

# AACN CCRN (Adult) - Quiz Questions with Answers

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## IA. Cardiovascular

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IA. Cardiovascular

1.

Which of the following is MOST LIKELY to be true about a patient who is experiencing a hypertensive crisis?

**They will likely be found to have been noncompliant with ordered antihypertensive therapies**

They are likely to have never been diagnosed with hypertension previously

They have likely been diagnosed with diabetes prior to the hypertensive crisis

They are likely to be pregnant

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*Correct answer: They will likely be found to have been noncompliant with ordered antihypertensive therapies*

*Most patients who are experiencing a hypertensive crisis are found to have been noncompliant with ordered antihypertensive therapies. These patients likely have established hypertension that is not being treated correctly. While a diagnosis of diabetes may increase the risk of chronic hypertension and a subsequent hypertensive crisis, this diagnosis is not the most common feature for patients experiencing a hypertensive crisis. Pregnancy is a risk factor for developing a hypertensive crisis; however, patients who experience a hypertensive crisis are more likely to have it as a complication of chronic, untreated hypertension.*

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**2.**

All of the following are evidence-based treatment approaches in the acute management of Myocardial Infarction (MI) EXCEPT:

**Fibrinolytics for NSTEMI**

Fibrinolytics for STEMI

ECG obtained within ten minutes of arrival to emergency department

Percutaneous coronary intervention for NSTEMI

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*Correct answer: Fibrinolytics for NSTEMI*

*For acute management of MI, the optimal time for initiation of therapy is within one hour of symptom onset (rarely feasible due to delay in seeking treatment). Fibrinolytics are not recommended for reperfusion of a NSTEMI (Non-ST-Elevation Myocardial Infarction).*

*Fibrinolytics should be initiated within 30 minutes of the arrival of a STEMI. PCI (Percutaneous Coronary Intervention) should be performed within 24 hours of arrival for NSTEMI reperfusion. An initial ECG (Electrocardiogram) should be obtained within ten minutes of emergency department arrival for all acute coronary symptomatology.*

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**3.**

Which of the following signs and symptoms is least likely to be present in a patient experiencing shock due to an aortic rupture?

**Hypertension**

Tachycardia

Tachypnea

Pallor

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*Correct answer: Hypertension*

*Hypotension, tachycardia, tachypnea, and pallor are common signs of shock, including in cases of an aortic rupture. Hypertension is less likely to be present during shock from an aortic rupture as the patient typically experiences a significant drop in blood pressure due to blood loss.*

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**4.**

Which cardiac enzyme elevates FIRST in acute cardiac ischemia?

**Myoglobin**

Troponin T

Troponin I

Creatine Kinase-MB (CK-MB)

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*Correct answer: Myoglobin*

*Myoglobin is released more rapidly from infarcted myocardium than troponin and CK-MB. It may be detected as early as 2 hours after an acute myocardial infarction (AMI). Levels peak in 6-7 hours, and then return to normal within 24 hours.*

*Elevated myoglobin increases suspicion of acute myocardial infarction (AMI) in patients presenting with anginal-type chest pain, and is a better marker for early detection of MI. If myoglobin is not elevated and levels are normal, it is a better negative indicator of MI.*

*Troponin I begins to increase 3 hours after onset of MI, peaks at 14 to 18 hours, and remains elevated for 5-7 days.*

*Troponin T begins to increase 3-5 hours after symptom onset and remains elevated for 14-21 days.*

*CK-MB has good sensitivity and specificity for detecting MI within the first 6 hours.*

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**5.**

Diagnosis of acute myocardial infarction (AMI) is based on two of three findings.

Of the following, which is NOT one of these findings diagnostic for acute myocardial infarction (AMI)?

**ST-segment elevation on ECGs**

History of ischemic-like symptoms

Changes on serial ECGs

Elevation and fall of serum cardiac enzymes

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*Correct answer: ST-segment elevation on ECGs*

*Diagnosis of AMI is based on two of three findings:*

- 1. History of ischemic-like symptoms*
- 2. Changes on serial ECGs (T-wave inversion or ST-segment depression)*
- 3. Elevation and fall in level of serum cardiac biomarkers (Troponin I or T, myoglobin, and creatine kinase)*

*Of AMI patients, 50% do not present with ST-segment elevation.*

*Other indicators include: ST-segment depression (may indicate NSTEMI), new left bundle branch block (LBBB) and ST-segment depression that resolves with relief of chest pain. T-wave inversion in all chest leads may indicate NSTEMI with a critical stenosis in the proximal left anterior descending coronary artery (LAD).*

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**6.**

Which of the following statements is ACCURATE regarding the diagnosis of acute myocardial infarction (AMI) and cardiac biomarkers?

**Diagnosis is based on two of three findings: history of ischemic-like symptoms, changes in serial ECGs, and elevation/fall in level of serum cardiac biomarkers**

Troponin T is released from the myocardium within 2 hours of coronary occlusion

Troponins I and T are better markers for an early ruling out of MI than the other cardiac enzymes

Of AMI patients, approximately 75% have ST-segment elevation on their initial ECG, and the label "STEMI" is used in this situation

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*Correct answer: Diagnosis is based on two of three findings: history of ischemic-like symptoms, changes in serial ECGs, and elevation/fall in level of serum cardiac biomarkers*

*Diagnosis of AMI is based on two of three findings:*

- *History of ischemic-like symptoms*
- *Changes in serial ECGs*
- *Elevation and fall in level of serum cardiac biomarkers*

*Thirty-five percent (not 75%) of patients with AMI have ST-segment elevation on their initial ECG, and in these situations, the label "STEMI" is used. Approximately 65% of those with AMI have no ECG or other diagnostic changes.*

*Cardiac enzymes include troponin I and T, myoglobin, and creatine kinase (CK and CK-MB). Myoglobin (not troponin T) is released from the myocardium within 2 hours of coronary occlusion, and is a better marker for early detection of MI. It is also a better negative indicator if negative.*

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**7.**

Which of the following is MOST LIKELY to be the cause of hypertrophic cardiomyopathy?

**Aortic stenosis**

Chagas disease

Alcohol use

Myocardial fibrosis

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*Correct answer: Aortic stenosis*

*Hypertrophic cardiomyopathy is most likely to be caused by aortic stenosis, causing increased afterload and hypertrophy of the ventricular myocardium. Chagas disease and alcohol use are most likely to cause dilated cardiomyopathy, while myocardial fibrosis is most likely to cause restrictive cardiomyopathy.*

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**8.**

Bleeding is a common complication of fibrinolytic therapy. What is the MOST common location of bleeding?

**Groin**

Intracerebral

Genitourinary

Gastrointestinal

*Correct answer: Groin*

*Totally occluded arteries require immediate reperfusion therapy, such as fibrinolysis, angioplasty, or coronary artery bypass grafting (CABG), to effectively restore blood flow to the coronary artery. In the acute setting, for STEMI (ST-elevation myocardial infarction), fibrinolytic therapy is often the fastest, most universally available method for reperfusion if a catheterization laboratory is not available or operational 24 hours a day.*

*Fibrinolytic therapy works by dissolving clots which are obstructing blood flow to the brain. The most common complication associated with fibrinolytic therapy is bleeding. Localized groin bleeding has the highest occurrence at 25–45%, followed by gastrointestinal bleeding at 4–10%. Intracerebral bleeding is the most dangerous complication, but its incidence is quite low at 1.45%. Genitourinary bleeding occurs in 1-5% of patients undergoing fibrinolytic therapy.*

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**9.**

All of the following laboratory values indicate a diagnosis of Acute Myocardial Infarction (AMI) EXCEPT:

**Creatine Kinase (CK): 135 mcg/L**

Troponin T: 0.5 ng/mL

Troponin I: 0.9 ng/mL

Myoglobin: 85 ng/mL

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*Correct answer: Creatine Kinase (CK) 135 mcg/L*

*Creatine Kinase (CK) of greater than 150 to 180 mcg/L is an indicator of a heart attack; therefore, CK of 135 mcg/L does not indicate AMI.*

*The three other labs are elevated; therefore, indicative of Myocardial Infarction (MI). MI is indicated with lab results showing:*

- *Troponin T: > 0.1 to 0.2 ng/mL*
  - *Troponin I: > 0.4 ng/mL*
  - *Myoglobin: 17.4 to 105.7 ng/mL*
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**10.**

Which of the following BEST describes the function of the papillary muscles?

**The papillary muscles control the opening and closure of heart valves.**

The papillary muscles play an important role in the letdown reflex during lactation.

The papillary muscles maintain vascular tone in the smallest blood vessels throughout the body.

The papillary muscles assist the ventricles to fully contract during systole.

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*Correct answer: The papillary muscles control the opening and closure of heart valves.*

*The papillary muscles sit within the ventricles and control the opening and closure of heart valves. These muscles account for about 10% of heart mass. They do not assist the ventricles in fully contracting during systole and are not connected with any non-cardiac functions.*

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**11.**

Of the following drug classes, which is NOT indicated for the management of heart failure (HF)?

**Calcium channel-blocking (CCBs) agents**

Selective beta-blocking agents

Nitrates

Angiotensin-converting enzyme (ACE) inhibitors

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*Correct answer: Calcium channel-blocking (CCBs) agents*

*CCBs should generally be avoided in patients with HF plus reduced ejection fraction since they provide no functional or mortality benefit, and some first generation agents may worsen outcomes. They have negative inotropic activity, and therefore, weaken the force of myocardial contractility.*

*First line drugs in the management of acute heart failure include:*

- *Nitrates: reduce oxygen consumption, dilate venous system, and relax arterial smooth muscle*
  - *ACE inhibitors: decrease afterload, inhibit the renin-angiotensin-aldosterone system (RAAS), reducing fluid volume overload and remodeling of the left ventricle*
  - *Beta-blockers: reduce the frequency of ventricular tachycardia and ventricular fibrillation, which are the most prevalent cause of death in heart failure patients*
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**12.**

Which of the following is the MOST LIKELY early symptom to occur with an aortic aneurysm?

**Early symptoms are not likely to occur with aortic aneurysms**

Dyspnea

Tachycardia

Tearing pain in the chest, back, or abdomen

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*Correct answer: Early symptoms are not likely to occur with aortic aneurysms*

*Aortic aneurysms are normally asymptomatic in their early stages. Pain only occurs as an expanding aneurysm begins to create pressure on the internal tissues and nerves. Tachycardia and dyspnea are both late signs that occur when the aneurysm places pressure on blood vessels, airways, or begins to dissect or rupture.*

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**13.**

Which of the following types of cardiomyopathy is MOST LIKELY to cause a left bundle branch block (LBBB) on a 12-lead electrocardiogram?

**Dilated cardiomyopathy**

Hypertrophic cardiomyopathy

Restrictive cardiomyopathy

A bundle branch block is not indicative of any type of cardiomyopathy

*Correct answer: Dilated cardiomyopathy*

*Dilated cardiomyopathy, the most common type of cardiomyopathy, is often caused by coronary artery disease, and is associated with impaired myocardial contractility and increased ventricular filling pressures.*

*Dilated cardiomyopathy can be diagnosed with a 12-lead electrocardiogram (ECG or EKG) showing:*

- *bundle branch block (LBBB most common)*
- *ST-segment and T-wave changes*
- *left axis deviation*
- *left ventricular hypertrophy*

*ECG changes associated with hypertrophic cardiomyopathy include ST-segment and T-wave changes, septal Q waves due to septal hypertrophy, and left ventricular hypertrophy.*

*ECG changes associated with restrictive cardiomyopathy include ST-segment and T-wave changes, and low QRS amplitude.*

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**14.**

Meperidine, a short-acting opioid, is avoided in patients taking monoamine oxidase inhibitors (MAOIs) because of the potential for development of:

**Hypertensive crisis**

Distributive shock

Seizures

Opioid toxicity

*Correct answer: Hypertensive crisis*

*Meperidine is a short-acting opioid that has one-seventh the potency of morphine. Patients who are taking MAOIs, a strong class of antidepressants, should not concurrently take meperidine because of the risk of developing a hypertensive crisis that may be fatal. A hypertensive crisis may develop in these patients up to 2 weeks after initiation of meperidine.*

*While meperidine is an opioid, opioid toxicity is not the primary concern when combining it with MAOIs. The role of this agent as an analgesic has been reduced drastically due to seizure potential, which is an adverse effect of meperidine alone, not in combination with other drugs. Distributive shock is not a concern here.*

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**15.**

The critical care nurse is caring for a patient with a diagnosis of cardiogenic shock. Which of the following hemodynamic parameters are aligned with this diagnosis?

**Left Atrial Pressure (LAP) 15 mmHg**

Pulmonary Artery Wedge Pressure (PAWP) 5 mmHg

Heart rate 82 beats per minute

Cardiac Output (CO) 8.9 L/min

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*Correct answer: Left Atrial Pressure (LAP) 15 mmHg*

*Normal values of LAP are 6–12 mmHg; thus an elevated LAP of 15 mmHg best aligns with the diagnosis of cardiogenic shock.*

*In cardiogenic shock, the heart ceases to function effectively as a pump, resulting in decreases in stroke volume and cardiac output; this leads to a decrease in blood pressure and tissue perfusion. The inadequate emptying of the ventricle increases left atrial pressure, which then increases pulmonary venous pressure. As a result, pulmonary capillary pressure increases, resulting in pulmonary edema.*

*Normal values of CO are 4–8 L/m and are decreased in cardiogenic shock; thus a CO of 8.9 L/min does not align with cardiogenic shock. Cardiogenic shock generally causes PAWP to increase; thus a PAWP of 5 mmHg does not align with the diagnosis (normal is 6–12 mmHg). Patients in shock generally present as tachycardic, so a normal heart rate of 82 does not align with cardiogenic shock.*

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**16.**

The nurse is caring for a patient and auscultates a diastolic heart murmur. In which of the following valvular disorders would the nurse anticipate with this finding?

**Mitral stenosis**

Tricuspid insufficiency

Aortic stenosis

Mitral insufficiency

*Correct answer: Mitral stenosis*

*Heart murmurs are the result of abnormal blood flow and are produced by two murmurs: mitral stenosis and mitral insufficiency. Mitral stenosis is a narrowing of the mitral valve opening that blocks (obstructs) blood flow from the left atrium to the left ventricle. Mitral insufficiency is a backflow of blood caused by the failure of the heart's mitral valve to close tightly. Both of these can cause heart murmurs.*

- *Systolic murmurs: Produced by mitral and tricuspid insufficiency*
  - *Diastolic murmurs: Produced by mitral and tricuspid stenosis; pulmonic and aortic insufficiency*
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**17.**

The nurse is caring for a newly admitted patient with worsening chronic heart failure. The nurse notes on the patient's EKG strip that the P wave in lead II is  $> 0.13$  seconds and  $> 3.2$  mm.

The nurse knows that these findings MOST LIKELY indicate:

**Atrial hypertrophy**

Atrial hypotrophy

Ventricular hypertrophy

Ventricular hypotrophy

*Correct answer: Atrial hypertrophy*

*The P wave represents atrial muscle depolarization. It is normally 2.5 mm or less in height and 0.11 seconds or less in duration. The P wave morphology, which is smooth and rounded, can reveal right or left atrial hypertrophy or atrial arrhythmias and is best determined in leads II and V1 during sinus rhythm.*

**Patient's EKG Findings      Normal EKG Findings**

$> 3.2$  mm

$\leq 2.5$  mm

$> 0.13$  seconds

$\leq 0.11$  seconds

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**18.**

A patient with Wolff-Parkinson-White syndrome asks the critical care nurse about treatment of this condition. Which of the following answers is CORRECT?

**The specific therapy depends on the mechanism of the tachyarrhythmia caused.**

There is no cure for Wolff-Parkinson-White syndrome.

Wolff-Parkinson-White syndrome should be treated as soon as possible once it is diagnosed.

Treatment for Wolff-Parkinson-White syndrome focuses on treating a malfunctioning AV node.

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*Correct answer: The specific therapy depends on the mechanism of the tachyarrhythmia caused.*

*There are multiple potential therapies that can be used to treat Wolff-Parkinson-White syndrome, but the specific therapy does depend on the mechanism causing the tachyarrhythmia. Wolff-Parkinson-White syndrome can be cured by radioablation that destroys the aberrant conduction pathway. Wolff-Parkinson-White syndrome is only treated if it causes symptomatic tachyarrhythmias. In Wolff-Parkinson-White syndrome electrical signals in the heart bypass the AV node. The AV node functions normally, but is circumnavigated by aberrant conduction pathways. Treating the AV node is not a component of treating Wolff-Parkinson-White syndrome.*

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**19.**

In which of the following clinical scenarios is intra-aortic balloon pump (IABP) therapy contraindicated?

**Aortic aneurysm**

Angina refractory to medical therapy

Cardiogenic shock

Failure to wean from cardiopulmonary bypass after cardiac surgery

*Correct answer: Aortic aneurysm*

*The IABP provides cardiac assistance by improving myocardial oxygen supply and reducing cardiac workload. The IABP works on the principle of counterpulsation. Gas (helium or CO<sub>2</sub>) moves back and forth from the IABP console to the IABP catheter, causing inflation and deflation of the balloon. Inflation occurs during ventricular diastole, increasing intra-aortic pressure and blood flow to coronary arteries. Deflation occurs immediately before ventricular systole, decreasing intra-aortic pressure. This pressure reduces the resistance to left ventricular ejection, or afterload.*

*IABP therapy may be used to treat:*

- *Angina refractory to medical therapy*
- *Left ventricular failure*
- *Cardiogenic shock*
- *Failure to wean from cardiopulmonary bypass after cardiac surgery*

*Symptoms necessitating the need for IABP therapy include symptoms of cardiogenic shock (tachycardia, systolic BP > 90 mmHg, MAP < 70 mmHg, CI < 2.2–2.5 L/min/square meter, PAOP pressure < 18 mmHg), decreased oxygenation, unstable angina, inadequate peripheral perfusion, and decreased urine output.*

*Contraindications to IABP therapy include moderate to severe aortic insufficiency and aortic aneurysms.*

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**20.**

Which of the following is a goal of intra-aortic balloon pump therapy?

**Maximize aortic diastolic augmentation pressure**

Increase systolic blood pressure

Decrease MAP

Increase end-diastolic blood pressure

*Correct answer: Maximized aortic diastolic augmentation pressure*

*The IABP (Intra-Aortic Balloon Pump) provides cardiac assistance by improving myocardial oxygen supply and reducing cardiac workload. The IAPB works on the principle of counterpulsation. Gas (helium or CO<sub>2</sub>) moves back and forth from the IABP console to the IABP catheter, causing the balloon to inflate (during ventricular diastole, increasing intra-aortic pressure and blood flow to the coronary arteries) and deflate (just prior to ventricular systole, decreasing intra-aortic pressure). This counterpulsation increases the Mean Arterial Pressure (MAP), improves coronary artery blood flow and perfusion during diastole, and decreases systolic blood pressure and end-diastolic blood pressure.*

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**21.**

Which of the following factors *directly* affects myocardial oxygen demand?

**Heart rate**

Preload

Afterload

Right ventricular pressure

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*Correct answer: Heart rate*

*Major physiologic factors that determine the heart's demand for oxygen include the heart size, the left ventricular (LV) systolic pressure, the heart rate, and the level of myocardial inotropic state. Heart rate and contractility affect myocardial oxygen consumption. Any therapeutic intervention that diminishes heart size, LV pressure, heart rate, and inotropic state will decrease myocardial oxygen demand.*

*Preload, also known as the left ventricular end-diastolic pressure (LVEDP), is the amount of ventricular stretch at the end of diastole. Think of it as the heart loading up for the next big squeeze of the ventricles during systole. Some people remember this by using an analogy of a balloon. Blow air into the balloon and it stretches. The more air you blow in, the greater the stretch.*

*Afterload, also known as the systemic vascular resistance (SVR), is the amount of resistance the heart must overcome to open the aortic valve and push the blood volume out into the systemic circulation. It is the pressure that the ventricles must overcome to open the aortic and pulmonic valves and to pump blood into the systemic and pulmonary vasculature. If you think about the balloon analogy, afterload is represented by the knot at the end of the balloon. To get the air out, the balloon must work against that knot.*

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**22.**

The gold standard for determining left ventricular function is:

**ejection fraction**

Cardiac Index (CI)

Cardiac Output (CO)

Left Ventricular End-Diastolic Pressure (LVEDP)

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*Correct answer: ejection fraction*

*Ejection fraction, the percentage of blood volume ejected from the left ventricle with each contraction, is the gold standard for determining left ventricular function and is helpful in selecting treatment strategies. A normal Left Ventricular Ejection Fraction (LVEF) is 55% to 60% and is one of the most important predictors of long-term outcome following acute MI.*

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**23.**

Which of the following valves can be replaced using a TAVR?

**Only the aortic valve**

The aortic and pulmonic valves

The mitral and tricuspid valves

Only the mitral valve

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*Correct answer: Only the aortic valve*

*A Transcatheter Aortic Valve Replacement (TAVR) is a minimally invasive procedure used to replace the aortic valve using an approach that involves accessing the valve using transvenous catheters. Only the aortic valve can be accessed using this method.*

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**24.**

In a patient with heart failure, which abnormal heart sound would the nurse expect to be MOST LIKELY?

**S<sub>3</sub>**S<sub>4</sub>S<sub>1</sub>S<sub>2</sub>

Correct answer: S<sub>3</sub>

*In healthy adults, there are two normal heart sounds, often described as a lub and a dub, that occur in sequence with each heartbeat. These are the first heart sound (S<sub>1</sub>) and second heart sound (S<sub>2</sub>), produced by the closing of the atrioventricular valves and semilunar valves. S<sub>3</sub> is an abnormal gallop that occurs during early diastole and is frequently caused by ventricular overload. It is an early sign of right heart failure and can also be heard in left heart failure.*

*S<sub>4</sub> is associated with angina more so than heart failure. While it may occur with heart failure, an S<sub>3</sub> is more common.*

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**25.**

In which type of shock is the heart UNABLE to pump enough blood to meet the oxygen and metabolic needs of the body?

**Cardiogenic**

Hypovolemic

Distributive

Neurogenic

*Correct answer: Cardiogenic*

*Cardiogenic shock occurs when the heart cannot pump enough blood to meet the oxygen and metabolic needs of the body. Coronary artery disease and severe heart attack are common causes of pump failure. In every case of cardiogenic shock, the heart fails to function effectively as a pump, leading to decreases in stroke volume, cardiac output, blood pressure, and tissue perfusion.*

*Hypovolemic shock occurs when there is inadequate volume in the vascular space, as in the cases of acute blood loss or shifting of fluid out of the vascular space into other body fluid spaces.*

*Distributive shock is characterized by an abnormal placement or distribution of vascular volume and occurs in three situations: sepsis, neurologic damage, anaphylaxis. Of the distributive shock syndromes, septic shock is most commonly seen in critical care settings.*

*Neurogenic shock occurs when neurological injury affects the ability to maintain vascular tone.*

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**26.**

Which of the following factors is NOT used to diagnose AMI?

**ST-segment depression**

History of ischemic-like symptoms

Changes on serial EKGs

Elevation and fall in level of serum cardiac biomarkers

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*Correct answer: ST-segment depression*

*ST-segment depression itself is not used to diagnose AMI (Acute Myocardial Infarction) unless it is noted as a change on a serial EKG. While ST-segment depression indicates an NSTEMI (Non-ST-Elevation Myocardial Infarction), it must be new or worse compared to a prior EKG. A history of ischemic-like symptoms, changes on serial EKGs, and an elevation and fall in the level of serum cardiac biomarkers are the three factors on which a diagnosis of AMI is made, with at least two of the findings needing to be present to make the diagnosis.*

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**27.**

The critical care nurse knows that the V1 electrode should be placed:

**at the fourth intercostal space, right sternal border**

at the left midaxillary line at the V4 level

below the rib cage or on the hip

on the posterior shoulder as close as possible to where the arm joins the torso

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*Correct answer: at the fourth intercostal space, right sternal border*

*Correct placement of cardiac monitoring leads is essential to obtaining accurate information from any monitoring lead. Place V1 electrode at the fourth intercostal space at the right sternal border.*

*V6 should be applied at the left midaxillary line at the V4 level. Below the rib cage or on the hip is where the leg electrodes should be placed, while the arm electrodes should be applied on the posterior shoulder as close as possible to where the arm joins the torso (this keeps the anterior chest clear for defibrillation if needed).*

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**28.**

Which of the following statements made by a patient indicates understanding of how a TAVR works?

**I may have an increased risk of bleeding internally from my femoral artery afterwards.**

I will have an incision in the center of my chest that will eventually heal.

This will significantly improve circulation to my heart muscle.

This procedure is not recommended for people who are not candidates for heart surgery.

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*Correct answer: I may have an increased risk of bleeding internally from my femoral artery afterwards.*

*A Transcatheter Aortic Valve Replacement (TAVR) is used to replace the aortic valve without requiring open-heart surgery. This means the patient will not have a sternotomy incision that will have to heal. A TAVR improves circulation produced by the heart, but is not designed to restore circulation to the myocardium. TAVRs are preferred in patients who are not candidates for more invasive surgeries.*

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**29.**

A nurse is instructing a patient with an aortic aneurysm on signs of aortic dissection. Which of the following is NOT a sign of aortic dissection?

**Hemoptysis**

A sudden increase in existing chest or back pain

Oliguria

Weakness

*Correct answer: Hemoptysis*

*Hemoptysis is not a symptom of aortic dissection. An aortic dissection would not communicate with the airways, making hemoptysis an unlikely symptom in most situations. A sudden increase in existing chest or back pain can be an indicator of dissection. Oliguria and weakness are possible symptoms due to anemia and hypovolemia that may be caused by dissection.*

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**30.**

Which of the following is the MOST definitive test for the diagnosis of aortic dissection?

**MRI**

EKG

Echocardiogram

Chest x-ray

*Correct answer: MRI*

*An MRI scan (or CT scan) is the most definitive test for the diagnosis of aortic dissection. An MRI determines the size of the aorta, size of the aneurysm, the extent of a dissection, the involvement of additional arterial branches, lumen diameter, and wall thickness.*

*Echocardiogram findings can visualize the location and size of an aneurysm. A chest x-ray may show the dilated aorta, widening of the mediastinum, and mediastinal mass. An EKG is not used to diagnose aortic dissection.*

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**31.**

Which of the following is not a cause of unstable angina?

**Left ventricular hypertrophy**

Vasoconstriction

Nonocclusive thrombus

Inflammation or infection

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*Correct answer: Left ventricular hypertrophy*

*Unstable angina is an angina of new onset, increasing in frequency, or occurring at rest. Unstable angina is predominantly caused by conditions that diminish the flow of blood in the coronary arteries to adequately supply the heart with oxygen.*

*Vasoconstriction or a nonocclusive thrombus present in the coronary artery can lead to this diminished blood flow to the heart and result in unstable angina. Inflammation and infection (ie, acute endocarditis) can also trigger unstable angina, particularly with the formation of embolisms from vegetative growth.*

*Left ventricular hypertrophy is often caused by long-standing, poorly controlled hypertension, but does not impact blood flow to the heart.*

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**32.**

Which ECG leads will BEST show an acute inferior wall Myocardial Infarction (MI)?

**II, III, aVF**

I, aVF, aVL

II, III, aVL

I, II, aVR

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*Correct answer: II, III, aVF*

*The critical care nurse can locate an MI based on the ECG recording. Leads II, III, and aVF monitor the LV inferior wall, and thus inferior wall MI is diagnosed by indicative changes (ST elevation) in leads II, III, and aVF.*

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**33.**

In patients with cardiac tamponade, there is an increase in Central Venous Pressure (CVP), Pulmonary Artery Diastolic pressure (PAD), and Pulmonary Artery Occlusion Pressure (PAOP), all within two to three mmHg of each other, referred to as diastolic plateau; this is accompanied by which three symptoms?

**Muffled heart tones, decreased blood pressure, decreased cardiac output**

Hypertension, muffled heart tones, and increased cardiac output

Tachycardia, restlessness, and muffled heart tones

Tachycardia, widening pulse pressure, and tachypnea

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*Correct answer: Muffled heart tones, decreased blood pressure, decreased cardiac output*

*The pericardial sac is normally stiff and noncompliant. Cardiac tamponade occurs when bleeding into the pericardial sac causes compression on the heart, compromising cardiac function and cardiac output, and can be a life-threatening condition if not treated promptly. Signs and symptoms of this condition include tachycardia, SOB, anxiety, decreased LOC, Pulsus Paradoxus (PP), increased CVP, PAD, and PAOP. These values are often within two to three mmHg of one another, and this phenomenon is called diastolic plateau or equalization of pressures; it is accompanied by muffled heart tones, decreased BP and cardiac output.*

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**34.**

Which of the following types of cardiomyopathy may be idiopathic?

**All types of cardiomyopathy may be idiopathic**

Dilated cardiomyopathy

Restrictive cardiomyopathy

Hypertrophic cardiomyopathy

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*Correct answer: All types of cardiomyopathy may be idiopathic*

*While each type of cardiomyopathy has a distinct set of likely causes, all types of cardiomyopathies can be idiopathic and may not have a clearly identifiable cause.*

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**35.**

How is Cardiac Index (CI) calculated?

**By dividing the cardiac output by the patient's BSA**

By dividing the cardiac output by the patient's weight

By dividing the cardiac output by the patient's PCWP

By dividing the cardiac output by the patient's MAP

*Correct answer: By dividing the cardiac output by the patient's BSA*

*Cardiac Index (CI) is a hemodynamic parameter that relates the Cardiac Output (CO) from the left ventricle in one minute to Body Surface Area (BSA), thus relating heart performance to the size of the individual. The unit of measurement is liters per minute per square meter (L/min/m<sup>2</sup>).*

*Normal Cardiac Index (CI) is 2.5 to 4.3 liters/minute/m<sup>2</sup>.*

*$(CO/BSA) / 1000 = CI$*

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**36.**

Which of the following is MOST LIKELY to be a congenital condition?

**Hypertrophic obstructive cardiomyopathy**

Infective endocarditis

Dilated cardiomyopathy

Restrictive cardiomyopathy

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*Correct answer: Hypertrophic obstructive cardiomyopathy*

*Hypertrophic obstructive cardiomyopathy (HOCM) is considered a congenital cardiomyopathy. The diagnosis of HOCM is made if hypertrophy of the intraventricular septum is present.*

*Dilated cardiomyopathy is typically caused by coronary artery disease (CAD).*

*Restrictive cardiomyopathy is due to ventricular fibrosis, typically due to a pathological condition. It is the least common of the cardiomyopathies.*

*Infective endocarditis is an acquired valve disorder, often leading to gradual fibrotic changes of the valve and calcification of the valve cusps. Shortening of the chordae tendineae also may occur.*

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**37.**

Which of the following is a classic sign of acute pericarditis?

**Pain in the chest that increases with movement**

Sinus tachycardia and elevated cardiac pressures

Pericardial friction rub

Narrowed pulse pressure

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*Correct answer: Pain in the chest that increases with movement*

*Pericarditis is a chronic or acute inflammation of the pericardial lining of the heart. Acute pericarditis usually occurs secondary to another disease process, usually resolving within 6 weeks. Chronic pericarditis, however, may last for months. Inflammation of the pericardium causes an increase in pericardial fluid production, and a sudden increase in this fluid dramatically impairs the hemodynamic status.*

*A classic sign of acute pericarditis is a sharp, stabbing, burning, dull, or aching pain in the substernal or pericardial area, which increases with movement, inspiration, or coughing, or when the patient is in a recumbent position. This pain is alleviated by leaning forward.*

*The other answer choices are clinical signs of acute pericarditis, but not considered a classic sign of this condition.*

---

**38.**

The MOST common type of cardiomyopathy is:

**Dilated**

Hypertrophic

Restrictive

Obstructive

*Correct answer: Dilated*

*Cardiomyopathy, a disease involving the destruction of the cardiac muscle fibers, causes impairment of myocardial function and decreased cardiac output.*

*Cardiomyopathies are commonly classified into three types:*

- 1. **Dilated (most common):** Commonly caused by CAD (Coronary Artery Disease\_ and associated with impaired myocardial contractility and increased ventricular filling pressures*
  - 2. **Hypertrophic:** Categorized as obstructive and nonobstructive*
  - 3. **Restrictive (least common):** A classic finding is ventricular fibrosis, often caused by infiltration of the cardiac myocytes with abnormal tissue (i.e., sarcoid or amyloid disease)*
-

**39.**

What is the PRIORITY in the postoperative care of an acute aneurysm rupture repair with graft placement?

**Blood pressure management**

Hemodynamic monitoring

Pain management

Fluid management to prevent hypovolemia

---

*Correct answer: Blood pressure management*

*Blood Pressure (BP) management is a priority in postoperative (as well as preoperative) care to prevent disruption of the graft, dissection, and hemorrhage. Antihypertensive agents used preoperatively may be continued in the postoperative period.*

*Pain management, continuous ECG and hemodynamic monitoring, fluid management to prevent overload or hypovolemia, correct coagulopathy, anticoagulation therapy, and administration of antibiotics to prevent graft infections are other components of postoperative management.*

---

**40.**

The critical care nurse and a student nurse are caring for a patient who has recently experienced a blunt chest trauma. The student nurse suggests considering drawing a troponin T level on this patient. Which of the following responses by the nurse is best?

**This would be a good way to evaluate for myocardial damage.**

This would only tell us if the patient is having a myocardial infarction.

We already know that this will definitely be elevated, and there is no need to test this.

We already know that this will not be elevated, and there is no need to test this.

---

*Correct answer: This would be a good way to evaluate for myocardial damage.*

*Testing the patient's troponin T following a blunt chest trauma can indicate if myocardial damage has occurred and can allow for quantification of this damage. This test is not only indicated for myocardial infarction and is indicated under this patient's circumstances.*

---



**41.**

The nurse is assisting during a routine cardiac catheterization and notes that the patient's extremity feels cool to the touch. Furthermore, the nurse notes that the extremity is losing color and upon auscultation, notes a thready, weak pulse in the same extremity.

Which of the following conditions has the patient MOST likely developed?

**Thromboembolism**

Cerebrovascular accident due to embolus

Coronary artery dissection

Pulmonary embolism

*Correct answer: Thromboembolism*

*During cardiac catheterization, a number of complications may occur, including peripheral thromboembolism (or embolus in an extremity). In this scenario, manifestations include pain, pallor, weak pulse or pulselessness (in extreme cases), paresthesias, and paralysis; the extremity may also be cool to touch.*

*Interventions for this condition include continuing unfractionated heparin or other anticoagulant, in addition to possible thrombolytic therapy directly to the clot using a tracking catheter. If these fail, surgical intervention may be necessary.*

*A stroke, also known as a cerebrovascular accident (CVA), can be caused by a thromboembolism but presents with neurological symptoms. You would need to monitor the patient for signs and symptoms of neurologic compromise including speech patterns, orientation, and vision.*

*Coronary artery dissection will have a systemic effect, not a local effect.*

*In pulmonary embolism, you would note breathing irregularities and a drop in arterial oxygen saturation. You would need to provide immediate supplemental oxygen and administer heparin and other thrombolytic therapy as necessary.*

---

**42.**

Which of the following 12-Lead ECG changes is **STRONGLY** suggestive of ST-Elevation MI (STEMI)?

**Q waves changes**

T wave inversion

Normal ST-segment

Ventricular fibrillation

---

*Correct answer: Q waves changes*

*A STEMI is evident on ECG by ST-segment elevations and Q wave changes. A Non-ST-Elevation MI (NSTEMI) is evident on ECG by ST-segment depression and T wave inversion. Ventricular fibrillation is seen on ECG when the patient has conduction defects and is a lethal dysrhythmia.*

---

43.

Which of the following dysrhythmias is the patient is MOST LIKELY being treated for if he has a DVI pacemaker?

**Second degree AV block Type I**

Atrial fibrillation

Atrial flutter

Atrial tachycardia

*Correct answer: Second degree AV block Type I*

*DVI pacemakers (paces atria and ventricles, senses only in the ventricle, and inhibits pacing output when sensing occurs) are used to treat a clinically significant AV block.*

#### **Pacemaker Codes**

<b>1st Letter (Chamber Paced)</b>	<b>2nd Letter (Chamber Sensed)</b>	<b>3rd Letter (Response to Sensing)</b>	<b>4th Letter (Rate Modulation)</b>	<b>5th Letter (Multisite Pacing*)</b>
0=None	0=None	0=None	0=None	0=None
A=Atrium	A=Atrium	I=Inhibited	R=Rate modulation	A=Atrial
V=Ventricle	V=Ventricle	T=Triggered		V=Ventricular
D=Dual (A&V)	D=Dual (A&V)	D=Dual (I&T)		D=Dual

#### **Dual-Chamber Pacing Modes**

<b>Mode</b>	<b>Chamber(s) Paced</b>	<b>Chamber(s) Sensed</b>
DVI	Atrium and ventricle	Ventricle
VDD	Ventricle	Atrium and ventricle
DDI	Atrium and ventricle	Atrium and ventricle
DDD	Atrium and ventricle	Atrium and ventricle

**44.**

Which of the following statements about the development of cardiomyopathies is ACCURATE?

**Dilated cardiomyopathy is the most common type of cardiomyopathy**

Cardiomyopathies are often first recognized due to the bradycardia they cause

Cardiomyopathies will normally develop during a distinct period that lasts between 4 and 8 weeks

Cardiomyopathies have a clearly defined cause

---

*Correct answer: Dilated cardiomyopathy is the most common type of cardiomyopathy*

*Dilated cardiomyopathy, the most common type of cardiomyopathy, is commonly caused by coronary artery disease, and is associated with impaired myocardial contractility and increased ventricular filling pressures.*

*Cardiomyopathies develop over a prolonged period that may be several years. Cardiomyopathies are often initially asymptomatic. One of the first symptoms may be tachycardia, as the cardiac output compensates for lower stroke volumes by increasing the heart rate. While cardiomyopathies often have a clearly defined cause, they may also be idiopathic in nature.*

---

**45.**

Which of the following laboratory values remains elevated for 14 to 21 days following an acute myocardial infarction (AMI)?

**Troponin T**

Troponin I

Myoglobin

Myocardial muscle creatine kinase (CK-MB)

*Correct answer: Troponin T*

*Troponin T is a protein that is released into the bloodstream when the heart muscle has been damaged, such as with an AMI. The more damage there is to the heart, the greater the amounts of Troponin T and Troponin I there will be in the bloodstream. Troponin T begins to increase 3 to 5 hours after symptoms begin, and remains elevated for 14 to 21 days post-injury.*

*Troponin I begins to increase 3 hours after onset of MI and remains elevated for 5 to 7 days.*

*Myoglobin is released from the myocardium within 2 hours of coronary occlusion and peaks in 6 to 7 hours; myoglobin is a better marker for early detection of MI and is a better negative indicator if negative.*

*CK-MB values return to baseline within 2 to 3 days after symptom onset, and have better sensitivity and specificity for detecting MI within the first 6 hours (values peak at 12 hours after symptom onset).*

---

**46.**

Which of the following is CORRECT when measuring the QTc?

**This value is most commonly obtained by dividing the QT interval by the square root of the preceding R-R interval.**

This value is measured by measuring between the Q wave and the end of the T wave.

This value is most commonly obtained by dividing the QT interval by the PR interval.

This value is most commonly obtained by multiplying the QT interval by the heart rate.

---

*Correct answer: This value is most commonly obtained by dividing the QT interval by the square root of the preceding R-R interval.*

*The QTc is an adjusted QT interval that takes the influence of heart rate into consideration. This value is typically obtained by dividing the QT interval by the square root of the preceding R-R interval. Measuring between the Q wave and the end of the T wave provides the QT interval, not the QTc.*

---

**47.**

Indicative changes for an inferior Myocardial Infarction (MI) can be found in:

**leads II, III, aVF**

leads V1, V2

leads V2, V3, V4

leads I, aVL, V5, V6

---

*Correct answer: Leads II, III, aVF*

*The nurse can locate the area of infarction from the ECG; inferior wall MI is diagnosed by indicative changes (specifically, ST-segment elevation) in leads II, III, and aVF.*

*A septal MI is diagnosed by indicative changes in leads V1–V2. An anterior MI is recognized by indicative changes in V1–V4 (not necessarily all of these leads). Indicative changes for a lateral MI can be found in leads I, aVL, V5, and V6.*

---

**48.**

A critical care nurse is providing teaching to a patient about a TAVR they are about to undergo. Which of the following statements made by the patient indicates the need for further teaching?

**I will probably not have chest tubes for more than three days.**

They will not need to open my chest to perform this surgery.

This surgery involves replacement of my aortic heart valves.

I will probably be discharged within a couple of days after this procedure.

---

*Correct answer: I will probably not have chest tubes for more than three days.*

*A Transcatheter Aortic Valve Replacement (TAVR) involves replacement of the aortic valve using catheters inserted into the heart through blood vessels. Patients who undergo this procedure are likely to be discharged within a couple of days and will not require chest tubes like patients who undergo open heart surgery.*

---



**49.**

Which of the following symptoms, if observed in a patient with an aortic aneurysm, is MOST likely to indicate aortic dissection?

**Sudden increase in the intensity of pain**

Sudden cessation of pain

Reoccurrence of pain that had disappeared

Absent pain coupled with a decrease in hemoglobin

*Correct answer: Sudden increase in the intensity of pain*

*A sudden increase in the intensity of pain is a key symptom of aortic dissection. This condition occurs when there is a tear in the inner layer of the aorta, leading to severe and sudden chest or back pain.*

*A sudden cessation or reoccurrence of pain is more commonly associated with complications such as aortic rupture. Although a decrease in hemoglobin may be seen in aortic dissection due to blood loss, the absence of pain is not a typical presentation of this condition. Recognizing the specific symptom patterns to differentiate between these life-threatening conditions is crucial.*

---

**50.**

The nurse is caring for a patient recently diagnosed with acute left-sided heart failure. Which of the following is consistent with this diagnosis?

**Bilateral pleural effusions**

Decreased pulmonary artery pressures

An Ejection Fraction (EF) 55%

Pansystolic murmur heard at LLSB (Lower Left Sternal Border) secondary to tricuspid ring stretching

*Correct answer: Bilateral pleural effusions*

*Patients with Heart Failure (HF) present with clinical signs and symptoms of intravascular and interstitial volume overload, as well as manifestations of impaired tissue perfusion (i.e., dyspnea, pulmonary edema, JVD (Jugular Vein Distention), chest discomfort and peripheral edema). More specific to left-sided HF is pulmonary congestion, including pleural effusions and pronounced crackles and/or rales upon auscultation. Diagnostic tests include chest x-ray findings of cardiomegaly and a cardiothoracic ratio of > 0.5.*

*Pulmonary artery pressures are generally elevated and EF is typically < 40% secondary to decreased left ventricular function. A pansystolic murmur is heard at the apex due to mitral regurgitation.*

---

**51.**

All postoperative cardiac surgical patients typically develop:

**pericarditis**

hypertension

hypokalemia

chronic chest pain

*Correct answer: pericarditis*

*Pericarditis is a chronic or acute inflammation of the pericardium. Acute pericarditis typically follows another disease process or cardiac surgery and usually resolves within six weeks. Pericarditis can occur due to:*

- *Infections (viral and bacterial)*
- *Cardiac surgery*
- *Rheumatic disease*
- *Radiation therapy*
- *Neoplasm*
- *Myocardial infarction*
- *Uremia*
- *Scleroderma*

*Hypertension, hypokalemia, and chronic chest pain are not common manifestations in postoperative cardiac surgical patients.*

---

**52.**

The nurse is caring for a patient in the cardiac ICU and notes the following characteristics on the ECG strip: a heart rate of 150 with a regular rhythm, P waves that are not visible, and a normal QRS complex. Which of the following types of arrhythmia is the patient MOST likely experiencing?

**Supraventricular Tachycardia (SVT)**

Premature Ventricular Complexes (PVCs)

Ventricular Tachycardia (VT)

Atrial Fibrillation (AF)

---

*Correct answer: Supraventricular Tachycardia (SVT)*

*A Supraventricular Tachycardia (SVT) is any rhythm at a rate faster than 100 beats/min originating above the ventricle or using the atria or AV junction as part of the circuit that maintains the tachycardia. SVTs present with a heart rate from 140–250 bpm, a regular rhythm, hidden (usually not visible) P waves, and a normal QRS complex. In addition, the PR interval is not measurable, since the P waves are usually unable to be seen.*

*Premature Ventricular Complexes (PVCs) often present with a heart rate of 60–100 beats/min with an abnormal rhythm. Ventricular Tachycardia (VT) is typically faster than 100 bpm; rhythm can be regular or irregular. Atrial Fibrillation (AF) has a heart rate of 160–200 bpm with an irregular rhythm and absent P waves. It is the most common arrhythmia seen in clinical practice.*

---

**53.**

Which of the following rhythms CANNOT be defibrillated with an AED?

**Atrial fibrillation (A-fib)**

Ventricular fibrillation (V-fib)

Ventricular tachycardia (V-tach)

All of these can be defibrillated

---

*Correct answer: Atrial fibrillation (A-fib)*

*An Automated External Defibrillator (AED) is a portable electronic device that automatically diagnoses the life-threatening cardiac arrhythmias of ventricular fibrillation and pulseless ventricular tachycardia, and is able to treat them through defibrillation, the application of electricity which stops the arrhythmia, allowing the heart to reestablish an effective rhythm. Defibrillation is a technique used in emergency medicine to terminate Ventricular Fibrillation (VF) or pulseless Ventricular Tachycardia (VT). If the AED does not identify one of these life-threatening rhythms, it will not shock the patient and will not allow the operator to deliver a shock.*

*Defibrillation is not indicated for atrial fibrillation. CPR must be conducted on a patient with asystole, and cardiac stimulating medications must be delivered if advanced rescue is present. If all efforts yield a shockable rhythm, the AED will then indicate the AED operator to shock the patient.*

---

**54.**

A patient who is being treated for chest trauma from a motor vehicle accident complains of pain that is described as a tearing sensation between his scapulas. Which of the following interventions is MOST important?

**Take the patient's blood pressure and pulse on both arms.**

Place the patient in reverse Trendelenburg.

Draw cardiac enzymes and perform a 12 lead EKG.

Prepare to intubate the patient.

---

*Correct answer: Take the patient's blood pressure and pulse on both arms.*

*A pain described as tearing is suspicious for aortic aneurism or dissection. The recent chest trauma combined with the location of the pain make it even more likely that a thoracic aortic aneurism is the cause of the pain. In patients who are experiencing a thoracic aortic aneurism, the blood pressure or pulse may vary between arms and assessing the blood pressure and pulse on both limbs is an appropriate intervention. Placing the patient in reverse Trendelenburg is not likely to improve the patient's situation. Drawing cardiac enzymes and performing a 12 lead EKG may be necessary to rule out other causes of the patient's symptoms; however, the possibility of aortic aneurism should be further assessed first. There are no indicators that intubation is necessary for this patient.*

---

**55.**

The MOST common mechanism of injury to the chest is:

**Blunt trauma**

Improper cardiopulmonary resuscitation (CPR)

Dysrhythmias

Penetrating trauma

---

*Correct answer: Blunt trauma*

*Thoracic trauma accounts for approximately 25% of all trauma-related deaths, and may include injuries created by fractured ribs, blunt cardiac injury, vascular injury, and contused or punctured lung tissue. The most common mechanism of injury to the chest includes blunt trauma (caused by motor vehicle-related injuries), followed by penetrating chest trauma from gunshots and stabbings.*

*Dysrhythmias are common in patients with blunt cardiac injury. Improper CPR is not a common mechanism of injury to the chest.*

---

**56.**

When does the Intra-Aortic Balloon Pump (IABP) inflate?

**During ventricular diastole**

During ventricular systole

Immediately prior to ventricular systole

At the end of ventricular diastole

*Correct answer: During ventricular diastole*

*The Intra-Aortic Balloon Pump (IABP) catheter is inserted percutaneously or via a surgical incision into the femoral artery and is advanced into the aorta. When correctly positioned, it lies in the descending thoracic aorta, just distal to the left subclavian artery and above the renal arteries. The balloon inflates at the beginning of ventricular diastole, increasing the aortic pressure and augments blood flow to the coronary arteries. It then deflates just prior to ventricular systole, decreasing intra-aortic pressure and reducing the resistance to left ventricular ejection.*

*IABP therapy is indicated for angina that is not relieved by medical therapy, left ventricular failure, cardiogenic shock, and failure to wean from cardiopulmonary bypass after cardiac surgery.*

---



**57.**

An 82-year-old female arrives at the emergency department with complaints of abdominal cramping, nausea and diarrhea. She has a history of renal failure and diabetes mellitus. The nurse establishes an IV line and draws the patient's blood for lab studies. The patient's serum potassium level is 6.5 mEq/L.

Which of the following ECG changes should the nurse expect in this patient?

**Widened QRS complex**

Prolonged QT interval

Tachycardia

Shortened PR interval

*Correct answer: Widened QRS complex*

*Because K<sup>+</sup> impacts normal neuromuscular and cardiac function, these systems are carefully evaluated when hyperkalemia is suspected or confirmed (serum K<sup>+</sup> more than 5.5 mEq/L). The predominant cardiac abnormalities are repolarization changes, which are reflected as tall, tented (peaked) T waves. These are seen in the early phase of hyperkalemia.*

*As potassium levels increase, other ECG changes occur. These include:*

- **5.5-6.5 mEq/L**
- QT interval may shorten
- ST-segment depression
- **6.5-8.0 mEq/L**
- Peaked T waves
- Widened QRS complex
- Amplified R wave
- Prolonged PR interval
- **> 8.0 mEq/L**
- Absence of P wave
- Progressive QRS widening
- Advanced AV block with ventricular escape rhythms, ventricular fibrillation, or asystole

*Bradycardia is also seen with hyperkalemia.*

---

**58.**

Which of the following findings is associated with cardiac tamponade?

**Pulsus paradoxus**

Widened pulse pressure

Heightened awareness

Increased cardiac output

*Correct answer: Pulsus paradoxus*

*Cardiac tamponade is compression on the heart that occurs when blood or fluid builds up in the space between the heart muscle and the outer covering sac of the heart. This compromises cardiac function and cardiac output. Signs and symptoms of this medical emergency include: tachycardia, SOB, anxiety and decreased level of consciousness, pulsus paradoxus (a fall of systolic blood pressure of >10 mmHg during the inspiratory phase), equalization of pulmonary pressures (increase in CVP, PAD, and PAOP all within 2 to 3 mmHg of each other) which is accompanied by muffled heart tones, decreased BP and cardiac output.*

---

**59.**

Which of the following symptoms is MOST commonly associated with an abdominal aortic aneurysm?

**Dull, constant abdominal pain**

Chest pain described as sharp or tearing

Swelling of the ankles and feet

Acute onset of dyspnea

---

*Correct answer: Dull, constant abdominal pain*

*Dull, constant abdominal pain is a symptom commonly associated with an abdominal aortic aneurysm. Chest pain is a symptom of a thoracic aortic aneurysm, not an abdominal aortic aneurysm. Swelling of the ankles and feet is not commonly associated with abdominal aortic aneurysms. Acute onset of dyspnea may be a symptom of aortic dissection, not an abdominal aortic aneurysm.*

---

**60.**

The nurse is caring for a patient in hypovolemic shock secondary to injuries sustained from a motor vehicle accident (MVA). The nurse recognizes that all of the following signs and symptoms are associated with causing hypovolemic shock EXCEPT:

**neurologic damage**

decreased intravascular volume

bleeding

dehydration

*Correct answer: neurologic damage*

*Neurologic damage causes distributive shock, not hypovolemic shock. Hypovolemic shock refers to a condition in which rapid fluid loss results in multiple organ failure due to inadequate circulating volume and subsequent inadequate perfusion and results in decreased intravascular volume, bleeding, fluid shifts, and dehydration.*

*Cardiogenic Shock:*

- *Decreased LV function*
- *Myocardial infarction*
- *Cardiomyopathy*
- *Other cardiac diseases*

*Distributive Shock:*

- *Vasodilation*
  - *Sepsis*
  - *Neurologic damage*
  - *Anaphylaxis*
-

**61.**

Which of the following is TRUE about how all forms of cardiomyopathy affect cardiac output (CO)?

**Stroke volume is decreased**

Stroke volume is increased

Heart rate is decreased

Heart rate is increased

---

*Correct answer: Stroke volume is decreased*

*All cardiomyopathies involve decreased stroke volume, a decrease in the amount of blood put out by the heart during systole. Heart rate may increase to compensate for decreased stroke volume, but this is to maintain CO, not affect cardiac output.*

---

**62.**

The patient undergoing a cardiac catheterization should ideally be NPO for at least:

**six to 12 hours**

12 to 18 hours

18 to 24 hours

two to four 4 hours

---

*Correct answer: six to 12 hours*

*In the event that emergency intubation is required during the procedure, the patient undergoing a cardiac catheterization should ideally be NPO for six to 12 hours. Medications are an exception to the NPO rule and should be taken the day of the procedure with small sips of water.*

---

**63.**

All of the following are accurate regarding Acute Myocardial Infarction (AMI)  
EXCEPT:

**CK-MB detects MI within the first three hours**

myoglobin is released from the myocardium within two hours of coronary occlusion

approximately 65% of patients have no ECG or other diagnostic changes

the primary objective in managing AMI is to optimize blood flow to the myocardium

---

*Correct answer: CK-MB detects MI within the first three hours*

*CK-MB (Creatine Kinase, Muscle, and Brain) has better sensitivity and specificity for detecting AMI within the first six hours.*

*The other answer choices are true regarding AMI.*

---

**64.**

Which of the following measures left ventricular preload?

**Pulmonary Artery Occlusion Pressure (PAOP)**

Systemic Vascular Resistance (SVR)

Stroke Volume (SV)

Central Venous Pressure (CVP)

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*Correct answer: Pulmonary Artery Occlusion Pressure (PAOP)*

*Pulmonary Artery Occlusion, or Wedge, Pressure (PAOP) is pressure within the pulmonary arterial system. More specifically, with the insertion of 1.25 to 1.50 mL of air into the balloon port of the Pulmonary Artery (PA) catheter, the balloon becomes 'wedged' in a portion of the PA that is smaller than the balloon; this blocks blood flow distal to the catheter tip. When the mitral valve is open during ventricular diastole, the pressure that is sensed is that of the left ventricle, the Left Ventricular End-Diastolic Pressure (LVEDP), or LV preload. Normal LV preload is 8 to 12 mm Hg.*

---



**65.**

Which of the following is TRUE regarding the use of sodium nitroprusside in a patient with a subarachnoid hemorrhage (SAH)?

**Due to cost, other drugs that are just as effective and safer are used more frequently**

Sodium nitroprusside is the preferred treatment for these patients

Sodium nitroprusside should be used unless the patient has liver dysfunction

Sodium nitroprusside is contraindicated for these patients

---

*Correct answer: Due to cost, other drugs that are just as effective and safer are used more frequently*

*Sodium nitroprusside is a balanced vasodilator that affects the arterial and venous systems. Blood pressure reduction occurs within seconds after an infusion is started, with a duration of action of less than 10 minutes once the infusion is discontinued.*

*It was previously considered the agent of choice in acute hypertensive conditions, such as hypertensive encephalopathy, intracerebral infarction, SAH, and malignant hypertension. However, the use of this agent has been severely restricted due to significant cost increases compared with effective, safer, and less costly alternatives. In addition to this, if sodium nitroprusside is used for longer than 48 hours, there is the risk of thiocyanate toxicity.*

*Sodium nitroprusside should not be used in patients with renal dysfunction, not liver dysfunction.*

---

**66.**

Which of the following does the critical nurse recognize as an early sign of an aortic aneurysm?

**There are not typically any early signs of aortic aneurysm**

A subtle decrease in hemoglobin

A subtle elevation in d-dimer

A mild throbbing sensation at the aneurysm site

---

*Correct answer: There are not typically any early signs of aortic aneurysm*

*There are not typically any early signs of aortic aneurysm. If symptoms do occur, they are caused by compression of adjacent structures. A subtle decrease in hemoglobin, a subtle elevation in d-dimer, and a mild throbbing sensation at the aneurysm site are not recognized as early signs of an aneurysm.*

---

**67.**

Which of the following options is CORRECT when categorizing hypertrophic cardiomyopathy?

**Obstructive vs. nonobstructive**

Congenital vs. acquired

Restrictive vs. dilated

Idiopathic vs. pathological

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*Correct answer: Obstructive vs. nonobstructive*

*Hypertrophic cardiomyopathy is classified as either obstructive or nonobstructive. Hypertrophy of the intraventricular septum is the distinguishing feature of the two categorizations and indicates obstructive hypertrophic cardiomyopathy if present.*

---

**68.**

Which of the following statements made by a student nurse indicates that they understand the pathology of cardiac tamponade?

**Both the rate of bleeding and the amount of blood impact how severe a cardiac tamponade will be.**

Cardiac tamponade may cause severe distress, but rarely causes death.

Chest x-ray is the ideal way to confirm the diagnosis of cardiac tamponade.

A cardiac tamponade can occur when the heart is compressed by fluid building up anywhere in the thoracic cavity.

---

*Correct answer: Both the rate of bleeding and the amount of blood impact how severe a cardiac tamponade will be.*

*Cardiac tamponade occurs with bleeding into the pericardial sac. While the amount of bleeding affects the pressure applied on the heart, the speed of bleeding also affects the ability of the heart and pericardium to compensate. Cardiac tamponade often leads to death if untreated. While a chest x-ray may be used to diagnose cardiac tamponade, and echocardiogram is the ideal diagnostic method. Cardiac tamponade occurs when fluid builds up specifically in the pericardial sac.*

---

**69.**

What is the nonsurgical intervention for the treatment of Peripheral Artery Disease (PAD)?

**Angioplasty**

Endarterectomy

Angiography

Cardiac catheterization

*Correct answer: Angioplasty*

*Angioplasty is a minimally invasive, endovascular procedure to widen narrowed or obstructed arteries or veins, typically to treat arterial atherosclerosis. Angioplasty, with and without stent placement, is recommended in patients with severe PAD that is amendable by the nonsurgical route. A deflated balloon attached to a catheter is passed over a guide-wire into the narrowed vessel and then inflated to a fixed size. The balloon forces expansion of the blood vessel and the surrounding muscular wall, allowing improved blood flow. A stent may be inserted at the time of ballooning to ensure the vessel remains open, and the balloon is then deflated and withdrawn. Stents may keep the arteries open with a lower restenosis rate over angioplasty alone.*

*Angiography is a diagnostic test, not an intervention, in the treatment of PAD.  
Endarterectomy is a surgical intervention to remove or bypass the fatty deposits, or blockage, in an artery narrowed by the buildup of fatty tissue (atherosclerosis).  
Cardiac catheterization is used for evaluation of valvular heart disease, not PAD.*

---

**70.**

Which of the following is a classic finding in cardiac tamponade?

**Beck's triad**

Brudzinski's sign

Cushing's triad

Kernig's sign

---

*Correct answer: Beck's triad*

*Beck's triad is a classic finding in cardiac tamponade. Beck's triad includes:*

- *Hypotension*
- *Muffled heart tones*
- *Jugular venous distention*

*Other signs and symptoms of tamponade include tachycardia, shortness of breath, anxiety, decreased level of consciousness, and paradoxus.*

*Brudzinski's sign and Kernig's sign are both associated with meningeal irritation. Cushing's triad is a sign of increased intracranial pressure. It is the triad of hypertension, bradycardia, and irregular respirations. Some sources describe widened pulse pressure (increasing difference between systolic and diastolic BP) as the third component of the triad, rather than irregular respirations.*

---

**71.**

A patient experiences life-threatening bradycardia and undergoes a subsequent heart transplant. Which of the following drugs is the BEST medication to treat this patient's slow rhythm?

**Isoproterenol**

Adenosine

Dopamine

Epinephrine

*Correct answer: Isoproterenol*

*Isoproterenol is a potent pure beta-receptor agonist. It has potent inotropic, chronotropic, and vasodilatory properties, increasing heart rate and contractility, and causing vasodilation in mesenteric, renal, and skeletal muscle tissue beds.*

*Its use is typically reserved for temporizing life-threatening bradycardia, as significant tachycardia almost always accompanies it. The restrictions on this agent are further enhanced by dramatic price increases, which negate clinical benefit compared with other agents and devices (eg, pacemakers). Adverse effects include tachyarrhythmias, myocardial ischemia, and hypotension.*

*Adenosine depresses sinus node automaticity and atrioventricular nodal conduction. It is indicated for the acute termination of atrioventricular nodal and reentrant tachycardia, and for SVTs, including Wolff-Parkinson-White (WPW) syndrome. Adenosine slows the heart rate down, rather than speeding it up.*

*Dopamine and epinephrine can be used to treat symptomatic bradycardia. However, in this example, the patient undergoes a heart transplant; therefore, the patient will require treatment with isoproterenol.*

---

**72.**

Which of the following is NOT an indication for a CABG?

**Left Ventricular Ejection Fraction (LVEF) < 45%**

Left main coronary artery stenosis

Three-vessel disease

Coronary artery dissection

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*Correct answer: Left Ventricular Ejection Fraction (LVEF) < 45%*

*Indications for Coronary Artery Bypass Grafting, or CABG, include left main coronary artery stenosis, severe triple vessel disease, coronary artery dissection, multiple coronary artery occlusions, and any contraindication to angioplasty/stent procedures. In addition, LVEF of < 35% is an indication for a CABG.*

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**73.**

The critical care nurse is precepting a new nurse who is caring for a patient with Wolff-Parkinson-White syndrome. Which of the following statements by the new nurse requires correction by the preceptor?

**This disease increases the risk of bradycardia.**

This disease does not affect the function of the AV node.

A delta wave may be present on the patient's EKG.

This disease only requires treatment if it is associated with symptomatic tachycardias.

---

*Correct answer: This disease significantly increases the risk of bradycardia.*

*Wolff-Parkinson-White syndrome is a condition in which electrical impulses from the atria bypass the AV node through accessory pathways, prematurely stimulating the ventricles. Wolff-Parkinson-White syndrome increases the risk of tachycardias, not bradycardias. While Wolff-Parkinson-White syndrome results in the AV node being bypassed, it does not affect the AV node itself. A delta wave is often noted in the EKGs of patients with Wolff-Parkinson-White syndrome. This condition does only require treatment if symptomatic tachycardias are present.*

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**74.**

The nurse is caring for a patient that goes into ventricular asystole, with no rate or rhythm present on the patient's ECG strip. Occasional P waves show on ECG.

All of the following interventions are recommended for the treatment of asystole EXCEPT:

**Atropine**

Cardiopulmonary Resuscitation (CPR)

IV epinephrine

Vasopressin therapy

*Correct answer: Atropine*

*Ventricular asystole is the absence of any ventricular rhythm. The nurse would expect to see an absent QRS complex, no pulse, and no cardiac output. P waves may be present if the sinus node is functioning. If ventricular asystole is not treated immediately, the results are fatal.*

*Current recommended treatment for ventricular asystole includes:*

- *Immediate CPR*
- *IV epinephrine*
- *Vasopressin therapy*

*Asystole has a very poor prognosis despite the best resuscitation efforts because it usually represents severe and extensive myocardial ischemia or underlying metabolic problems. Pacing and atropine are no longer recommendations for treatment.*

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**75.**

A 56-year-old male with a history of hyperlipidemia presents to the emergency department with shortness of breath, is diaphoretic, and reports pain in his left arm and his chest. His ECG reveals ST-segment depression and T-wave inversion.

What is this patient MOST LIKELY experiencing?

**NSTEMI**

STEMI

Unstable angina

Third-degree AV block

*Correct answer: NSTEMI*

*Non-ST-Elevation Myocardial Infarction (NSTEMI) is a type of heart attack characterized by ST-segment depression and T-wave inversion as shown in the diagram. ST segment depression generally resolves with relief of chest pain. Factors that increase the risk of developing NSTEMI include:*

- 1. High serum cholesterol level*
- 2. Hypertension*
- 3. Diabetes mellitus*
- 4. Cigarette smoking*

*Minor risk factors:*

- 1. Increasing age*
- 2. Male gender*
- 3. Family history*
- 4. Physical inactivity*
- 5. Obesity*
- 6. Excess alcohol consumption*
- 7. Excess carbohydrate intake*
- 8. Social deprivation*
- 9. Stressful lifestyle*
- 10. Diets deficient in fresh vegetables, fruit, and polyunsaturated fatty acids*

*Reperfusion strategy for NSTEMI includes heparin administration, IV beta-blocker given within 24 hours of arrival, and lipid-lowering agents should be initiated.*

*STEMI is characterized by ST elevation. Unstable angina can result in either STEMI or NSTEMI. Third-degree AV block is characterized by no conduction through the AV node.*

---

**76.**

Which of the following is LEAST LIKELY to be a sign of cardiac tamponade?

**Irregular respiratory rate**

Muffled heart sounds

Distended jugular veins

Hypotension

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*Correct answer: Irregular respiratory rate*

*Cardiac tamponade is indicated by Beck's triad. These three clinical signs include muffled heart sounds, distended jugular veins, and hypotension or a weak pulse. An irregular respiratory rate is a component of Cushing's triad, which indicates increasing intracranial pressure, but is not part of Beck's triad.*

---

**77.**

Malignant ventricular ectopy typically responds well to:

**lidocaine 1.5 mg/kg IV over two minutes**

propranolol 0.5–1 mg IV push

digoxin 0.5 mg IV push

amiodarone 0.5 mg/min IV push

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*Correct answer: lidocaine 1.5 mg/kg IV over two minutes*

*For malignant ventricular ectopy and/or Wolff–Parkinson–White syndrome (WPW), lidocaine (an antiarrhythmic agent) is dosed at 1.5 mg/kg IV over two minutes with a maintenance infusion of 1 to 4 mg/min.*

*Propranolol (a beta-blocking agent) is given for slowing ventricular rate in atrial fibrillation, atrial flutter, and SVT; and for suppression of PVCs. Digoxin is indicated when AV conduction slowing occurs in atrial fibrillation and atrial flutter. Amiodarone is indicated for life-threatening ventricular arrhythmias, SVTs, including WPW refractory to other agents.*

---

**78.**

What causes the ventricles to become noncompliant or rigid in restrictive cardiomyopathy?

**Interstitial fibrosis or amyloid deposits**

Gradual destruction of myocardial fibers

Compensation for necrotic myocardial tissues

Coronary artery disease

*Correct answer: Interstitial fibrosis or amyloid deposits*

*Restrictive cardiomyopathy, the least common type of cardiomyopathy, is characterized by infiltration of the cardiac myocytes with abnormal tissue such as sarcoid or amyloid disease. Deposits of protein fibrils throughout the myocardium create a rubbery consistency of the ventricular wall, impairing myocardial function. The fibrotic muscle tissue becomes very rigid with decreased compliance, thus limiting distention during diastole. Amyloid deposits are the most common cause.*

*The gradual destruction of myocardial fibers occurs with a dilated cardiomyopathy. Ventricular stenosis and hypertension are causes of the nonobstructive form of hypertrophic cardiomyopathy. Coronary artery disease is the most common cause of dilated cardiomyopathy in the United States.*

---

**79.**

Which of the following is TRUE when using a CT scan to evaluate for cerebral ischemia?

**Evidence of ischemia may not appear on a CT scan until 12 hours after the onset of symptoms.**

A CT scan can only be used to rule out intracranial bleeding, not to find ischemia.

A CT scan and MRI are similarly effective in detecting ischemia.

Only a CT scan with contrast can detect ischemia.

---

*Correct answer: Evidence of ischemia may not appear on a CT scan until 12 hours after the onset of symptoms.*

*Signs of ischemia may be very subtle and are often not detectable by CT scan until 12-24 hours after the onset of symptoms. A CT scan is much better at detecting intracranial bleeding than it is at detecting ischemia; however, it is capable of both. An MRI is more effective at detecting an ischemic than a CT scan. Contrast is not absolutely necessary to detect ischemia using a CT scan.*

---



**80.**

A patient is admitted with acutely decompensated Heart Failure (HF) with dyspnea while at rest. The physician orders that the patient receive nesiritide (Natrekor) for volume overload after the patient failed to respond to loop diuretics.

The nurse should closely monitor the patient for which adverse effect of nesiritide?

**Hypotension**

Hypothyroidism

Hypokalemia

Oliguria

*Correct answer: Hypotension*

*Nesiritide is a cardiac hormone that regulates cardiovascular homeostasis and fluid volume during states of volume and pressure overload. It is effective at reducing PCWP (Pulmonary Capillary Wedge Pressure) and improving dyspnea symptoms in patients with acutely decompensated HF. The most common side effects include hypotension, tachycardia, and/or bradycardia.*

---

**81.**

A diastolic murmur is auscultated in which of the following valvular insufficiencies?

**Pulmonic, aortic**

Mitral, tricuspid

Tricuspid, pulmonic

Mitral, aortic

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*Correct answer: Pulmonic, aortic*

*A diastolic murmur would be caused by the backward regurgitant flow of blood through the incompetently closed pulmonic and aortic valves during diastole.*

*Mitral and tricuspid insufficiencies involve regurgitation of blood through incompetently closed mitral and tricuspid valves during systole, thus causing a systolic murmur.*

- *Systolic murmurs: Produced by mitral and tricuspid insufficiency*
  - *Diastolic murmurs: Produced by mitral and tricuspid stenosis; pulmonic and aortic insufficiency*
-

**82.**

A patient was recently involved in a pedestrian accident in which he was struck by a truck. His chest primarily absorbed the impact. The patient is experiencing frequent runs of ventricular tachycardia. The critical care nurse recognizes that which of the following is CORRECT?

**Extensive myocardial damage has likely occurred**

The patient is developing a cardiac tamponade

The heart is temporarily shocked due to the injury

The patient is likely having a cardiac event unrelated to the trauma

---

*Correct answer: Extensive myocardial damage has likely occurred*

*While dysrhythmias such as atrial fibrillation, PVCs, and sinus tachycardia may be common after chest trauma, ventricular tachycardia is an indicator that extensive myocardial damage has occurred. Ventricular tachycardia is not a strong indicator that a cardiac tamponade is developing, although it may occur during a cardiac tamponade. The ventricular tachycardia does not indicate temporary shock or a cardiac event unrelated to the injury.*

---

**83.**

A patient who is about to undergo a TAVR asks the critical care nurse, "How long after this will I start to feel better?" Which response by the nurse is BEST?

**Patients undergoing this procedure normally experience immediate relief.**

Do you feel anxious about undergoing this procedure?

The doctor would be the best person to answer this question.

Patients undergoing this procedure normally start to feel better within 72 hours.

---

*Correct answer: Patients undergoing this procedure normally experience immediate relief.*

*A Transcatheter Aortic Valve Replacement (TAVR) involves replacing the aortic valve using a minimally invasive approach through the patient's venous system. Relief is immediate for most patients undergoing this procedure. Asking the patient if they feel anxious about the procedure or referring them to the doctor is not correct, as the nurse is able to answer this question.*

---

**84.**

Which of the following terms is characterized by blood pressure that rises quickly and severely, relative to the patient's baseline BP, and causes risk of organ damage if NOT treated immediately?

**Hypertensive crisis**

Accelerated hypertension

Malignant hypertension

Pulmonary hypertension

*Correct answer: Hypertensive crisis*

*A hypertensive crisis is characterized by markedly increased BP with potentially life-threatening symptoms and signs indicative of acute impairment of one or more organ systems (especially the central nervous system, cardiovascular system or the kidneys). Typically, the systolic blood pressure is at least over 180 mmHg or the diastolic is over 110–120 mmHg. It can result in irreversible organ damage. In a hypertensive crisis, the patient's blood pressure should be slowly lowered over a period of minutes to hours with an antihypertensive agent.*

*Accelerated hypertension is a precursor to malignant hypertension and is characterized by an increase in the patient's baseline BP. Myocardial hypertrophy is often visualized on chest x-ray in the patient with hypertensive crisis.*

---

**85.**

Following an acute Myocardial Infarction (MI), which of the following classes of drugs may reduce mortality rates?

**Beta-adrenergic blockers**

Diuretics

Nitrates

ACE inhibitors

*Correct answer: Beta-adrenergic blockers*

*Beta-adrenergic blockers work by increasing ventricular filling time, thus decreasing heart rate; they are the only class of drugs that have been shown to reduce mortality in patients following an acute Myocardial Infarction (MI).*

*Diuretics (e.g., furosemide) and nitrates along with cardiac glycosides (e.g., digoxin) have been shown to improve symptoms but have not yet been shown to reduce mortality. ACE (Angiotensin-Converting Enzyme) inhibitors may be used in the medical management of a patient following an acute MI as they decrease afterload, but have also not been shown to reduce mortality.*

---

**86.**

Which of the following is TRUE regarding neurogenic pulmonary edema?

**It is a complication of an aneurysmal subarachnoid hemorrhage (aSAH)**

It has an insidious onset

Treatment rarely involves mechanical ventilation

It is caused by cardiac dysfunction

---

*Correct answer: It is a complication of an aneurysmal subarachnoid hemorrhage (aSAH)*

*A SAH means that there is bleeding in the space that surrounds the brain. Often, it occurs when a weak area in a blood vessel, known as an aneurysm, bursts and leaks on the surface of the brain.*

*Systemic complications of aSAH include myocardial dysfunction, cardiac arrhythmias, and neurogenic pulmonary edema (NPE). NPE is an increase in pulmonary interstitial and alveolar fluid that is due to an acute central nervous system injury. It usually develops rapidly after the injury (not insidiously), and generally resolves quickly, typically within 72 hours.*

*Treatment will often involve mechanical ventilation. Cardiogenic pulmonary edema is caused by cardiac dysfunction, while neurogenic pulmonary edema is thought to occur from CNS-mediated increases in intravascular permeability.*

---

**87.**

An ICU patient is experiencing low cardiac output syndrome. Which of the following vasopressors is indicated when the desired effect is vasoconstriction without tachycardia?

**Phenylephrine (Neosynephrine)**

Dopamine (Intropin)

Norepinephrine (Levophed)

Epinephrine

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*Correct answer: Phenylephrine (Neosynephrine)*

*Epinephrine, norepinephrine, and dopamine all have a combination of alpha and beta stimulation, producing both vasoconstriction and increased cardiac stimulation (inotropic and chronotropic responses). This makes the heart beat both stronger and faster.*

*Phenylephrine is only an alpha stimulant, so there is less direct effect on the heart; it is a pure vasoconstrictor without direct cardiac effect and is useful when the desired effect is vasoconstriction without increased heart rate.*

---



**88.**

Assessment of chest pain is often remembered by the nomogram "PQRST." What does the "T" stand for in this mnemonic?

**Timing**

Thrombosis

Tachycardia

Trauma

*Correct answer: Timing*

*Obtaining an accurate assessment of chest pain history is important to differentiate cardiac chest pain from other sources of pain. The "PQRST" mnemonic prompts the clinician to ask a series of questions which help to clarify the characteristics of the cardiac pain.*

- *Provoke: What provokes or precipitates the pain?*
  - *Quality: What is the quality of the pain?*
  - *Radiation: Does the pain radiate to other locations besides the chest?*
  - *Severity: What is the severity of the pain (one to ten scale)?*
  - *Timing: What is the time of onset of this episode?*
-

**89.**

A male patient is admitted to the ICU after a motor vehicle accident (MVA) in which he sustained blunt trauma to his chest from the steering wheel and to his head from the dashboard. A projectile also caused a right leg injury. The patient has controlled bleeding from the right leg but suddenly becomes less responsive. The nurse notes muffled heart sounds, tachycardia, jugular vein distension (JVD), and decreasing blood pressure upon assessment.

Which of the following responses by the nurse is CORRECT?

**Prepare for a pericardiocentesis**

Apply a tourniquet to the right leg proximal to the site of injury

Insert an arterial line and provide a bolus of crystalloids if the MAP <70 mm Hg

Rapid infusion of IV fluids followed by a STAT chest MRI

*Correct answer: Prepare for a pericardiocentesis*

*Signs such as rapid heart rate, JVD, low blood pressure, pulsus paradoxus, and finally, ventricular fibrillation and cardiac arrest may ensue in cardiac tamponade. Coupled with the patient's recent history of blunt chest trauma, the nurse should rapidly infuse IV fluids and prepare for a pericardiocentesis to relieve (decompress) the pressure of the cardiac tamponade.*

*The bleeding from the leg is controlled, so the application of a tourniquet is unnecessary. While the patient's hypotension will require treatment that may include arterial line monitoring and IVF boluses, treating the underlying cause of the hypotension is more important. A STAT chest MRI is indicated in the case of aortic disruption. Echocardiography is generally used to confirm a diagnosis of cardiac tampanode.*

---

**90.**

The nurse is caring for a patient with acute coronary syndrome (ACS), and has an order to obtain an ECG for further evaluation.

Which of the following leads assists in the diagnosis of hemiblock, a common cause of coronary artery disease (CAD)?

**Lead III**

V6

Lead II

V1

*Correct answer: Lead III*

*One of the most common causes of hemiblocks is CAD, followed by arterial hypertension. Lead III (or aVF) assists in diagnosing a hemiblock.*

*V1 and V6 differentiate between right and left bundle branch block, right and left ventricular ectopy, and right and left ventricular pacing.*

*Lead II is often the best lead for identifying atrial flutter waves.*

---

**91.**

What is the definitive management of a patient with a fusiform abdominal aortic aneurysm that measures 6 cm in diameter?

**Aortic graft replacement**

Pain management

Lowering blood pressure

Diet modification and smoking cessation

---

*Correct answer: Aortic graft replacement*

*Surgery is indicated for an acute aneurysm rupture, aortic dissection in the ascending aorta, aortic dissection refractory to medical therapy, and asymptomatic patients with a fusiform aneurysm 6 cm or more in diameter (normal diameter is 2.5–3cm). During surgery, the aortic aneurysm is resected and a prosthetic graft is sutured in place. The original aorta may be wrapped around the prosthetic graft for additional support.*

*Relieving pain and anxiety, lowering BP and thereby decreasing stress on the aneurysm, patient teaching, and prevention of complications (e.g., diet modification and smoking cessation) are also primary objectives in the management of aortic aneurysm.*

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**92.**

The nurse is caring for a newly-admitted patient transferred from the emergency department due to digitalis toxicity. The patient's cardiac strip shows the following:

- Rate: 60 bpm
- Rhythm: irregular
- QRS complex: absent
- PR interval: absent

Which type of dysrhythmia is the patient MOST LIKELY experiencing?

**Sinus arrest**

Normal sinus rhythm (NSR)

Premature atrial complexes (PACs)

Atrial flutter

*Correct answer: Sinus arrest*

*Digitalis toxicity (a complication of digoxin therapy) may cause sinus arrest, which occurs when sinus node firing is depressed and impulses are not formed when expected; they discharge irregularly. The result is an absent P wave at the expected time. The QRS complex is also missing, unless there is escape of a junctional or ventricular impulse. Because the sinus node is not forming impulses regularly as expected, the PP Interval in sinus arrest is not an exact multiple of the sinus cycle.*

*Strip presentation is characteristic of rates within the normal range but may be in the bradycardia range, irregular rhythm (due to absence of sinus node discharge), normal PR interval when P waves are present (absent when P waves are absent), normal QRS complex when sinus node is functioning, and absent during periods of sinus arrest, unless escape beats occur.*

*PACs generally present with a normal rate, regular rhythm (except when PACs occur, resulting in early beats), a QRS complex that may be normal, wide, or absent, depending on the prematurity of the beat, and PR intervals may be normal or long, depending on the prematurity of the beat. PACs do not result from digitalis toxicity. Rather, they can be caused by caffeine, alcohol, nicotine, heart failure, pulmonary disease, interruptions in atrial blood supply by myocardial ischemia or infarction, anxiety, and hypermetabolic states. PACs can also occur in normal hearts sporadically.*

*ECG characteristics of atrial flutter include an atrial rate between 250 and 350 beats/min (most commonly 300 beats/min), atrial rhythm is regular and ventricular rhythm may be regular or irregular, QRS complex is usually normal (aberration can occur), and a flutter wave (F wave) is seen, with an FR interval (or flutter wave to the beginning of the QRS complex) that may be consistent or may vary.*

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**93.**

Which of the following statements made about aortic dissection by a student nurse requires correction by the critical care nurse?

**"Aortic dissection is not life-threatening if it does not rupture."**

"Aortic dissection occurs when the inner wall of the aorta is disrupted."

"Aortic dissection can decrease hemoglobin and hematocrit."

"Aortic dissection can cause dyspnea or extremity weakness."

---

*Correct answer: "Aortic dissection is not life-threatening if it does not rupture."*

*Aortic dissection can create a false lumen that compresses the aortic lumen, leading to obstruction of the aorta. For this reason, aortic dissection can be life-threatening even if rupture does not occur. Aortic dissection does occur when the inner wall of the aorta is disrupted. It can decrease hemoglobin and hematocrit. Aortic dissection can cause dyspnea or extremity weakness, amongst other symptoms.*

---

**94.**

An array of factors cause plaque to become susceptible to tearing and rupture. Which of the following is NOT a characteristic of plaque at an increased risk for rupture?

**The plaque is covered by a smooth fibrous cap**

The plaque is located in an area of greater turbulence of blood flow

There is a large amount of lipid inside the plaque's core

The plaque is infiltrated with macrophages

*Correct answer: The plaque is covered by a smooth fibrous cap*

*Although most people have some degree of atherosclerotic plaque formation by age 30, the vast majority of these plaques are considered "stable," covered by smooth fibrous caps that allow sufficient blood flow through the coronary arteries. Thus, these "stable" plaques are not prone to development of unstable angina or myocardial ischemia (MI).*

*However, in young, growing plaques, the fibrous cap may become thin and rupture, resulting in unstable angina, ischemia, or MI.*

*Characteristics of plaque at an increased risk of rupture include:*

- Location of the lesion in the vascular tree: Areas of greater turbulence of flow and dynamic activity during the cardiac cycle are at higher risk of rupture.*
  - Size of the lipid pool within the plaque: A large amount of lipid inside the plaque core is more likely to be associated with plaque disruption.*
  - Invasion of the plaque with macrophages: Macrophages tend to weaken the lining of the fibrous cap of the plaque, making rupture more likely.*
-



**95.**

In the treatment of acute coronary syndrome (ACS), which of the following pharmacologic therapies works by increasing ventricular filling time?

**Beta-blockers**

Aspirin

Nitrates

Angiotensin-converting enzyme (ACE) inhibitors

*Correct answer: Beta-blockers*

*Regardless of whether a patient presents with unstable angina or acute MI, restoration and maintenance of coronary blood flow is important to improve patient outcomes. Interventions to optimize blood flow to the myocardium include pharmacologic measures, mechanical measures, and/or coronary artery bypass grafting (CABG).*

*Beta-blockers work by decreasing heart rate, thus increasing ventricular filling time and decreasing myocardial oxygen consumption ( $MVO_2$ ).*

*Antiplatelet agents, such as aspirin, are used in the medical management of ACS to decrease activity of the coagulation system and prevent platelet aggregation. In ACS, the timely administration of aspirin inhibits both platelet aggregation and the formation of thrombi.*

*Nitrates are indicated in ACS to reduce preload, and ACE inhibitors are utilized to reduce afterload (if ejection fraction is at or below 40%).*

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**96.**

Which of the following is LEAST LIKELY to be caused by blunt chest trauma?

**Cushing's triad**

Beck's triad

Aortic disruption

Flail chest

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*Correct answer: Cushing's triad*

*Cushing's triad is a set of symptoms that is associated with increased Intracranial Pressure (ICP). A blunt chest trauma is unlikely to cause increased ICP. Beck's triad is indicative of cardiac tamponade. Cardiac tamponade, aortic disruption, and flail chest are all possible results of blunt chest trauma.*

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**97.**

A patient has been complaining of tearing pain in their chest and is about to be tested for a possible aortic aneurysm. The patient calls the nurse into the room and tells them "my pain just suddenly went away on its own." Which of the following responses is CORRECT?

**I am going to call a rapid response team to your room.**

That is good news, but we will still want to continue with the test that we have planned.

This means that we can probably cancel the test that we had planned.

I will let the doctor know, and he will probably want to test for a different condition that may have been causing your pain.

---

*Correct answer: I am going to call a rapid response team to your room.*

*Pain that is likely related to an aortic aneurysm and suddenly resolves can be symptomatic of aortic rupture, a life-threatening emergency. Calling the rapid response team to the patient's room to respond to this change is an appropriate intervention. Continuing with the test as planned or canceling the tests are not correct if aortic rupture may have occurred. The sudden change in condition does not mean that a different diagnosis should be considered.*

---

98.

Which of the following is MOST LIKELY to cause papillary muscle rupture?

**Myocardial infarction**

Hypertensive crisis

Mitral insufficiency

Chest trauma

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*Correct answer: Myocardial infarction*

*Myocardial infarction can cause papillary muscle rupture if blood supply to the tissues is diminished or absent. Hypertensive crisis and chest trauma are both much less likely to be a cause of papillary muscle rupture. Papillary muscle rupture will cause severe mitral insufficiency, but mitral insufficiency is not a likely cause of papillary muscle rupture.*

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