# 1 Cardiology

## QUESTIONS

**1** William, a 66-year-old man, has been brought into the A & E department by ambulance with central chest pain. Paramedics suspect he is having a heart attack, and have given him morphine, oxygen, nitrates and aspirin.

**a** What three further questions would you ask him about:

i) his pain? ***3 marks***

ii) his other symptoms? ***3 marks***

**b** You suspect he is having an acute MI. What is the most important immediate investigation you would request? ***1 mark***

**c** You diagnose him with a STEMI. What would be the next step in your management, considering he is currently stable? ***1 mark***

**d** Give two further investigations you would request for this man in the long term. ***2 marks***

**e** What four medications is he likely to be started on prior to discharge (assuming there are no contraindications)? ***4 marks***

**2** Victor, a 72-year-old man, is brought into the A & E department with central crushing chest pain, radiating to his left arm. He looks particularly unwell, is sweating, and has vomited in the ambulance on the way in. His ECG shows no abnormalities.

**a** What is the most likely diagnosis? ***1 mark***

**b** What further single investigation would you request to confirm this diagnosis? ***1 mark***

**c** Give four risk factors for this condition. ***4 marks***

**d** Suggest four areas of lifestyle advice you would give this man on discharge. ***4 marks***



Complete SAQs for Medical Finals By P. Stather et al, Published 2010 by Blackwell Publishing, ISBN: 978-1-4501-8928-6.

**3** Winifred, an 80-year-old lady, is on her way into A & E under blue lights. She collapsed in the town and an ambulance was called. An ECG showed ST elevation in leads II, III and AVF. Paramedics have given her morphine, oxygen, nitrates and aspirin.

- **a** Where is the location of her infarction? ***1 mark***
- **b** Which coronary artery supplies this territory, and is therefore occluded? ***1 mark***
- **c** She is given thrombolytic treatment, and a repeat ECG is performed after 1 hour. What are you looking for on this ECG to determine if the thrombolysis has worked? ***1 mark***
- **d** If the thrombolysis has been unsuccessful, suggest two treatment options. ***2 marks***
- **e** A week later this patient develops mitral regurgitation. Describe the three characteristic findings on auscultation of this murmur. ***3 marks***
- **f** Explain the likely cause of this murmur in this patient. ***2 marks***

**4** Vivian, a 64-year-old lady, who suffers from type 2 diabetes and vascular dementia, has come into A & E with chest pain. You are unable to obtain a history from her, but her husband says the pain began a few hours ago, and she has had it before.

- **a** Name three systems which may cause chest pain, and an example of each. ***3 marks***
- **b** Name four investigations you would request immediately for this patient. ***4 marks***
- **c** Your tests come back showing that she has had a STEMI. You plan to give thrombolytic agents. Give three contraindications to thrombolysis. ***3 marks***

**5** Zachary, a 57-year-old man, comes to see you in your GP clinic. He has been having chest pain for the past 2 months, which comes and goes. The pain tends to occur when he walks into town, or up the stairs, and goes after he has rested for a few minutes.

- **a** What is the most likely diagnosis? ***1 mark***
- **b** Give three risk factors for this disease. ***3 marks***
- **c** Identify three different mechanisms or causes responsible for this condition. ***3 marks***
- **d** Give three different types of medication that could be used to help control this condition. ***3 marks***
- **e** What are the two surgical options in this case, considering the patient is otherwise healthy? ***2 marks***

**6** Wilma, a 60-year-old Caucasian lady, has come to see you in the GP surgery. You take her BP, which reads 150/95.

- **a** What would you do next? ***1 mark***
- **b** She is diagnosed with essential hypertension and started on medication. Please describe the four steps of the antihypertensive ladder for this patient. ***4 marks***
- **c** Unfortunately this lady is unable to tolerate an ACE inhibitor as it has been causing her to cough. Explain the biochemical cause of the cough, and what can be done about it. ***2 marks***
- **d** Give four common causes of secondary hypertension. ***4 marks***

**7** Xavier, a 68-year-old man, presents to A & E with collapse. On examination you find an ejection systolic murmur.

- **a** What diagnosis is this murmur consistent with? ***1 mark***
- **b** Give two common causes of this condition. ***2 marks***
- **c** Suggest three symptoms the patient may have because of this. ***3 marks***
- **d** Give three possible complications of this condition. ***3 marks***
- **e** What single investigation would you request in order to assess the extent of disease in this valve? ***1 mark***
- **f** This patient requires replacement of his valve. What different varieties of valves can be used, and what are the pros and cons of each? ***4 marks***

**8** Vincent, a 45-year-old man, comes to see you for a routine work physical. You detect no abnormalities, although routine bloods are taken, and his fasting cholesterol is 7.5. You ask him to return to see you in view of this result.

- **a** Describe two aspects of your initial management of this patient. ***2 marks***
- **b** He adheres to your initial plan, but it does little to affect his lipid profile. Give two classes of medication you could use in this case. ***2 marks***
- **c** Suggest two physical features you may elicit in this patient. ***2 marks***
- **d** Name three other common conditions which may cause raised lipids. ***3 marks***
- **e** Give three possible common complications of raised cholesterol. ***3 marks***

**9** Rhys, a 36-year-old man, who is an IV drug user, is admitted with fever, weight loss and a systolic murmur.

- **a** What condition are you concerned about in this patient? *1 mark*
- **b** Give three abnormalities you may detect on examining this patient's hands. *3 marks*
- **c** What is the most common bacteria causing this condition? *1 mark*
- **d** What would you do to determine the causative agent? *2 marks*
- **e** Give three pre-existing conditions that increase the chance of a patient contracting this disease. *3 marks*
- **f** What single measure may be taken to help prevent those patients at risk of this condition from obtaining it? *1 mark*

**10** Morgan, a 32-year-old man, has come in to A & E with chest pain. It is worse when lying flat, and relieved by leaning forwards. He has also noticed difficulty breathing when lying down.

- **a** What is the medical term for difficulty in breathing on lying down? *1 mark*
- **b** You suspect pericarditis in this patient. What two abnormalities might you find on auscultation? *2 marks*
- **c** What would expect to see on an ECG of this patient? *1 mark*
- **d** What sign may you see on CXR of this patient? *1 mark*
- **e** Give three possible causes of pericarditis. *3 marks*
- **f** This patient's condition progresses, and he develops cardiac tamponade. What procedure can be done to relieve the stress on the heart, and name one risk associated with this procedure. *2 marks*

**11** Yvonne, a 63-year-old lady, presents with a central chest pain radiating to her back. It feels like a tearing pain, which is spreading down her body. She is sweating profusely and short of breath.

- **a** What diagnosis are you concerned about in this lady? *1 mark*
- **b** Suggest two other conditions you would be considering at this stage. *2 marks*
- **c** Give three aspects of your initial management of this patient. *3 marks*
- **d** Give two risk factors for this condition. *2 marks*

**e** What are the two treatment options for this condition? ***2 marks***

**12** Zoe, a 68-year-old lady with a BMI of 35, comes to see you in the GP surgery. She has been feeling increasingly short of breath, and has noticed that her ankles have swollen recently.

**a** Give the most likely diagnosis. ***1 mark***

**b** What three further aspects of the respiratory history would you ask about? ***3 marks***

**c** Name three blood tests you would do in this patient, and why. ***3 marks***

**d** What cardiac abnormality may you see on CXR in this patient? ***1 mark***

**e** What might been seen on ECG in this patient? ***1 mark***

**f** What abnormality might be seen on ECHO? ***1 mark***

**g** Give two classes of medications that would be appropriate in this case. ***2 marks***

**13** Douglas, a 70-year-old man, comes into A & E complaining of palpitations and light-headedness. His pulse is irregularly irregular, although there is no other abnormality detected on examination.

**a** What is the likely diagnosis? ***1 mark***

**b** An ECG is performed. What would you look for on the ECG to diagnose this condition? ***1 mark***

**c** You decide to try to cardiovert this gentleman. Give two different ways of doing this. ***2 marks***

**d** Unfortunately the cardioversion is unsuccessful. Give three long-term treatments this patient may require. ***3 marks***

**e** Give three further complications this patient is at risk of. ***3 marks***

**14** Jenny, a 10-day-old baby, has central cyanosis. She is diagnosed with tetralogy of Fallot.

**a** Give two other congenital cardiac causes of cyanosis. ***2 marks***

**b** What are the four abnormalities present in tetralogy of Fallot? ***4 marks***

**c** Give three other symptoms of this condition. ***3 marks***

**d** What are the three shunts found in the circulatory system in utero, which close after birth? ***3 marks***

# Cardiology

## ANSWERS

**1 a** i) Severity *(1 mark)*, quality *(1 mark)*, radiating sites (neck, jaw, arm or back) *(1 mark)* /3

ii) *(1 mark for each correct answer, maximum 3 marks)* /3
Associated symptoms – sweating *(1 mark)*, pallor *(1 mark)*, SOB *(1 mark)*, cough *(1 mark)*, palpitations *(1 mark)*, dizziness *(1 mark)*

**b** ECG *(1 mark)* /1

**c** Thrombolysis *(1 mark)* – typically with reteplase /1

**d** *(1 mark for each correct answer, maximum 3 marks)* /2
Exercise tolerance test *(1 mark)*
Angiogram *(1 mark)*
ECHO *(1 mark)*

**e** ACE inhibitor *(1 mark)* /4
Aspirin 75 mg *(1 mark)*
Statin *(1 mark)*
Beta-blocker *(1 mark)*

**Summary**

Following an MI, NICE guidelines suggest all patients should be advised to undertake physical activity for 20–30 minutes per day, stop smoking and eat a more Mediterranean-style diet. All patients should also ideally be started on an ACE inhibitor, beta blocker, statin and aspirin, and in the case of an NSTEMI then clopidogrel should be added for 12 months. All patients should also be considered for coronary revascularisation.

**2 a** NSTEMI *(1 mark)* /1

**b** Troponin *(1 mark)* /1

**c** *(1 mark for each correct answer, maximum 4 marks)* /4
Smoking *(1 mark)*
Family history < 50 *(1 mark)*
Diabetes *(1 mark)*
Age *(1 mark)*

hypertension *(1 mark)*
Obesity *(1 mark)*
Hypercholesterolaemia *(1 mark)*
Male *(1 mark)*
Ethnicity *(1 mark)*

**d** *(1 mark for each correct answer, maximum 4 marks)* /4
Regular attendance with GP to follow up blood pressure, cholesterol and diabetes *(1 mark)*
Don't smoke *(1 mark)*
Keep alcohol consumption to a moderate level *(1 mark)*
Eat less fat and more fruit, vegetables and fish – a Mediterranean diet *(1 mark)*
Take regular exercise *(1 mark)*
Lose weight *(1 mark)*

**Summary**

Lifestyle advice and modification of risk factors is important in any condition. Patients acting on such advice can feel they are helping prevent further health problems. However, motivation is often a problem, and some patients require a lot of encouragement.

**3 a** Inferior *(1 mark)* /1

**b** Right coronary artery *(1 mark)* /1

**c** A decrease in the ST elevation of 50% *(1 mark)* /1

**d** Further thrombolysis *(1 mark)* /2
Percutaneous intervention (emergency stenting) *(1 mark)*

**e** Pansystolic murmur *(1 mark)* /3
Consistent volume *(1 mark)*
Radiating to the axilla *(1 mark)*

**f** Impairment of the blood supply to the area around the mitral valve (the valve itself being avascular) *(1 mark)*, causing weakening of the papillary muscles and rupture of the chordae tendinae *(1 mark)*. In some cases the ischaemic cardiac damage can cause dilatation of the heart *(1 mark)* leading to mitral regurgitation. /2

**Summary**

In the majority of patients, the left anterior descending artery supplies the anterior septum, anterior wall, and apex of the heart, the left circumflex artery supplies the lateral wall, and the right coronary artery supplies the posterior, lateral and inferior segments of the heart.

**4 a** Cardiac – MI, angina, pericarditis, aortic dissection /3
*(1 mark for the system and 1 example)*
Gastrointestinal – GORD, gastric/peptic ulcer, cholecystitis, pancreatitis, strangulated hiatus hernia *(1 mark for the system and 1 example)*
Respiratory – pleurisy, costochondritis, PE, pneumothorax, pneumonia *(1 mark for the system and 1 example)*
Musculoskeletal pain – fractured rib, pulled muscle *(1 mark for the system and 1 example)*

**b** ECG *(1 mark)* /4
CXR *(1 mark)*
Bloods (FBC, U+E, LFT, CRP, glucose, D-dimer) *(1 mark for any of these, maximum 2 marks)*

**c** *(1 mark for each correct answer, maximum 3 marks)* /3
Intracranial haemorrhage *(1 mark)*
Stroke within the past 3 months *(1 mark)*
Head injury within the past 3 months *(1 mark)*
Brain tumours *(1 mark)*
Pregnancy *(1 mark)*
Severe hypertension *(1 mark)*
Major surgery within the past 3 weeks *(1 mark)*
Internal bleeding within the past 2–4 weeks *(1 mark)*
Active peptic ulcer disease *(1 mark)*
Trauma *(1 mark)*

## Summary

There are a large number of causes of chest pain, and it is important to be able to distinguish between the different systems causing this, and know what initial investigation must be performed in these patients. It is imperative that all patients presenting with chest pain have an ECG done ASAP. A large number of patients are admitted daily due to chest pain, and discharged 12 hours later following a negative troponin level and normal CTPA, with a diagnosis of musculoskeletal pain; however, it is important to rule out more serious pathology.

**5 a** Angina *(1 mark)* /1

**b** *(1 mark for each correct answer, maximum 3 marks)* /3
Male *(1 mark)*
Diabetes *(1 mark)*
Family history under 50 *(1 mark)*

Hypertension *(1 mark)*
Hypercholesterolaemia *(1 mark)*
Obesity *(1 mark)*
Smoking *(1 mark)*
Ethnicity *(1 mark)*

**c** *(1 mark for each correct answer, maximum 3 marks)* /3
Decreased coronary perfusion *(1 mark)*
Arrhythmias *(1 mark)*
Anaemia *(1 mark)*
Coronary artery spasm *(1 mark)*
Heart failure *(1 mark)*
Valvular disease *(1 mark)*
Hyperthyroidism *(1 mark)*

**d** *(1 mark for each correct answer, maximum 3 marks)* /3
GTN or longer acting nitrates *(1 mark)*
Aspirin *(1 mark)*, statins *(1 mark)*
Antihypertensives (beta-blockers, ACEI) *(1 mark)*
Calcium channel blockers *(1 mark)*

**e** Angioplasty *(1 mark)* /2
CABG *(1 mark)*

## Summary

Angina is caused by decreased oxygen supply to the heart. It is a common condition, with the aim of treatment to prevent further deterioration of the condition, and to make the patient symptom free. This is initially done with aspirin, statins, blood pressure control and PRN GTN; however, many patients require further surgical intervention to improve their quality of life.

**6 a** Obtain repeat BP readings spread over time to determine if she has hypertension. *(1 mark)* /1
If this remains inconclusive then obtain 24-hour BP. *(1 mark)*

**b** She should be started on either a calcium channel blocker or a diuretic. *(1 mark)* /4
If this does not control the hypertension then an ACE inhibitor should be added. *(1 mark)*
The next step is either a calcium channel blocker or diuretic depending upon your first choice of drug. *(1 mark)*
Beta-blockers can be used fourth line. *(1 mark)*

**c** ACE inhibitors cause a build-up of bradykinin, causing the cough. *(1 mark)* /2
Her treatment should be changed to an angiotensin receptor blocker. *(1 mark)*

**d** *(1 mark for each correct answer, maximum 4 marks)* /4
Glomerular disease *(1 mark)*
Renal artery stenosis *(1 mark)*
COCP *(1 mark)*
Coarctation of the aorta *(1 mark)*
Diabetes *(1 mark)*
Cushing's disease *(1 mark)*
Pregnancy *(1 mark)*
Conn's syndrome *(1 mark)*
Phaeochromocytoma *(1 mark)*

## Summary

Essential hypertension accounts for 90–95% of hypertension. The treatment ladder depends on the age and sex of the patient, and any other conditions the patient may have. For young non-black patients the initial treatment is with an ACE inhibitor, however this is second line in those over 55, or any black patient. Secondary causes of hypertension should be looked for through initial screening with blood tests to look for renal disease and diabetes; however, further testing should be reserved for those with resistant hypertension, that is a BP over 150/90 on three antihypertensive agents.

**7 a** Aortic stenosis *(1 mark)* /1

**b** *(1 mark for each correct answer, maximum 2 marks)* /2
Rheumatic fever *(1 mark)*
Bicuspid aortic valve *(1 mark)*
Calcification of the aortic valve *(1 mark)*

**c** *(1 mark for each correct answer, maximum 3 marks)* /3
Fainting *(1 mark)*
Dyspnoea *(1 mark)*
Palpitations *(1 mark)*
Chest pain *(1 mark)*

**d** *(1 mark for each correct answer, maximum 3 marks)* /3
Left ventricular hypertrophy *(1 mark)*
Left-sided heart failure *(1 mark)*
Arrhythmias *(1 mark)*
Endocarditis *(1 mark)*

**e** Echocardiogram *(1 mark)* /1

**f** Metallic valve *(1 mark)* – longer life (20 years) but requires lifelong warfarin. *(1 mark)* /4
Tissue valve graft *(1 mark)* – shorter life (10 years) but requires warfarin for only 6 months. *(1 mark)*

## Summary

Heart valve replacements have traditionally been performed through open heart surgery; however, newer techniques are now beginning to allow replacement of a valve through percutaneous intervention, which has the added advantage of a much shorter recovery time. The choice between mechanical and artificial valves depends on the co-morbidities and life expectancy of the patient. For example, a young woman who wants children cannot have a metallic valve as she would need to take warfarin, which is teratogenic, whereas a fit 70-year-old man may prefer a metallic valve and to accept the increased risk of bleeds.

**8 a** Dietary advice (less fat, less alcohol, more fruit and veg) *(1 mark)* /2
Encourage more exercise *(1 mark)*

**b** *(1 mark for each correct answer, maximum 2 marks)* /2
Statins *(1 mark)*
Fibrates *(1 mark)*
Bile salt sequestrants *(1 mark)*
Nicotinic acid *(1 mark)*

**c** *(1 mark for each correct answer, maximum 2 marks)* /2
Xanthelasma *(1 mark)*
Corneal arcus *(1 mark)*
Xanthoma *(1 mark)*

**d** *(1 mark for each correct answer, maximum 3 marks)* /3
Diabetes *(1 mark)*
Hypothyroidism *(1 mark)*
Cushing's disease *(1 mark)*
Kidney failure *(1 mark)*

**e** *(1 mark for each correct answer, maximum 3 marks)* /3
Atherosclerosis *(1 mark)*
Coronary artery disease *(1 mark)*
Stroke *(1 mark)*
MI *(1 mark)*
Peripheral vascular disease *(1 mark)*

## Summary

Treatment of hypercholesterolaemia has been shown to significantly reduce morbidity and mortality across populations. Treatment should be initiated in all patients with a raised cholesterol level, and statins are used for secondary prevention in patients following MI, angina, stroke, TIA, or peripheral arterial disease.

**9 a** Subacute bacterial endocarditis *(1 mark)* /1

**b** *(1 mark for each correct answer, maximum 3 marks)* /3
Janeway lesions *(1 mark)*
Osler nodes *(1 mark)*
Splinting haemorrhages *(1 mark)*
Septic emboli/gangrene *(1 mark)*
Clubbing *(1 mark)*

**c** *Streptococcus viridans (1 mark)* /1

**d** Blood cultures *(1 mark)* taken from 3 different sites, separated over time *(1 mark)* /2

**e** *(1 mark for each correct answer, maximum 3 marks)* /3
Congenital heart disease *(1 mark)*
Rheumatic heart disease *(1 mark)*
Cardiac valve anomalies *(1 mark)*
Artificial heart valves *(1 mark)*

**f** Prophylactic antibiotics before invasive procedures *(1 mark)* /1

## Summary

Infective endocarditis is an infection involving the endocardial surface of the heart, which causes valvular insufficiency, causing congestive heart failure, and possibly abscesses on the myocardium. Emboli from the valve, which may be infective, along with immune reactions, cause the variety of signs and symptoms of the condition. Infective endocarditis should be suspected in any patient with a fever and newly diagnosed heart murmur.

**10 a** Orthopnoea *(1 mark)* /1

**b** Muffled heart sounds *(1 mark)* /2
Pericardial rub *(1 mark)*

**c** Saddle-shaped ST segment throughout the majority of the leads *(1 mark)* /1

**d** Globular heart *(1 mark)* /1

**e** *(1 mark for each correct answer, maximum 3 marks)* /3

Infection *(1 mark)*
Autoimmune disorders *(1 mark)*
Rheumatic fever *(1 mark)*
TB *(1 mark)*
Cancer *(1 mark)*
Leukaemia *(1 mark)*
Renal failure *(1 mark)*
HIV *(1 mark)*
Hypothyroidism *(1 mark)*

**f** Pericardiocentesis *(1 mark)* /2
Risks of puncturing the myocardium or a coronary artery, MI, needle induced arrhythmias, pneumopericardium, infection, and accidental puncture of other organs *(1 mark for any of these examples)*

## Summary

Pericarditis may be idiopathic, although is caused by several conditions, such as infections, autoimmune conditions, MI (Dressler's syndrome), trauma to the heart, malignancy, and as a side effect of medications. Patients typically present with chest pain radiating to the back, which is relieved by sitting forward, and exacerbated by lying down. They may also have a cough, fever and fatigue.

**11 a** Aortic dissection *(1 mark)* /1

**b** *(1 mark for each correct answer, maximum 2 marks)* /2
MI *(1 mark)*
Pericarditis *(1 mark)*
Musculoskeletal pain *(1 mark)*
Aortic aneurysm *(1 mark)*

**c** *(1 mark for each correct answer, maximum 3 marks)* /3
ABC *(1 mark)*
Check blood pressure on both arms *(1 mark)*
Request CT scan if unsure of the diagnosis and the patient is stable *(1 mark)*
Refer to surgeons urgently *(1 mark)*

**d** *(1 mark for each correct answer, maximum 2 marks)* /2
Atherosclerosis *(1 mark)*
Hypertension *(1 mark)*
Traumatic injury *(1 mark)*
Connective tissue disorders *(1 mark)*

**e** Medical management – pain relief and ensuring the blood pressure is stable *(1 mark)* /2
Surgical repair or replacement of the aorta *(1 mark)*

## Summary

Aortic dissection resulting in rupture has an 80% mortality rate, with the majority of patients not making it into hospital. If you suspect a patient has a dissection you must phone the surgical registrar on call immediately. Take blood samples from the patient including cross match of at least 6 units, and do not give any fluids, as this will increase their BP and increase the risk of further haemorrhage. They must be operated on ASAP, then they can be fluid resuscitated.

**12 a** Heart failure *(1 mark)* /1

**b** *(1 mark for each correct answer, maximum 3 marks)* /3
Smoking *(1 mark)*
Orthopnoea *(1 mark)*
Paroxysmal nocturnal dyspnoea *(1 mark)*
Cough *(1 mark)*
Sputum production *(1 mark)*

**c** FBC – look for anaemia *(1 mark)* /3
U+E – assess renal function, which may affect fluid balance *(1 mark)*
LFT – fluid overload can cause congestion of the liver, and a low albumin can cause fluid overload *(1 mark)*

**d** Cardiomegaly (cardiothoracic ratio >50%) *(1 mark)* /1

**e** Left ventricular hypertrophy (S in V1 + R in V5 or V6 >35mm) *(1 mark)* /1

**f** Decreased ejection fraction (<40%) *(1 mark)* /1

**g** *(1 mark for each correct answer, maximum 2 marks)* /2
Diuretics *(1 mark)*
ACE inhibitors *(1 mark)*
Beta-blockers *(1 mark)*

## Summary

Congestive cardiac failure is an impairment of the heart's ability to pump blood around the body, causing fluid overload. The NYHA classification of heart failure gives four categories of severity of heart failure depending on the activity of the patient:

Class I – no limitation and asymptomatic
Class II – Slight, mild limitation of activity, although the patient is comfortable at rest

Class III – Marked limitation of any activity, with the patient only comfortable at rest

Class IV – Discomfort and symptoms occur with any activity and at rest.

**13 a** Atrial fibrillation *(1 mark)* /1

**b** Absence of 'p' waves *(1 mark)* /1

**c** Electrical *(1 mark)* /2

Medical (amiodarone, sotalol, or flecainide) *(1 mark)*

**d** Digoxin *(1 mark)* /3

Beta-blockers *(1 mark)*

Warfarin *(1 mark)*

**e** *(1 mark for each correct answer, maximum 3 marks)* /3

PE *(1 mark)*

Stroke *(1 mark)*

Transient ischaemic attack *(1 mark)*

Collapse *(1 mark)*

## Summary

Atrial fibrillation can occur due to a variety of cardiac causes, such as coronary artery disease, mitral stenosis, mitral regurgitation, HOCM, pericarditis, congenital heart disease, and previous cardiac surgery, as well as hypertension, lung disease, alcohol, hyperthyroidism and carbon monoxide poisoning. Treatment involves rate control to try to revert the patient back into sinus rhythm, and anticoagulation, in order to prevent thrombo-embolic events.

**14 a** *(1 mark for each correct answer, maximum 2 marks)* /2

Transposition of the great arteries *(1 mark)*

Total anomalous pulmonary venous return *(1 mark)*

Truncus arteriosus *(1 mark)*, tricuspid atresia *(1 mark)*

Hypoplastic left heart syndrome *(1 mark)*

**b** Ventricular septal defect *(1 mark)* /4

Pulmonary stenosis *(1 mark)*

Over-riding aorta *(1 mark)*

Right ventricular hypertrophy *(1 mark)*

**c** *(1 mark for each correct answer, maximum 3 marks)* /3

Difficulty feeding *(1 mark)*

Developmental delay *(1 mark)*

Poor weight gain *(1 mark)*

Clubbing *(1 mark)*

Sudden death *(1 mark)*

**d** Ductus arteriosus *(1 mark)* /3
Ductus venosus *(1 mark)*
Foramen ovale *(1 mark)*

## Summary

The foramen ovale may be kept patent for a short period of time by the use of prostin. This is done with patients where the blood flow to the lungs from the right ventricle is inadequate to maintain sufficient oxygenation for life. These patients may then have their congenital defects corrected, or a shunt put in place from a branch of the aorta to the pulmonary artery.