Cardiovascular System

United States Medical Licensing Examination (USMLE) Step 1

6 to 12% of Step 2 CK · 9 sections · content outline and specifications

The cardiovascular system is about 6 to 12% of Step 2 CK. Questions ask what you would do next for a patient: the most likely diagnosis, the best test, the first-line drug, or the right intervention. Chest pain, heart failure, arrhythmias, and shock are tested as emergencies where order matters. Hypertension, lipids, and screening are tested as office care with current US guidelines. Children's heart disease, pericardial disease, and diseases of the aorta, leg arteries, and veins also appear. Always check first whether the patient is stable or unstable.

You should be able to: After this guide, you should be able to decide whether a cardiovascular patient is stable, choose the best next test or treatment, pick the first-line drug, and apply current US screening and prevention advice.

Every section: the key point and the trap

1 Chest pain and acute coronary syndromes

Get an ECG within 10 minutes of arrival for chest pain. Repeat it if the first one is normal and pain continues.

Trap: Do not give nitrates to a patient with right ventricular infarction, a systolic pressure under 90 mm Hg, or a phosphodiesterase-5 inhibitor taken in the last 24 to 48 hours. Do not give fibrinolysis for NSTEMI.

2 Heart failure

Use BNP and echocardiography to confirm heart failure and to measure the ejection fraction.

Trap: Never give an ACE inhibitor with sacubitril-valsartan; stop the ACE inhibitor 36 hours before the switch. Do not stop a beta-blocker for mild congestion unless the patient is in shock.

3 Arrhythmias

First question: is the patient unstable (hypotension, confusion, chest pain, shock, acute heart failure)? Unstable tachycardia with a pulse: synchronized cardioversion. Pulseless VT or VF: defibrillation and CPR.

Trap: Torsades de pointes is treated with intravenous magnesium, not amiodarone. Adenosine does not convert atrial fibrillation or flutter; it only slows the rate briefly.

4 Valvular disease and endocarditis

Aortic stenosis: crescendo-decrescendo murmur at the right upper sternal border to the carotids, slow weak pulse. Symptoms (angina, syncope, heart failure) with severe stenosis mean valve replacement, surgical or transcatheter.

Trap: Do not give antibiotics before cultures in a stable patient; a negative culture makes the diagnosis and the drug choice hard. Mitral valve prolapse alone does not need antibiotic prophylaxis.

5 Hypertension

Confirm the diagnosis with home or ambulatory readings. Stage 1 is 130 to 139 or 80 to 89 mm Hg; stage 2 is 140 or more or 90 or more.

Trap: ACE inhibitors and ARBs are not used in pregnancy; use labetalol or nifedipine. Do not drop a hypertensive emergency to normal quickly, except in aortic dissection, where the systolic target is about 120 mm Hg within 20 minutes.

6 Lipids and cardiovascular prevention

High-intensity statin for clinical cardiovascular disease and for LDL of 190 mg/dL or more, whatever the risk score.

Trap: Bile acid binders raise triglycerides; do not use them when triglycerides are high. Do not use aspirin for primary prevention in older adults because bleeding outweighs benefit.

7 Aortic, peripheral arterial, and venous disease

Aortic dissection: tearing pain to the back, pulse or pressure difference between arms. Control heart rate and pressure with intravenous esmolol first. CT angiography if stable; transesophageal echocardiography if unstable.

Trap: Do not order a D-dimer when the pretest probability is high; a normal result cannot rule out the disease. In dissection, do not give a vasodilator before the beta-blocker, or reflex tachycardia can extend the tear.

8 Shock and pericardial disease

Hypovolemic and cardiogenic shock have a high systemic vascular resistance and cool skin. Distributive (septic) shock has a low resistance and warm skin.

Trap: Avoid intubation and positive-pressure ventilation in tamponade if possible; it lowers venous return. Pericarditis with diffuse ST elevation is not a STEMI and does not need fibrinolysis.

9 Heart disease in children

Cyanosis in the first days that does not improve with 100% oxygen suggests a ductal-dependent heart lesion. Start prostaglandin E1 at once.

Trap: Indomethacin closes the ductus; never give it to a baby with a ductal-dependent lesion. Do not wait for echocardiography before starting prostaglandin E1 in a deeply cyanotic newborn.

Key terms

STEMI: A heart attack with ST elevation on the ECG, caused by a fully blocked coronary artery.

Ejection fraction: The share of blood in the left ventricle that is pumped out with each beat.

Synchronized cardioversion: An electric shock timed to the QRS complex to stop a fast rhythm in a patient with a pulse.

Pretest probability: How likely a disease is before a test is done, based on the history and examination.

Pulsus paradoxus: A fall of more than 10 mm Hg in systolic pressure during breathing in.

Ankle-brachial index: The ankle systolic pressure divided by the arm systolic pressure; 0.90 or less shows arterial disease.

Ductal-dependent lesion: A heart defect in which a newborn needs the ductus arteriosus to stay open to survive.

Guideline-directed medical therapy: The set of drugs that current guidelines advise because they lower death and hospital stays.

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