no ST-T wave changes. An exercise stress test is performed and showed no acute ST depressions, ST elevations of T wave inversions. Which of the following is the most likely diagnosis?
   a. acute pericarditis
   b. stable angina
   c. unstable angina
   d. prinzmetal's angina
   e. Non ST elevation myocardial infarction
7. A 14-year-old male comes in for a wellness visit and has a physical examination done. On cardiac examination, there is a systolic ejection crescendo-decrescendo murmur best heard at the left upper sternal border with a loud first heart sound and a widely fixed split second heart sound that does not vary with respirations. Blood pressure in the right arm is 120/80 and the left arm 125/80. Carotid and femoral pulses are 2+. Which of the following is the most likely diagnosis?
   a. coarctation of the aorta
   b. patent ductus arteriosus
   c. atrial septal defect
   d. aortic stenosis
   e. aortic regurgitation

8. A 42-year-old male presents with acute chest pain for 2 hours that is not relieved with rest. On physical examination, his vital signs are as follows:
   Blood pressure: 88/60
   Pulse: 49 beats per minute
   Respiration: 20 per minute
   O2 sat: 97% on room air
   Temperature: 98.9
   An ECG shows 3-mm ST elevations in leads II, III and avF and ST depressions in leads V1, V2, V3 and V4. Which of the following is the most appropriate management at this time?
   a. administration of IV nitroglycerin
   b. administration of IV morphine
   c. administration of IV fluids
   d. administration of IV labetalol
   e. administration of IV Furosemide

9. A 34-year-old patient presents with palpitations. The patient is hemodynamically stable. The following rhythm is seen on the monitor.

Which of the following is the management of choice
   a. synchronized cardioversion
   b. unsynchronized cardioversion
   c. amiodarone
   d. adenosine
   e. atropine
10. Which of the following is classically associated with mitral stenosis?
   a. bounding pulses
   b. weak, delayed carotid upstroke
   c. mid systolic ejection click
   d. opening snap
   e. increase in murmur intensity when then patient sits up and leans forward

**QUESTION 1**

*Choice B enalapril is correct.* The biopsy description is classic for *[Kimmelstiel-Wilson lesion](#)* (nodular glomerulosclerosis) which is a pathognomic lesion seen in patients with *[diabetic nephropathy](#)*. This lesion is due to non-enzymatic glycosylation of proteins seen with diabetes mellitus. This is usually the first evidence of proteinuria, leading eventually to microscopic proteinuria (evidence of renal damage and dysfunction). Over time this *[proteinuria](#)* and damage to the kidney will ultimately lead to end stage renal disease. Diabetes is the most common reason patients end up on dialysis (hypertension is second). ACE inhibitors are considered renoprotective and agents of choice in patients with diabetes, chronic kidney disease or nephrotic syndrome due to their mechanism of action. ACE inhibitors preferentially dilate the efferent arterioles near the glomerulus, leading to a drop in glomerular filtration rate. A drop in glomerular filtration rate means less protein is lost at the glomerulus, reducing proteinuria.

Choice A (hydrochlorothiazide) is incorrect. Thiazides are often used in patients diagnosed with hypertension with no comorbidities, in African-American patients (along with Calcium channel blockers) and in patients with isolated systolic hypertension. They do not have affects on proteinuria.

Choice C (Terazosin) is incorrect. This drug is not considered first line therapy due to its side effect profile (first dose hypotension and syncope). It is however considered a great choice in patients with both hypertension and benign prostatic hypertrophy. This is because alpha-1 receptor activation leads to contraction of the urethra and prostate, decreasing urinary outflow. *[alpha-1 blockers](#)* such as terazosin improve urinary outflow in patients with BPH by causing relaxation of the prostate and the bladder neck. Tamsulosin is the most uroselective of the alpha-1 blockers.

Choice D (Metoprolol) is a cardioselective beta blocker. Beta blockers are not usually first line medications in hypertension (but may be useful in patients with concurrent angina or post myocardial infarction).

Choice E (Verapamil) is a nondihydropyridine. In patients, Dihydropyridine calcium channel blockers (amlodipine, nicardipine etc. the ‘pines”) are preferred for hypertension because they have little effect on the heart but exerts its effect by causing dilation of peripheral arterioles. Verapamil may be useful in patients with hypertension and angina.
QUESTION 2

Choice E (septic shock) is the correct answer. Septic shock is a type of distributive shock. Distributive shock is defined as excess vasodilation with shunting of blood flow from vital organs (heart, kidney) to non-vital organs (ex skin). **Early septic shock is associated with increased cardiac output (brisk capillary refills, warm, flushed skin), and decreased systemic vascular resistance** when compared to other types of shock.

Choice B (obstructive shock) is incorrect. **Obstructive shock is due to obstruction of blood flow from the heart or great vessels.** Common causes include massive pulmonary embolism, pericardial tamponade, tension pneumothorax and aortic dissection. Obstructive shock leads to a decreased cardiac output, increased pulmonary capillary wedge pressure and increased systemic vascular resistance.

Choice C (cardiogenic shock) is a primary disorder of the myocardium (ex myocardial infection, myocarditis, valvular, congenital heart diseases, and cardiomyopathy. Cardiogenic shock is associated with decreased cardiac output (cool, clammy skin), increased pulmonary capillary wedge pressure, and increased systemic vascular resistance.

Choice D (hemorrhagic shock) and choice A (hypovolemic shock) are due loss of blood or fluid volume. Hypovolemic shock is associated with decreased cardiac output (cool, clammy skin), decreased pulmonary capillary wedge pressure, and increased systemic vascular resistance.

QUESTION 3

Choice B (widening of the mediastinum) is correct. This is the classic description of aortic dissection in which a patient develops ripping chest pain as there is a tear in the innermost layer of the aortic wall (the intima). A widened mediastinum may also be seen in pulmonary anthrax.

Choice A (cardiomegaly) appearance is classically seen with systolic dysfunction, dilated cardiomyopathy and large pericardial effusions).

Choice C (rib notching and a “3-sign”) are signs of narrowing (coarctation) of the aorta. Whenever there is significant variation of pulses between the left and the right, aortic dissection, Takayasu arteritis should be suspected. However, with coarctation, there should be a systolic murmur present that radiates to the back. Coarctation usually present with signs of heart failure instead of acute chest pain.
Choice D and E (Kerley B lines and Batwing appearance of the hilum) are associated with congestive heart failure. Pulmonary crackles (rales) would be most likely present in these patients and shortness of breath instead of knife-like pain is usually reported in congestive heart failure.

**QUESTION 4**

*Choice A (pericardial knock) is correct.* This is classically describing constrictive pericarditis. This is due to a stiff, inelastic pericardium that causes diastolic dysfunction by inhibiting filling of the ventricles during diastole. The pericardial knock is due to sudden cessation of ventricular filling by the stiff pericardium.

Choice B (bilateral atrial enlargement) and choice C (speckled myocardium) is seen in restrictive cardiomyopathy. Both are associated with diastolic dysfunction & impaired diastolic ventricular filling. However, restrictive cardiomyopathy is associated with myocardial dysfunction, not a thick or calcified pericardium. A speckled myocardium is classically seen with amyloidosis (the most common cause of restrictive cardiomyopathy).

Choice D (vegetation on the mitral valve) is classically associated with infective endocarditis.

Choice E (diastolic collapse of the ventricles) is classic for pericardial tamponade. In tamponade, Kussmaul’s sign (increased JVP with inspiration) may also be seen. Tamponade would be associated with Beck’s triad (muffled heart sounds due to the pericardial effusion), systemic hypotension (due to decreased forward flow) and increased jugular venous pressure (form increased backflow of blood). Tamponade by itself is not associated with thickening of the pericardium.

**QUESTION 5**

*Choice B is correct.* Viruses are the most common cause of myocarditis, which is inflammation of the heart muscle. Of all the viruses the Enteroviruses (Echovirus and Cosackie virus – especially Coxsackie B) are the most common causes.

Choice A (HSV) Choice C (adenovirus) and Choice D (influenza virus) may cause viral myocarditis, but is not the most common viral etiologies.

Choice E (Trypanosoma cruzi) are protozoa that can cause *Chagas disease*. Chagas disease is associated with dilated cardiomyopathy as well but will often have a *chagoma* (swelling at the site of bite by the Assassin bug – often on the face) and develops *ipsilateral periorbital swelling (Romanya's sign)* and evaluation of the blood will be positive for the parasitemia. The patient may even develop toxic megacolon as a complication. The patient would usually have travel history or lived in Latin America (especially South America)
QUESTION 6

Choice D (Prinzmetal’s angina) is correct. Prinzmetal’s angina is due to coronary vasospasm, leading to transient ST elevations, and a normal ECG in between episodes. The chest pain is classically nonexertional and often occurs at night and at rest. Ischemic disease would most likely show ECG changes (although 50% of patients with ischemic disease will have a normal resting ECG). A negative stress test and negative angiography are more likely seen in patients with Prinzmetal’s angina, reflecting that the underlying problem is vasospasm not atherosclerosis.

Choice A (acute pericarditis) is classically associated with chest pain that is pleuritic (sharp and worsened with inspiration), persistent, postural (relieved with sitting forward) and often associated with a pericardial friction rub. Pericarditis is also classically associated with diffuse ST elevations especially in the precordial leads, reflecting epicardial injury.

Choice B stable angina will often shows ST depressions (normal resting ECG in up to 50%) but a stress test would most likely induce chest pain or ST/T wave changes.

Choice C unstable angina would classically show ST depression and T wave inversions.

Choice E (Non ST elevation MI) would classically show ST depression and T wave inversions, as well as positive cardiac enzymes.

QUESTION 7

Choice C (atrial septal defect) is correct. Atrial septal defect classically presents with a systolic murmur, prominent S1 and a widely fixed, split S2 sound.

Choice A (coarctation of the aorta) is classically associated with a systolic ejection murmur that radiates to the back or scapula and delayed weak femoral pulses and asymmetrical blood pressure measurements between arms of >20 mmHg.

Choice B (patent ductus arteriosus) is classically associated with a continuous machinery murmur

Choice D (aortic stenosis) is classically associated with a systolic ejection crescendo murmur that radiates to the neck and is associated with a weak, delayed upstroke of the peripheral pulses.

Choice E (aortic regurgitation) is a diastolic murmur(not systolic).
**QUESTION 8**

*Choice C (IV fluids) is correct.* The inferior ST elevations and the St depressions in anterior leads (which in reality represent with reciprocal changes seen in posterior wall myocardial infarctions) reflect right coronary artery involvement. In patients with myocardial infarction, tachycardia is common but since the right coronary artery supplied the Sa and the AV node in the majority of patients, they may present with bradycardia. Because right sided infarctions are preload dependent, IV fluids help to preserve preload, thereby protecting the cardiac output.

Choice A (IV nitroglycerin) is incorrect. Although IV nitroglycerin is helpful patients with myocardial infarction, patients with inferior and/or posterior wall MI’s are preload dependent. IV nitroglycerin may drop preload. In addition, a systolic blood pressure <90 mm Hg is a contraindication to it’s use. This question tests your knowledge of the contraindications of the drugs.

Choice B (IV morphine) can also drop preload in these patients who are preload dependent (although often used in acute coronary syndrome).

Choice D (IV labetalol) is also often used in the management of acute coronary syndrome. A pulse >50 bpm, systolic blood pressure <100 are also contraindications to the use of beta blockers. Beta blockers are also often routinely used in ACS but be familiar with the indication and contraindications of beta blockers in these patients.

Choice E (Furosemide) is helpful in congestive heart failure, not inferior/posterior wall infarctions.

**QUESTION 9**

*Choice D (Adenosine) is correct.* Adenosine is the drug of choice for narrow complex SVT. Adenosine temporarily blocks the AV node, thereby terminating the reentry of the impulse.

Choice A (synchronized cardioversion) is the treatment of choice for unstable tachycardia

Choice B (unsynchronized cardioversion) is the treatment of choice only for pulseless ventricular tachycardia or ventricular fibrillation.

Choice C (amiodarone) is the treatment of choice for wide complex tachycardia not narrow one.

Choice E (atropine) is an anticholinergic drug that would increase the heart rate not decrease it.
**QUESTION 10**  
*Choice D (opening snap) is correct.* Mitral stenosis is almost always caused by rheumatic fever. It is classically associated with ruddy cheeks (mitral facies), atrial fibrillation (due to atrial enlargement), prominent S1 and opening snap.

Choice A (bounding pulses) is classic for aortic regurgitation

Choice B (weak, delayed carotid upstroke) is classic for aortic stenosis

Choice C (mid systolic click) is associated with mitral valve prolapse

Choice E (increase intensity of murmur when sitting up and leaning forward) is associated with aortic murmurs – aortic stenosis and aortic regurgitation not mitral murmurs. Mitral murmurs are increased when placed in the left lateral decubitus position.