

check

Independent learning program for GPs



Unit 480 March 2012

Ischaemic heart disease



The Royal Australian
College of General
Practitioners

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Ischaemic heart disease is the major cause of death in Australia and a leading cause of morbidity. It should be considered in all patients presenting with chest pain or pain in surrounding regions, and checking for the presence of risk factors that can lead to ischaemic heart disease forms an essential part of preventive health.

Presentations of ischaemic heart disease can vary greatly and include stable angina, acute coronary syndrome, cardiac arrest and even death. A diagnosis of ischaemic heart disease might also be suggested by changes identified incidentally on an electrocardiographic (ECG) tracing in an apparently asymptomatic individual.

Management of acute coronary syndrome is determined by presentation, classification and location (metropolitan or rural) within Australia. Current classification divides acute coronary syndromes into STEMI (ST elevation myocardial infarction) or NSTEMI (Non-ST elevation acute coronary syndrome), the latter of which can be further subdivided into NSTEMI (Non-ST elevation myocardial infarction) or unstable angina. The occurrence of a STEMI in a rural location may warrant treatment with fibrinolysis, whereas a metropolitan general practitioner is more likely to focus solely on stabilisation prior to transfer.

This unit of *check* looks at use of the Australian cardiovascular risk calculator, treatment of cardiovascular risk factors as well as management of suspected and established ischaemic heart disease.

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The learning objectives for this unit are to:

- identify cardiovascular risk factors and target levels for treatment in individuals with and without established ischaemic heart disease, and appropriately counsel patients about lifestyle interventions in order to address these risk factors
- develop increased confidence in using the Australian cardiovascular risk calculator to assess the risk of getting cardiovascular disease within the next 5 years in an individual aged between 45–74 years (or aged 35–74 years if Aboriginal or Torres Strait Islander background)
- obtain a focused history, perform a targeted examination and request appropriate investigations in cases of suspected ischaemic heart disease
- develop increased confidence in interpreting ECG changes associated with myocardial infarction
- develop increased confidence in managing acute coronary syndrome in both metropolitan and rural settings
- understand the role of medications such as aspirin, clopidogrel, statins and angiotensin converting enzyme inhibitors in secondary prevention of ischaemic heart disease
- develop a management plan involving education, lifestyle management, treatment of cardiovascular risk factors to target, medication and cardiac rehabilitation if available in patients diagnosed with ischaemic heart disease.

We hope this unit of *check* will assist you to confidently assess and manage patients who have cardiovascular risk factors and those who present with symptoms that could suggest ischaemic heart disease.

Kind regards



Catherine Dodgshun
Medical Editor

CASE 1

IS SOPHIE AT RISK?

Sophie, aged 15 years, consults you for a diphtheria-tetanus-acellular pertussis (DTPa) vaccination. Her mother Jenny accompanies her. Sophie was absent on the day students received their DTPa vaccinations at school. She is well today and has no significant medical history. She takes ethinyloestradiol 30 mcg/drospirenone 3 mg for menstrual regulation, and has no allergies. Sophie has not had any adverse reactions to vaccinations in the past. You explain the actions and possible adverse effects of a DTPa vaccination. With the consent of Sophie and her mother, you administer the DTPa vaccination using standard procedures.

You observe that Sophie appears to be obese.

QUESTION 1 

Why does this consultation present an opportunity for screening for cardiovascular risk?

QUESTION 2 

How would you introduce the concept of screening for cardiovascular risk in this consultation?

QUESTION 3 

What history would you like to obtain from Sophie to help you determine her cardiovascular risk?

QUESTION 4 

What would be an appropriate physical examination for Sophie to help you determine her cardiovascular risk?

FURTHER HISTORY

Jenny agrees to leave the consulting room for you to conduct a health check for Sophie. Sophie tells you that she smokes about 5–10 cigarettes daily. She started smoking about 6 months ago and Jenny is aware of this. Sophie never eats breakfast as she is always too tired and in a rush in the mornings. She likes to eat pies, chips, chocolate and ice cream and rarely eats fruit or vegetables. Sophie does not do any regular exercise and has about 6–8 hours of 'screen time' (television, computer and phone) per day. She does not drink alcohol.

Otherwise, your HEADS psychosocial assessment does not reveal any concerns. HEADS is a mnemonic for an adolescent psychosocial assessment and has been expanded to HEEDSSS¹ – Home, Education, Employment, Activities, Drugs (smoking, alcohol, recreational), Sexuality, Suicide (depression) and Safety.

Sophie tells you that Jenny has diabetes and that her father Paul takes tablets for his cholesterol. Her paternal grandfathers both died from heart attacks, but Sophie does not know their ages when they had heart attacks, or their ages at death. She thinks they could have been in their 60s.

Sophie's BMI is 30 kg/m². Her waist circumference is 98 cm. Her blood pressure is 144/94 mmHg.

Use the 5As brief intervention strategy to help assess readiness to change, and facilitate change of unhealthy lifestyle habits – ask, assess, advise, assist, arrange.²

ANSWER 3

Ask Sophie about factors that may increase or decrease her risk of developing cardiovascular disease. Use the SNAP mnemonic² to ask about:

- smoking – duration, frequency and amount
- nutrition – saturated and trans fat, wholegrains, fruit and vegetables
- alcohol
- physical activity (and inactivity) – for example, ‘couch and screen time’.

Ask Sophie about any family history of heart disease, diabetes and high cholesterol (this may require Jenny’s input).

ANSWER 4

Determine Sophie’s body mass index (weight in kilograms, divided by height in metres squared) after measuring her height and weight and plot this on a BMI for age chart. Measure Sophie’s waist circumference and compare this with a waist circumference for age percentiles table. Measure blood pressure (correct cuff size, sitting, three measurements).

Figures 1 and 2 show body mass index for age percentiles for boys and girls aged 2 to 20 years respectively,³ and Table 1 shows waist circumference for age percentiles for both boys and girls.⁴

ANSWER 5

Sophie’s nonmodifiable risk factors are her first degree family history of diabetes and hypercholesterolaemia and her second degree family history of heart disease (if one or more of her grandparents developed symptomatic heart disease at less than 50 years of age this would constitute a significant family history of heart disease). Table 2 lists criteria that constitute a significant family history of heart disease.⁵⁻⁹

Sophie’s potentially modifiable risk factors are smoking, obesity, a diet high in saturated fat and physical inactivity.

Sophie’s risk cannot be quantified – the Australian absolute cardiovascular risk calculator (see Resources) is not validated for use in persons under the age of 45 years (and not under the age of 35 years in Aboriginal or Torres Strait Islander peoples).

Sophie’s BMI is above the 95th percentile (obese) and her waist circumference is above the 90th percentile.

ANSWER 6

Ask Jenny for details about Sophie’s father’s high cholesterol (does he have familial hypercholesterolaemia?) and about the ages that Sophie’s grandparents developed symptomatic heart disease.

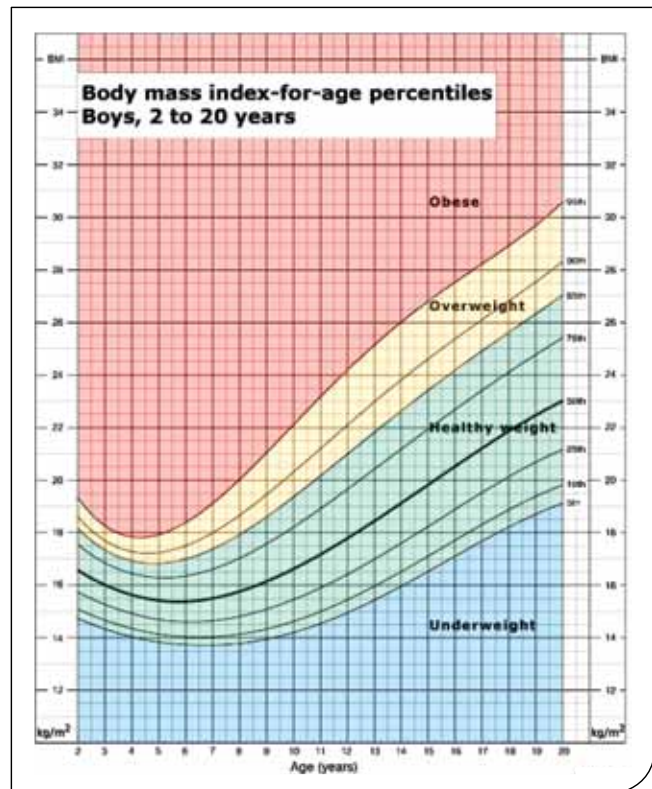


Figure 1. Body mass index for age percentiles (boys aged 2–20 years). Reproduced with permission from Centers for Disease Control and Prevention, USA

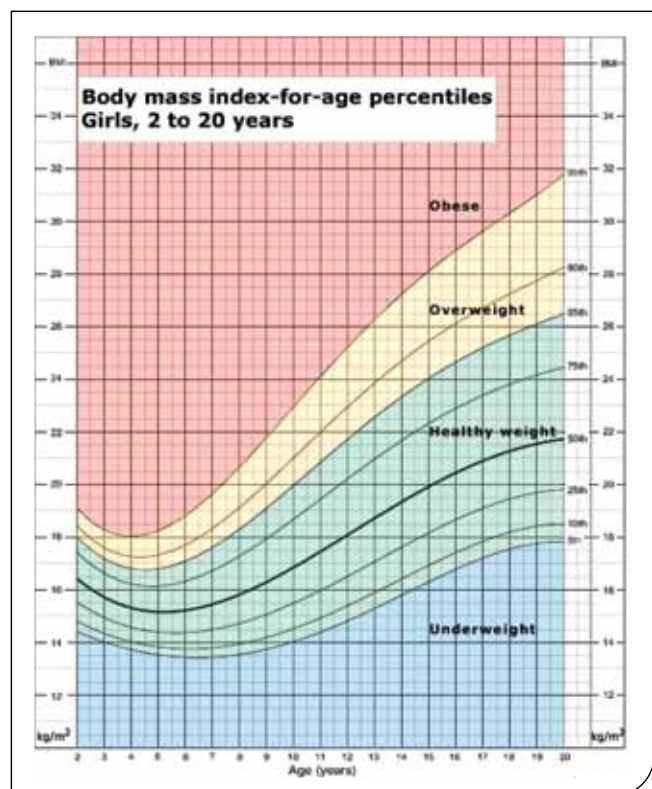


Figure 2. Body mass index for age percentiles (girls aged 2–20 years). Reproduced with permission from Centers for Disease Control and Prevention, USA

FEEDBACK

Familial hypercholesterolaemia (FH) is diagnosed by deoxyribonucleic acid (DNA) testing, or by hypercholesterolaemia and typical clinical features, eg. tendon xanthomas. The incidence is about 1:500.¹⁰ GPs are well placed to case find children of index patients with FH, and to initiate ‘cascade testing’ (testing of relatives of an affected individual) and referral to specialist services.

ANSWER 7

Continue a nonjudgemental, sensitive approach and ask Sophie if she has any concerns about her wellbeing and about her health in the future. Explain the risk factors, which have been identified, and tell her these will increase her chances of developing heart disease later in life. Explain that heart disease may cause symptoms, restriction of activities and premature death. Explain it is preventable.

ANSWER 8

Urinalysis, fasting lipids and fasting glucose should be checked.¹¹

FEEDBACK

Statin therapy can be used from 8 years of age (if LDL-cholesterol >3.3 mmol/L after appropriate dietary modification).¹¹

ANSWER 9

Adopt a motivational interviewing approach to address behavioural change for smoking, diet and physical activity. Does Sophie perceive that there are problems? Is she ready to make changes? What changes are realistic?^{12,13}

Consider using behavioural change tools such as ‘Lifescrpts’ (that include information on discussing lifestyle changes with patients and written advice in the form of prescription pads) to help to address smoking, diet, physical activity and weight (see *Resources*).

Arrange review and regular follow up to reinforce advice, to reassess ‘stage of behavioural change’ and to maintain changes (eg. 3 monthly – this could coincide with review of her prescription for the combined oral contraceptive pill).

Table 1. Waist circumference (cm) for age percentiles for boys and girls aged 2–18 years⁴

	Percentile for boys					Percentile for girls				
	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th
Intercept	39.7	41.3	43.0	43.6	44.0	40.7	41.7	43.2	44.7	46.1
Slope	1.7	1.9	2.0	2.6	3.4	1.6	1.7	2.0	2.4	3.1
Age (y)										
2	43.2	45.0	47.1	48.8	50.8	43.8	45.0	47.1	49.5	52.2
3	44.9	46.9	49.1	51.3	54.2	45.4	46.7	49.1	51.9	55.3
4	46.6	48.7	51.1	53.9	57.6	46.9	48.4	51.1	54.3	58.3
5	48.4	50.6	53.2	56.4	61.0	48.5	50.1	53.0	56.7	61.4
6	50.1	52.4	55.2	59.0	64.4	50.1	51.8	55.0	59.1	64.4
7	51.8	54.3	57.2	61.5	67.8	51.6	53.5	56.9	61.5	67.5
8	53.5	56.1	59.3	64.1	71.2	53.2	55.2	58.9	63.9	70.5
9	55.3	58.0	61.3	66.6	74.6	54.8	56.9	60.8	66.3	73.6
10	57.0	59.8	63.3	69.2	78.0	56.3	58.6	62.8	68.7	76.6
11	58.7	61.7	65.4	71.7	81.4	57.9	60.3	64.8	71.1	79.7
12	60.5	63.5	67.4	74.3	84.8	59.5	62.0	66.7	73.5	82.7
13	62.2	65.4	69.5	76.8	88.2	61.0	63.7	68.7	75.9	85.8
14	63.9	67.2	71.5	79.4	91.6	62.6	65.4	70.6	78.3	88.8
15	65.6	69.1	73.5	81.9	95.0	64.2	67.1	72.6	80.7	91.9
16	67.4	70.9	75.6	84.5	98.4	65.7	68.8	74.6	83.1	94.9
17	69.1	72.8	77.6	87.0	101.8	67.3	70.5	76.5	85.5	98.0
18	70.8	74.6	79.6	89.6	105.2	68.9	72.2	78.5	87.9	101.0

⁴Adapted with permission from Fernandez JR, Redden DT, Pietrobelli A, Allison DB. Waist circumference percentiles in nationally representative samples of African-American, European-American, and Mexican-American children and adolescents. *J Pediatr* 2004;145(4):439–44.

Table 2. Factors that constitute a significant family history of ischaemic heart disease⁵

- A significant family history of ischaemic heart disease is one or both of the following:
 - one or more first degree relatives who developed symptomatic IHD at age less than 60 years*
 - one or more second degree relatives who developed symptomatic IHD at age less than 50 years
- A significant family history of premature ischaemic heart disease is one or both of the following:
 - one or more first degree relatives who developed symptomatic IHD at age less than 55 years
 - two or more second degree relatives who developed symptomatic IHD at age less than 45 years

* Some authorities ^{6–9} expand this definition by differentiating between male and female relatives. In this case they consider age <55 years (male) and age <65 years (female) in one or more first degree relatives to be a significant family history of nonpremature ischaemic heart disease.

CASE 2

MINA'S BLOOD PRESSURE

Mina, aged 48 years, is a catering assistant at the local high school. Mina, her husband Adnan, their two children and Mina's mother moved to Australia 10 years ago as refugees from Sudan. Her communication in English is excellent. She attended a health check at work 2 weeks ago and she was told to see her GP because her blood pressure was mildly elevated at 148/96 mmHg. Apart from occasional episodes of mild low back pain, Mina has no symptoms and no significant medical history. Mina takes no medication. She has a levonorgestrel releasing intrauterine system (Mirena®) in situ, and attends a GP every 2 years for a Pap test and a check up.

You note that at her last consultation 16 months ago her blood pressure had been recorded as 136/86 mmHg. Mina asks you to check her blood pressure. She thinks it was probably a 'bit high' when tested at the work health check as she had been lifting some boxes just before the test.

QUESTION 1 

What is your approach to this consultation?

QUESTION 2 

What further history would you like to obtain to help in your assessment of Mina?

QUESTION 3 

What would be an appropriate focused physical examination for Mina?

FURTHER INFORMATION

Mina tells you that she has never smoked and that she does not drink alcohol. She smiles when she tells you that she enjoys all food. Her diet includes several serves of fruit and vegetables every day. Her daily diet also includes pies, cakes, biscuits and chocolate. Mina undertakes no regular physical exercise, but she is on her feet all day at work (5 days a week). Her father died 'from heart trouble' when he was 56 years old. Her mother, she said, had 'mild diabetes'.

Mina's weight is 80 kg and her body mass index is 29 kg/m². Her waist circumference is 96 cm. Her upper arm circumference is 35 cm, so you use a large cuff to measure her blood pressure. Her blood pressure (large cuff, sitting, right arm, three measurements) is 144/92 mmHg.

QUESTION 4 

How do you explain your clinical assessment to Mina?

QUESTION 5 

What investigations are indicated to further assess Mina's risk of developing IHD?

FURTHER INFORMATION

As scheduled, Mina returns to see you to discuss her results, which are as follows:

- fasting glucose: 6.7 mmol/L (normal 3.0–5.5 mmol/L)
- glycosylated haemoglobin (HbA1c): 6.2% (normal <6%)
- fasting lipids
 - total cholesterol (TC): 6.1 mmol/L (normal <5.5 mmol/L)
 - high density lipoprotein cholesterol (HDL-C): 0.9 mmol/L (normal >1.0 mmol/L)
 - low density lipoprotein cholesterol (LDL-C): 4.6 mmol/L (normal <3.5 mmol/L)
 - triglycerides (TG): 2.1 mmol/L (normal <2.0 mmol/L)
- urea, electrolytes and creatinine (UEC): normal
- urinalysis: negative for glucose, protein, blood and leucocytes
- electrocardiograph (ECG): sinus rhythm, 72 beats/min, normal.

QUESTION 6  

What is Mina's absolute cardiovascular disease risk?

QUESTION 7   

What is your management plan for Mina?

FURTHER INFORMATION

You request an oral glucose tolerance test, which reveals impaired fasting glycaemia with normal glucose tolerance.

Mina is motivated to 'get healthy and stay healthy'. She commences a self directed program of diet modification and exercise (walking for 60 minutes each day).

Mina has some questions. She tells you that one of her friends had a 24 hour blood pressure monitor test and asks if she should get this test too. Mina also tells you that she read in a magazine about getting a 'heart scan', doing a 'special blood test' and having a 'treadmill test' to check out the heart – and she wonders if she should have these tests. She also heard a report on television that taking half an aspirin every day can halve the risk of getting a heart attack – and asks you if she should take aspirin.

QUESTION 8  

How do you respond to Mina's questions about a 24 hour blood pressure monitor, heart scan, special blood test and a treadmill test? What do you say to Mina regarding the use of aspirin?

CASE 2 ANSWERS

ANSWER 1

This consultation presents an opportunity for a comprehensive assessment of cardiovascular risk and for providing preventive advice. It is not limited to a blood pressure check.

ANSWER 2

Ask Mina if she has a previous diagnosis of high blood pressure, such as hypertension in pregnancy. Ask about smoking (and, if relevant, duration, frequency and number), diet, alcohol consumption and physical activity.

Ask Mina if any of her relatives have or have had a history of heart disease, stroke or diabetes.

ANSWER 3

Determine Mina’s body mass index, measure her waist circumference, and check her sitting blood pressure using the correct size cuff according to her upper arm circumference. Perform cardiac auscultation to assess her heart sounds and check for the presence of a murmur, which may indicate previously undiagnosed rheumatic heart disease – that is more common in this population.

ANSWER 4

Commend Mina for her healthy habits (no smoking, no alcohol, consumption of fruit and vegetables).

Explain that the measurements obtained on physical examination indicate that she is overweight, her waist circumference is excessive, and she may have high blood pressure (repeated measurements are required to confirm this). Explain that being overweight, excessive abdominal fat, high blood pressure, a diet high in saturated fat, limited physical activity and adverse family history combine to increase her risk of having, or developing cardiovascular disease.

FEEDBACK

Table 3 lists the BMI and waist circumference measurements that increase cardiovascular risk.

Table 3. Body mass index, waist circumference (girth) and cardiovascular risk
<ul style="list-style-type: none"> The risk of cardiovascular disease is increased with BMI ≥ 25 Kg/m² (overweight) and/or waist circumference: ≥ 80 cm (for women); ≥ 90 cm (for Chinese and South East Asian men); ≥ 94 cm (for Caucasian men)
<ul style="list-style-type: none"> The risk of cardiovascular disease is substantially increased with BMI ≥ 30 Kg/m² (obesity) and/or waist circumference: ≥ 88 cm (for women); ≥ 102 cm (for men)

ANSWER 5

Fasting lipids and glucose should be requested to further assess Mina’s risk of developing IHD.

Consider requesting glycosylated haemoglobin – although in Australia this test is not yet in general use as a screening test for diabetes and there is no Medicare rebate for it.

If mild hypertension is confirmed, Mina should have an electrocardiogram, urinalysis and pathology testing for urea, electrolytes and creatinine.

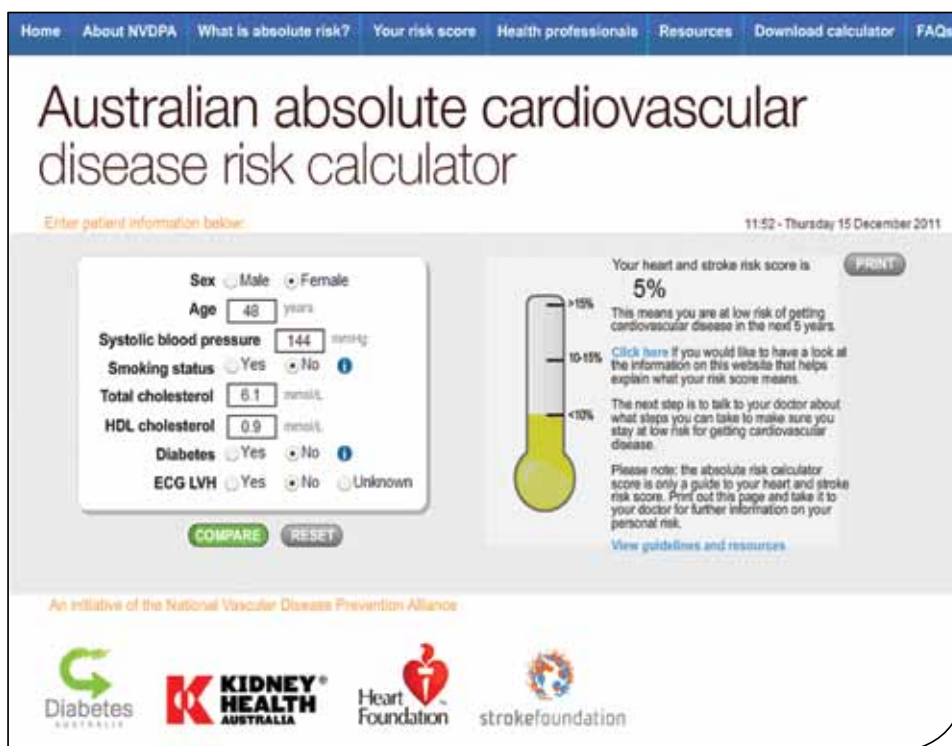


Figure 3. Adapted with permission from cvdcheck.org.au

ANSWER 6

Using the Australian absolute cardiovascular disease risk calculator, Mina’s risk of getting cardiovascular disease within the next 5 years is 5% (see Figure 3).¹⁴

The Australian absolute cardiovascular disease risk calculator (see Resources) is an online tool that calculates the risk of getting cardiovascular disease (defined as heart, stroke or peripheral vascular disease) within the next 5 years according to various factors such as age, gender, systolic blood pressure, smoking status, cholesterol levels and diabetes status. Those with a high (>15%) risk or intermediate (10–15%) 5 year risk should be followed up intensively, and are more likely to require more aggressive treatment of any one modifiable cardiovascular risk factor.¹⁵

The Australian absolute cardiovascular disease calculator is validated for persons aged 45–74 years (or aged 35–74 years if Aboriginal or Torres Strait Islander background) who do not have existing cardiovascular disease, and who do not have one or more factors that place an individual at high risk for cardiovascular disease¹⁵ such as those listed in Table 4. The calculated risk does not include the following factors:

- family history
- overweight and obesity
- diet
- physical activity
- impaired glucose tolerance
- mental health and socioeconomic status.

An individual's actual risk may be higher or lower than the calculated risk depending on these factors for each individual.

There are also Australian cardiovascular risk charts (see *Resources*), which utilise and determine similar information to the online cardiovascular disease risk calculator, but which are in tabular format.

Mina also has several features of the metabolic syndrome (abdominal obesity, elevated triglyceride level, reduced HDL, elevated blood pressure and fasting glycaemia) as defined by the International Diabetes Federation (IDF). See *Table 5* for the criteria for diagnosis of the metabolic syndrome according to the IDF.¹⁶

Table 4. Factors that place an individual at high risk for cardiovascular disease (including coronary artery disease)¹⁵

Note: Several factors trump the calculation of absolute risk. If a patient has one or more of these factors, the patient is promoted to high risk status (equivalent to an absolute risk of a cardiovascular event within 5 years, which is greater than 15%).

Group A

- Existing symptomatic cardiovascular disease (coronary artery disease), stroke disease and/or peripheral vascular disease.
- Diabetes and one or more of the following:
 - aged over 60 years
 - microalbuminuria (albumin:creatinine ratio >2.5 mg/mmol (male), >3.5 mg/mmol (female))
 - Aboriginal or Torres Strait Islander background
 - family history of premature coronary heart disease.

Group B

- Asymptomatic cardiovascular disease
- Moderate or severe renal disease
- Proteinuria (>1 g/24 hours)
- Familial hypercholesterolaemia
- Total cholesterol level >7.5 mmol/L
- Systolic BP >180 mmHg or diastolic BP >110 mmHg
- Moderate absolute risk (10–15%) of a cardiovascular event within 5 years plus metabolic syndrome and/or a positive family history of cardiovascular disease.

FEEDBACK

The metabolic syndrome represents the association of abdominal obesity, cardiovascular risk factors and metabolic risk factors with an increased risk of cardiovascular disease and type 2 diabetes. The metabolic syndrome is associated with a greater than twofold increase in the risk of developing cardiovascular disease.¹⁷ The prevalence of the metabolic syndrome is between 13% and 22% in Australian adults.¹⁷

ANSWER 7

Explain to Mina that she is at increased risk of developing cardiovascular disease and that this risk can be reduced by modifying her lifestyle.

Advise Mina to eat less, and adopt a Mediterranean type diet low in saturated fat and trans fat (avoid hydrogenated vegetable oils used in cakes and biscuits), and high in wholegrains, oats, fish, nuts, fruit and vegetables. Advise her to do aerobic exercise every day (such as walking, jogging, cycling or swimming to at least mild breathlessness) – 30 minutes every day is sufficient for reducing cardiovascular risk. However, Mina will need to exercise for 60 minutes every day to achieve weight loss and to further reduce her cardiovascular risk.

Consider referral (if available and cost feasible) to a dietician and an exercise physiologist. Weight loss may be more achievable if staged as a series of realistic targets, rather than a single potentially unrealistic goal. Mina is more likely to succeed if advised to lose weight in steps of 5% at a time, than if advised to lose 20% from the outset.

Consider arranging an oral glucose tolerance test. Arrange follow up and regular review (eg. every 1–3 months).

Mina is eligible for a Medicare time based health assessment either as a type 2 diabetes risk evaluation, or as a 45–49 year old health check.

Tools to assist GPs in managing patients' risk factors include Lifescripts (see *Resources*), *Managing my heart health* (a patient record card available from the NHF – see *Appendix 1*) and various patient resources for diet and physical activity, which are available on the NHF website (see *Resources*). These tools support self management.

FEEDBACK

In general, management of the metabolic syndrome addresses weight loss, poor diet, physical inactivity and each individual risk factor. Aspirin 100 mg daily is indicated for patients with metabolic syndrome who are at high absolute risk of cardiovascular disease. Adjuvant therapy with metformin may be considered for patients with dysglycaemia (abnormal blood glucose levels).

ANSWER 8

Ambulatory blood pressure monitoring (ABPM) should be considered if Mina's blood pressure measurements are inconsistently elevated or equivocal. A recent editorial in *The Medical Journal of Australia* has suggested that ABPM adds little to clinical decision making for most patients.¹⁸

There is no indication for a stress ECG or high sensitivity CRP as screening tests for coronary artery disease in asymptomatic individuals. In addition, homocysteine has not been validated as an indicator of cardiovascular risk.

The role of coronary CT scan and coronary artery calcium score (Agatston score) as a screening test for coronary artery disease in asymptomatic patients has not yet been well defined. Its role will become clearer as evidence and experience accumulate over time. It is not useful for diagnosis or evaluation. It provides a proxy measure

of the extent of coronary artery plaque (atherosclerosis). It does not indicate the site of plaque, or its haemodynamic significance. It is not useful for patients under the age of 45 years (false negative results may occur in younger patients in whom plaque may be uncalcified). An Agatston score of zero (no coronary artery calcium) has a high negative predictive value for coronary artery disease.¹⁹ This test may be helpful recategorising patients at moderate risk of cardiovascular disease (on risk factor assessment) as at high risk or low risk.

The test will cost the patient about \$200 and there is no Medicare rebate. A coronary CT scan will expose a patient to radiation of about 2 mSv (about 100 chest X-ray equivalent effective doses).

Aspirin can be considered for primary prevention of cardiovascular disease for patients who are at high absolute risk of developing cardiovascular disease when benefits of aspirin (risk reduction) outweigh risks of aspirin (gastrointestinal bleeding).²⁰ For patients at moderate or low risk, the potential risks of aspirin therapy (gastrointestinal bleeding) outweigh any potential benefit in risk reduction. As Mina is at low absolute risk, Mina should not take aspirin to prevent IHD.

Table 5. International Diabetes Federation definition of the metabolic syndrome¹⁶

- Abdominal obesity: waist circumference ≥ 80 cm (women) ≥ 90 cm (South East Asian, Chinese or Japanese men) ≥ 94 cm (Caucasian men)
- Plus any two of:
 1. elevated serum triglyceride level ≥ 1.7 mmol/L
 2. decreased serum HDL-cholesterol level ≤ 1.03 mmol/L (men) ≤ 1.29 mmol/L (women)
 3. elevated blood pressure: systolic ≥ 130 mmHg or diastolic ≥ 85 mmHg
 4. elevated fasting plasma glucose level ≥ 5.6 mmol/L
 5. taking lipid modifying medication
 6. taking antihypertensive medication
 7. diagnosis of type 2 diabetes.

FEEDBACK

The NHF recommends an aggressive risk factor reduction approach for patients who are at high risk (See *Table 4*).^{21,22}

The NHF approach to risk factor reduction includes:

- optimising lifestyle
 - avoid smoking
 - maintain normal weight (BMI 18.5–24.9 kg/m²) and normal girth (waist circumference: < 80 cm (women), < 94 cm (men))
 - consume a Mediterranean type diet
 - ensure low salt intake (< 4 g/day) – no added salt diet
 - reduce alcohol consumption: ≤ 2 standard drinks/day (for men), ≤ 1 standard drink/day (for women)
 - undertake physical activity > 30 minutes every day

- treating blood pressure to the following targets:
 - $< 140/90$ mmHg (in those without existing cardiovascular disease or diabetes)
 - $< 130/80$ mmHg (if existing cardiovascular disease and/or diabetes)
 - $< 125/75$ mmHg (if proteinuria > 1 g/day)
- treating serum lipid levels to the following targets:
 - LDL-C < 2.0 mmol/L (2.5 mmol/L may be acceptable for patients without existing cardiovascular disease)
 - HDL-C > 1.0 mmol/L
 - TC < 4.0 mmol/L
 - TG < 2.0 mmol/L
- aspirin 75–150 mg daily (See *Answer 8* regarding aspirin use in primary prevention of cardiovascular disease).

There is no evidence to support the use of statins and/or renin-angiotensin inhibitors (angiotensin converting enzyme inhibitors and angiotensin II receptor antagonists) in primary prevention for patients whose lipid levels and blood pressure are within target levels respectively. However, there is evidence for their use in secondary prevention irrespective of cholesterol level and blood pressure.^{23,24}

A 1% reduction in LDL cholesterol approximates to about a 1% reduction in the relative risk of a cardiovascular event. Rosuvastatin 40 mg and atorvastatin 80 mg will reduce LDL by 55%. More than 80% of the lipid lowering effect of a statin is achieved with 50% of its maximum dose.²⁵

Ezetimibe is an 'add-on' if lipid targets are not achieved with a statin or an alternative (which is generally less effective) if a statin not tolerated. Ezetimibe inhibits the absorption of dietary cholesterol. The dose of ezetimibe is 10 mg per day. Ezetimibe lowers LDL by approximately 15%.²⁶

The Pharmaceutical Benefits Scheme (PBS) will subsidise lipid lowering therapy irrespective of cholesterol level for patients with existing symptomatic cardiovascular disease and for patients at high risk of developing cardiovascular disease as listed in Group A in *Table 4*. For other patients, the PBS will subsidise lipid lowering therapy if, after a 6 week trial of dietary intervention, cholesterol levels are above the levels indicated for that patient category. See *Resources* for prescribing lipid lowering medicine under the PBS. A private prescription is required if PBS criteria are not satisfied.

CASE 3

LYNN PRESENTS WITH CHEST PAIN

Lynn, aged 51 years, consults you because she is worried about some episodes of chest pain that she's had over the past few days. There have been no other symptoms and she feels quite well otherwise. Lynn has no significant past medical history although mild hypercholesterolaemia was diagnosed at a health check 9 months ago when her fasting lipid levels were:

- TC 6.1 mmol/L (normal <5.5 mmol/L)
- HDL-C 0.8 mmol/L (normal >1.0 mmol/L)
- LDL-C 4.2 mmol/L (normal <3.5 mmol/L)
- TG 1.8 mmol/L (normal <2.0 mmol/L).

Lynn takes no medication and she has no allergies. She lives with her husband Mike and works as an office manager for a real estate agency.

QUESTION 1 

What are the key features to elicit in your focused history and examination for Lynn?

FURTHER INFORMATION

Lynn describes the pain as 'like a dull ache' localised behind and around the lower part of her breastbone. She rates it as about '5 to 6 out of 10'. The pain does not radiate from this area. The pain occurs in episodes lasting a few minutes, perhaps 10–15 minutes at most. The pain can occur at any time – it has occurred when sitting at her desk, it has occurred when walking around the office and it has also occurred at night. Lynn has not noticed that the episodes of pain are consistently related to exertion – the pain can occur when she is walking and when she is at rest. A few days ago, she had some mild chest pain for a couple of minutes after walking quickly to the office from her car (about 500 metres), but she put that down to feeling stressed as she was late. She has not had the chest pain after walking up stairs at work.

The most severe episode of chest pain woke her up from her sleep last night. She took some Mylanta® and it resolved after 15 minutes or so. She's had no chest pain since then.

Lynn smokes 10 cigarettes per day. She started smoking in her early 20s. She drinks about 1.5 standard drinks of red wine on most days.

Lynn is perimenopausal – she's had mild, hot flushes and irregular periods for the past year or so. Her father, who was a smoker, had a heart attack in his early 50s. He died from a stroke in his 70s. Her brother, Alex, had a stent inserted for a 'near heart attack' at the age of 56 years. Her mother has diabetes.

On examination, Lynn is a slim lady and her general appearance is normal. Her pulse is 64 beats/min and regular and her blood pressure is 130/82 mmHg. Heart sounds and abdominal examination are both normal. There is no definite chest wall tenderness.

QUESTION 2 

What features in Lynn's presentation increase your suspicion that her pain is due to coronary artery disease?

QUESTION 3 

List the possible causes of Lynn's chest pain using Murtagh's diagnostic strategy.²⁷

QUESTION 4 

How would you manage Lynn now?

FURTHER INFORMATION

You give Lynn chewable aspirin 300 mg. You obtain a 12 lead ECG, which shows no abnormalities. You insert an IV cannula. Her SpO₂ is 97%. You do not administer oxygen. Lynn says she feels a bit worried, a bit relieved, but okay. You call an ambulance.

QUESTION 5  

While waiting for the ambulance to arrive, Lynn asks you to explain what will happen when she is in hospital. How do you respond to Lynn's question?

FURTHER INFORMATION

Lynn is admitted to the coronary care unit at the hospital. She has no further episodes of pain. There are no abnormalities on serial troponin tests and serial ECGs. Lynn is stratified as presenting with intermediate risk non-ST elevation acute coronary syndrome (NSTEMI).²⁸ As there is no evidence of myocardial injury, the diagnosis is 'unstable angina' rather than 'non-ST-elevation myocardial infarction'. She is given enoxaparin 1 mg/kg SC, 12 hourly for 48 hours.

QUESTION 6  

Other than pathology biomarker tests, what investigations are appropriate for the diagnosis and evaluation of Lynn's chest pain? What are the advantages and disadvantages of each of these investigations?

QUESTION 7 

What is the likely management plan upon discharge from hospital for Lynn?

CASE 3 ANSWERS

ANSWER 1

Determine the nature of Lynn's chest pain regarding its site, radiation, character, severity, duration, frequency, associated factors (precipitating, aggravating, relieving) and associated symptoms.

The features of typical angina are chest pain or chest discomfort, which is:

- retrosternal
- tight, heavy or compressive in character
- 2–10 minutes in duration
- precipitated and aggravated by exertion
- relieved by rest.

One or more of these features is absent in atypical chest pain.

One or more of the following features suggest that chest pain is less likely to be due to myocardial ischaemia, but they do not exclude the diagnosis:

- sharp
- localised
- associated with chest wall tenderness
- related to respiration, movement or posture
- brief (a few seconds) or prolonged (more than 2 hours).

The radiation of pain in myocardial ischaemia is variable and nonspecific.

Ask Lynn about smoking, alcohol and family history (heart disease, diabetes and cardiovascular risk factors).

Check Lynn's pulse (rate and rhythm) and blood pressure, listen to her heart sounds, check for chest wall tenderness, listen to her lung fields and check her peripheral pulses.

If Lynn is considered to be in a stable condition, check her BMI and waist circumference.

ANSWER 2

The following features increase your suspicion that Lynn's pain is due to coronary artery disease: the pain is retrosternal and up to 15 minutes duration; it can occur with exertion; Lynn's absolute risk of cardiovascular disease is calculated using the Australian absolute cardiovascular risk calculator¹⁴ to be moderately increased at 10%, and she has a family history of IHD.

ANSWER 3

Using Murtagh's diagnostic strategy,²⁷ the possible causes of Lynn's chest pain are:

- **probability diagnoses** (ie. common or likely diagnoses): musculoskeletal chest pain, anxiety
- **serious diagnoses** (not to be missed): myocardial ischaemia, pulmonary embolus, pericarditis

- **pitfalls** (often missed): shingles, gastro-oesophageal reflux, oesophageal spasm, cholelithiasis
- **masquerades**: depression, thoracic spine disease
- **is this patient trying to tell me something?** (anxiety, stress, domestic violence).

ANSWER 4

Lynn presents with atypical chest pain. The pain has occurred at rest. The most recent episode of chest pain occurred at night and at rest less than 24 hours prior to consultation. Lynn has a moderately high absolute risk of cardiovascular disease, which increases the likelihood that her atypical chest pain is due to myocardial ischaemia. This is unstable angina, or an acute coronary syndrome until proven otherwise.

Lynn should be transferred by ambulance to hospital for assessment and management. Depending on location and access, hospital may be a chest pain assessment unit, an emergency department or a rural hospital.

Management is guided by the acute coronary syndromes treatment algorithm²⁸ and includes:

- administering aspirin 150–300 mg stat (soluble or chewable) unless already given or contraindicated²⁸
- explaining to Lynn that her symptoms may indicate a blockage in an artery in her heart, and this needs to be assessed and managed in hospital
- explaining to Lynn that the absence of ongoing pain and the normal examination are reassuring and there may be other less serious causes for her pain, but these can only be diagnosed after ruling out a heart related cause
- transferring Lynn to the treatment room for observation, monitoring and 12 lead ECG while waiting for an ambulance
- calling for assistance (other GPs, practice nurses)
- calling an ambulance
- contacting an emergency physician or on-call cardiologist to discuss Lynn's presentation.

FEEDBACK

It is not appropriate to check troponin, unless this is in a hospital setting to enable serial testing and appropriate follow up. A single negative troponin result does not exclude myocardial infarction or ischaemia. An abnormal troponin result needs urgent action. This presents significant risk in the community setting if the GP and/or the patient are not immediately contactable about the abnormal result.

ANSWER 5

You explain to Lynn that her heart will be continuously monitored via tapes on her chest. She will have repeated ECGs and blood tests, the results of which will determine her management.

ANSWER 6

The gold standard investigation for the diagnosis and evaluation of coronary artery disease is invasive (catheter) coronary angiography, which demonstrates plaque, stenoses and flow (and ischaemia). This is the appropriate first line investigation for patients who are stratified to high risk NSTEMI/ACS.

Patients stratified to low risk or intermediate risk NSTEMI/ACS²⁸ and patients with stable, undifferentiated chest symptoms consistent with possible myocardial ischaemia can be investigated with functional (stress) tests and/or coronary CT angiography.

• Stress ECG

Myocardial ischaemia is indicated by ST-segment depression on stress. The severity of ischaemia may be implied by the degree of stress that induces ST depression (eg. the duration of exercise) and by the degree of ST segment depression. Stress ECG is about 70% sensitive and 70% specific for diagnosing coronary artery disease in men – it is about 60% sensitive and 60% specific for diagnosing coronary artery disease in women.²⁹ Compared to men, women are more likely to have single vessel and non-obstructive coronary artery disease; this is thought to reduce the diagnostic accuracy of stress ECG.

• Stress echocardiography

Myocardial ischaemia is indicated by the pattern and degree of abnormal ventricular wall motion during stress. Stress echocardiography is about 80% sensitive and 80% specific for diagnosing coronary artery disease for both men and women.²⁹

The interpretation of a stress test result depends on the test's positive and negative predictive values, which are determined by its sensitivity and specificity, and also by the prevalence of coronary artery disease in the population tested and thus by the pre-test probability of coronary artery disease in the individual patient. The predictive values for stress ECG and stress echocardiography are optimised for patients with an intermediate pre-test probability of having coronary artery disease.

• Myocardial perfusion imaging (MPI) single photon emission computed tomography (SPECT) with thallium (potassium analogue) or 99-technetium sestamibi (calcium analogue).

The patient receives an intravenous dose of tracer. Scans taken after stress are compared with scans taken after recovery. The differential patterns of tracer uptake indicate regions of reversible and irreversible myocardial ischaemia. The patient is exposed to a radiation dose of about 20 mSv (about 1000 chest X-ray effective equivalent doses). MPI may be useful for patients who have abnormal resting ECG such as a left bundle branch block. Patient selection and indications for MPI are complex. GPs should refer a patient to a cardiologist, rather than refer a patient for MPI.

Exercise (using a treadmill protocol) is the preferred mode for stress testing, but for patients who are unable to exercise stress can be simulated pharmacologically using dobutamine (as a positive chronotrope and inotrope) or using a vasodilator (eg. adenosine or dipyridamole) – which 'steals' perfusion from ischaemic myocardium.

- **Coronary CT angiography (CCTA)** has a negative predictive value approaching 100%. CCTA identifies plaque and stenoses with high sensitivity and specificity with a positive predictive value of about 90%.³⁰ CCTA is appropriate for excluding (or confirming) significant coronary artery disease in patients:
 - with undifferentiated chest pain, normal ECG and normal troponin
 - with continuing, stable chest symptoms and a normal stress test.
 A Medicare rebate applies if:
 - the patient has been referred by a GP to a specialist who then refers the patient for the CCTA, and
 - the indication is the investigation of stable symptoms consistent with myocardial ischaemia in a patient at low to intermediate risk of coronary artery disease.
 CCTA (64-slice) exposes the patient to a radiation dose of about 5 mSv (about 250 chest X-ray effective equivalent doses).
- **Coronary magnetic resonance angiography** is an evolving technique. It is not widely available. Its role will become clearer with increasing experience.

ANSWER 7

Lynn is likely to be discharged home with a 'Chest pain action plan',³¹ smoking cessation advice and on aspirin 100 mg daily. Prompt investigations are appropriate such as scheduling a stress ECG to be performed prior to discharge from hospital.

Note that if Lynn had diabetes, her presentation would be stratified as high risk NSTEMI and urgent angiography would be indicated.²⁸

Platelet glycoprotein IIb/IIIa inhibitors (eg. abciximab) have an important role in high risk NSTEMI and percutaneous coronary intervention (PCI) – their use is limited to the specialist context.³²

FEEDBACK

A gender bias has been identified in the current management of cardiovascular disease in women.³³ Coronary heart disease kills 55% of women who have it, compared to 43% of men. Under the age of 65 years, women have double the mortality post myocardial infarction compared to men. Risk factors (diabetes, hypertension and dyslipidaemia) cause higher morbidity and mortality in women than men. Women are less likely than men to be achieving optimum secondary prevention (taking appropriate medications, meeting therapeutic targets and participating in rehabilitation). These observations may reflect intrinsic gender differences, issues in systems of care and therapist attitudes.

CASE 4

GEOFF PRESENTS TO THE EMERGENCY DEPARTMENT

You are one of four GPs practising in a rural town (population 3000) located 250 km from the nearest regional centre (a minimum of 3 hours away by road ambulance). You are on duty for the local hospital, which has an emergency department, a two bed high dependency unit and 15 general inpatient beds. There are no resident specialists in the town. You are called by the duty nurse to attend the hospital urgently because a man, aged 62 years, has presented to the emergency department with severe chest pain and distress. The nurse tells you, 'It looks like an MI. He's pale and sweaty and his systolic is only 100'. You attend immediately.

You know the patient, Geoff, a mechanic and school bus driver, who has consulted you regularly over several years for management of his hypertension.

The key features in your initial rapid focused clinical assessment of Geoff are a 1 hour history of constant, severe, crushing central chest pain associated with nausea and vomiting. He takes amlodipine 5 mg daily. He has no known allergies.

Geoff is pale and diaphoretic with cool peripheries. His pulse is 50 beats/min and regular. Blood pressure is 105/60 mmHg. SpO2 is 96%. Heart sounds are normal and lung fields are clear.

Geoff says, 'Give me something for the pain, doc, it's killing me.'



Figure 4. Geoff's ECG tracing at presentation

QUESTION 1

What are the most important steps in your initial management of Geoff?

FURTHER INFORMATION

You administer aspirin 300 mg, clopidogrel 300 mg and glyceryl trinitrate. Glyceryl trinitrate fails to relieve Geoff's pain and you end up administering morphine 8 mg IV in 2 mg aliquots, as well as metoclopramide 10 mg IV. Your initial management has partly relieved Geoff's chest pain, improving his pain score from '12 out of 10' to '4 out of 10'. His pulse and blood pressure remain unchanged and stable. His 12 lead ECG is shown in *Figure 4*.

QUESTION 2

Systematically report Geoff's ECG. What is your interpretation of this ECG? What are the characteristic ECG features of myocardial infarction? What are the outcomes for myocardial infarction?

QUESTION 3

How would you manage Geoff now?

QUESTION 4

What are the contraindications to fibrinolysis? What are the possible adverse effects of fibrinolysis?

FURTHER INFORMATION

Geoff has no contraindications to fibrinolysis. He is given reteplase followed by adjuvant antithrombin therapy for 48 hours in the form of IV heparin.

Geoff's chest pain resolved completely about 2 hours after onset. During fibrinolysis you notice the rhythm in *Figure 5* on the cardiac monitor. Geoff is asymptomatic with no palpitations and no breathlessness. His blood pressure is 110/60 mmHg.

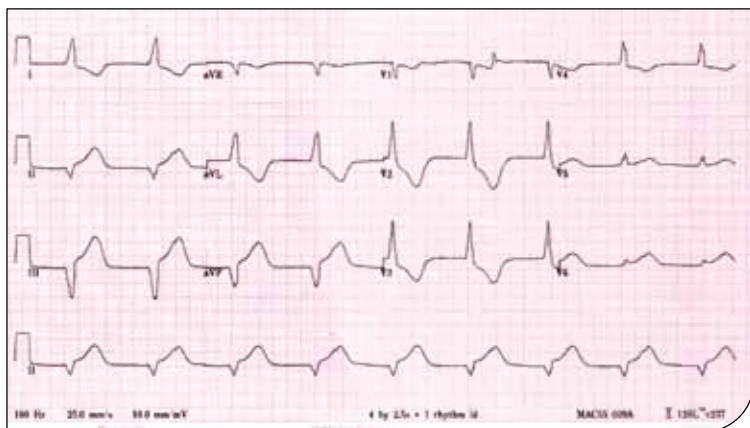


Figure 5. Geoff's ECG during fibrinolysis

QUESTION 5

What is this abnormal rhythm in *Figure 5* and what is your management?

FURTHER INFORMATION

Six hours after his initial presentation, Geoff feels tired but otherwise well. He has had no further chest pain. Clinically, he is stable. His pulse is 64 beats/minute, BP is 112/70 mmHg and ECG indicates sinus rhythm. You review his history, noting that he is an exsmoker (he ceased smoking 10 years ago) and that his lipid profile and fasting glucose were normal when tested most recently (18 months ago). Hypertension was diagnosed 10 years ago and this has been well controlled with amlodipine.

QUESTION 6

What is your ongoing management plan for Geoff?

QUESTION 7

What are the implications for Geoff's occupation as a bus driver?

CASE 4 ANSWERS

ANSWER 1

The most important steps in your initial management of Geoff are:

- call for help (other nursing staff, other GPs)
- start management during initial clinical assessment
- aspirin 150–300 mg stat (soluble or chewable) unless already given or contraindicated²⁸
- clopidogrel 300 mg stat³⁴
- intravenous access (14 or 16 gauge cannula – one or two)
- blood collected for high sensitivity troponin (TnT or TnI), CK-MB, UEC, glucose, full blood examination (FBE)
- glyceryl trinitrate (GTN) 400 mcg sublingually every 5 mins as required for pain (IV access must be obtained first – do not administer if systolic blood pressure (SBP) <100 mmHg)

- metoclopramide 10 mg IV
- morphine 2 mg IV every 5 mins titrated to pain relief
- oxygen 8 L/min only if SpO₂ <94%
- 12 lead ECG
- continuous cardiac monitoring (if available)
- 'set up and ready to go'
 - defibrillator
 - adrenaline 1 mg ampoules
 - saline 1L and IV infusion set
- concurrently obtain further history while implementing management documentation.

FEEDBACK

Oxygen should not be administered unless the patient is hypoxic or in cardiogenic shock. Hyperoxia may be detrimental to the ischaemic myocardium.^{35,36}

ANSWER 2

Geoff's ECG shows:

- moderate right axis deviation (QRS is positive in leads III and aVF and QRS is negative in leads I and aVL)
- sinus rhythm
- heart rate of 54 beats/min
- ST segment elevation of greater than 2 mm in leads II, III and aVF with tall (hyperacute) T waves in these leads
- reciprocal ST depression in leads aVL and V2
- nonpathological Q waves in leads III and aVF (<2mm deep)
- no T wave inversion.

The features indicate acute inferior myocardial infarction (MI).

The characteristic ECG features of acute myocardial infarction are ST elevation of ≥1 mm in two contiguous limb leads or ≥2 mm in two contiguous chest leads. As a myocardial infarction evolves, T wave inversion and Q wave development may occur. Reciprocal ST depression may be seen in leads, which relate to regions of myocardium that are opposite the infarcted region.

The region of myocardial infarction is implied by the pattern of leads in which the characteristic changes occur (see *Table 6*).

The likely site of arterial occlusion is implied by the affected region of myocardium. *Figure 6* shows the anatomy of the coronary arteries and *Table 7* shows the potential region of infarcted myocardium depending on the site of arterial occlusion.

Region of infarcted myocardium	ECG changes in leads
Inferior	II, III, aVF
Anterior	I, V2–V5
Septal	V1, V2
Lateral	I, aVL, V4–V6

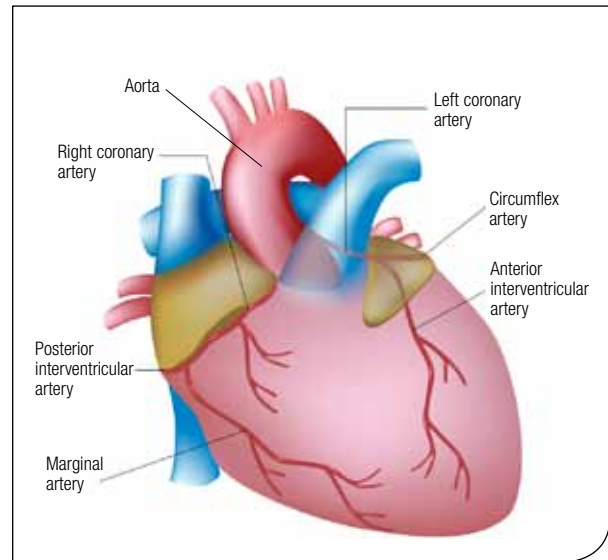


Figure 6. Anatomy of the coronary arteries.

Site of arterial occlusion	Potential region(s) of infarcted myocardium
left anterior descending artery	anterior wall of LV, anterior septum
left circumflex artery	lateral wall of LV, posterior wall of LV
right coronary artery	inferior wall of LV, posterior septum, right ventricle

LV= left ventricle

Right ventricular infarction (with ST-segment elevation in V4R [right ventricular lead]) occurs in about one third of patients who have inferior myocardial infarction. This may compromise right ventricular output leading to hypotension, particularly if a diuretic or nitrates are administered. Such hypotension may respond to an IV fluid bolus. Electrode placement for recording lead V4R is the right sided mirror image of the V4 electrode position.

Isolated posterior myocardial infarction occurs less commonly. It should be considered if there is ST-segment depression as well as tall R waves and tall T waves in leads V1–V3. It is diagnosed by demonstrating ST-segment elevation in leads V7–V9 (electrodes placed below left scapula).

Myocardial infarction may cause haemodynamic compromise (hypotension, cardiogenic shock), arrhythmia (eg. bradycardia with inferior infarction), cardiac rupture (septal, myocardial wall) and death. Potential late complications are left ventricular failure and pericarditis. About one third of patients who have myocardial infarction die – and about one half of these deaths occur before the patient reaches hospital.

ANSWER 3

There is no timely access to percutaneous coronary intervention (PCI); therefore, Geoff requires fibrinolysis (see *Figure 7*, which outlines hospital management of ST elevation myocardial infarction).

Provided there are no contraindications (see *Answer 4* of this case for details), fibrinolysis is indicated if all of the following apply:³²

- duration of symptoms of myocardial ischaemia or infarction greater than 20 minutes
- less than 12 hours have elapsed since onset of symptoms (initiation of fibrinolysis may be considered up to 24 hours after the onset of symptoms if there is evidence of ongoing ischaemia)
- ECG changes of either ST elevation >1 mm in two contiguous limb leads or ST elevation >2 mm in two contiguous chest leads (or new left bundle branch block).

Figure 7 outlines when to use fibrinolysis and PCI based on symptom onset and availability of PCI.³⁷

Retepase (a plasminogen activator) is preferred for ease of administration (10 units IV followed 30 minutes later by a second dose of 10 units IV). Retepase is superior to streptokinase (lives saved per 1000 patients at 30 days post treatment are 35 and 25 respectively).³² Retepase is less likely than streptokinase to cause adverse effects (particularly hypotension and allergic reactions). Streptokinase should not be used in patients who have previously received streptokinase, or in patients of Aboriginal or Torres Strait Islander background as these patients are likely to have high levels of neutralising antibodies.

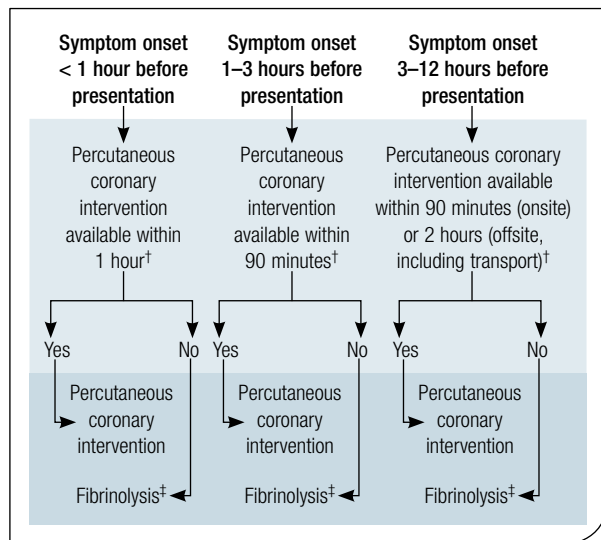


Figure 7. Hospital management of ST-segment-elevation myocardial infarction.

*Assuming no contraindications to fibrinolytic therapy. † Time delay refers to time from first medical contact to balloon. ‡ Patients with ongoing symptoms or instability should be transferred for percutaneous coronary intervention.

Note: Reperfusion after 12 hours is indicated for cardiogenic shock, ongoing pain or haemodynamic instability. Reproduced with permission from *The Medical Journal of Australia*. Guidelines for the management of acute coronary syndromes 2006. Med J Aust 2006;184(8 Supp):S1-S32.

ANSWER 4

The absolute and relative contraindications to fibrinolysis, are written below.^{32,38}

The absolute contraindications to fibrinolysis are:

- increased risk of bleeding
 - active bleeding or bleeding disorder (excluding menstruation)
 - closed head or facial trauma within 3 months
 - suspected aortic dissection
- increased risk of intracranial haemorrhage
 - any prior intracranial haemorrhage
 - ischaemic stroke within 3 months
 - known structural cerebral vascular lesion (arteriovenous malformation, aneurysm)
 - known malignant intracranial neoplasm.

The relative contraindications are:

- increased risk of bleeding
 - current use of anticoagulants (risk is proportional to the international normalised ratio [INR])
 - noncompressible vascular puncture
 - major surgery within 3 weeks
 - internal bleeding (gastrointestinal tract, urinary tract) within 4 weeks
 - active peptic ulcer
 - cardiopulmonary resuscitation if traumatic or longer than 10 minutes
- increased risk of intracranial haemorrhage
 - history of severe or poorly controlled hypertension
 - severe hypertension at presentation (SBP >180 mmHg or DBP >110 mmHg)
 - ischaemic stroke more than 3 months ago
 - known intracranial abnormalities that are not absolute contraindications
 - dementia
- pregnancy.

The possible adverse effects of fibrinolysis are:

- haemorrhage
- hypotension
- arrhythmia
- allergic reactions.

FEEDBACK

Adjuvant antithrombin therapy is given following administration of reteplase for 48 hours in the form of either:^{32,35}

- heparin 60 units/kg (maximum 4000 units) IV bolus followed by 12 units/kg/hour (maximum 1000 units/hour) IV infusion, adjusted to APTT (1.5–2 x control), or
- enoxaparin 30 mg intravenous bolus followed 15 minutes later by 1 mg/kg subcutaneously 12 hourly for patients younger than 75 years. For patients aged 75 years or older, no bolus and 0.75 mg/kg subcutaneously 12 hourly.

ANSWER 5

Geoff's ECG shows:

- broad complex bradycardia
- no P waves
- ST segment elevation in leads II, III and aVF
- deep Q waves in leads III and aVF.

In the context of an evolving inferior myocardial infarction, fibrinolysis and a stable patient (no chest pain, normal blood pressure), this is likely to represent slow accelerated idioventricular rhythm, which is a benign reperfusion arrhythmia. Other than ongoing monitoring, no intervention is indicated.

ANSWER 6

Ongoing management includes investigations, medication, patient education, referral for a catheter coronary angiogram, cardiac rehabilitation and aggressive management of cardiovascular risk factors.

Investigations could include the following:

- pathology:
 - serial high sensitivity troponin and CK-MB (6 hourly for 24 hours, then daily for a further 2 days)
 - UEC, FBE, fasting lipids and glucose
- ECG – 6 hourly for 24 hours, then daily for a further 2 days – plus ECG at any time if symptoms or arrhythmias occur
- imaging
 - chest X-ray
 - echocardiogram.

Provided that there are no contraindications and that the patient is stable, a clear prognostic benefit has been demonstrated for early introduction (within 24 hours) and ongoing therapy with the above^{39,40} with the following medications:

- antiplatelet therapy (aspirin 100 mg/day, clopidogrel 75 mg/day)
- an angiotensin converting enzyme inhibitor (eg. ramipril 5 mg daily)
- a statin (eg. atorvastatin 20 mg daily)
- a beta blocker – (eg. metoprolol 50 mg twice per day, atenolol 50 mg daily).

All patients should be prescribed a short acting nitrate (unless contraindicated) and provided with a written action plan for chest pain.

Patient education (explanation about coronary heart disease, information about lifestyle factors, activities, driving, occupation) is an important arm of management.

Referral should consist of:

- contacting the regional cardiologist to arrange early transfer for catheter coronary angiogram. Fibrinolytic reperfusion should be followed by assessment for revascularisation (percutaneous coronary intervention (PCI) or bypass surgery). 'Rescue' PCI (ideally within 12 hours of onset of symptoms) is indicated for patients who do not reperfuse within 90 minutes of fibrinolysis.³²
- referral for cardiac rehabilitation (if available).

ANSWER 7

Geoff must not drive a bus (or heavy vehicle) for 3 months following myocardial infarction.⁴¹ A conditional licence may be granted following satisfactory assessment by a cardiologist and provided he meets the following criteria: minimal symptoms, satisfactory stress ECG (exercise tolerance >9 minutes and no ST depression ≥ 2 mm) and ejection fraction >40%. Similar criteria (without the exclusion period) apply for patients with stable angina who have not had myocardial infarction.

Geoff can resume driving his car 2 weeks after myocardial infarction. There are no restrictions on driving for patients with stable angina.⁴¹

FEEDBACK

Note that pilots with coronary heart disease are required to successfully complete a comprehensive and stringent assessment by a cardiologist (including stress testing), every 6 months in order to obtain recertification. Pilots are not permitted to fly for a minimum of 6 months after myocardial infarction or PCI.

CASE 5

RICHARD IS EXPERIENCING CHEST PAIN DURING EXERCISE

Richard, aged 55 years, is a maths teacher and fitness fanatic. He is married to Louise. He runs about 80 km and cycles about 200 km every week. He has a healthy, varied diet based on wholegrain bread and cereal, fruit, vegetables, pulses, fish and lean meat. He has never smoked. He drinks two or three glasses of red wine per week.

Richard consults you with a 4 week history of an episodic mild tight sensation in the centre of his chest, which radiates to his throat. This lasts for a few minutes and there are no other symptoms. This only occurs during interval training (sprinting) and it resolves when he slows to his regular running pace. In the week before consulting you Richard had stopped interval training and has had no further episodes. He told you his father had a heart attack at 52 years of age. Richard is worried that he might be about to have a heart attack.

QUESTION 1 

What is your focused further history and focused examination for Richard?

FURTHER INFORMATION

Richard has had no previous episodes of chest pain. He's had numerous soft tissue injuries related to sporting activities, but has no significant past medical history. He takes fish oil 1g daily and a garlic tablet daily. His BMI is 21 kg/m² and his waist circumference is 88 cm. His pulse is 54 beats/min and regular. His blood pressure is 114/70 mmHg. His lipids and glucose levels were within normal limits when checked 5 years ago.

QUESTION 2 

What are the differential diagnoses for Richard's presentation?

QUESTION 3 

What investigations are indicated?

FURTHER INFORMATION

You obtain a resting 12 lead ECG, which shows no abnormalities. You refer Richard for an exercise ECG (semi urgent) and arrange for pathology testing of fasting glucose and fasting lipids. Richard has the exercise ECG 2 days later. You receive a phone call from the cardiologist informing you that the exercise ECG was positive for ECG changes and negative for symptoms at high workload. The cardiologist has arranged an urgent catheter coronary angiogram and advised Richard to commence aspirin 100 mg daily.

QUESTION 4 

A clinical diagnosis of angina and a positive stress ECG indicate that Richard has coronary artery disease. Is coronary angiography necessary?

FURTHER INFORMATION

Richard has coronary angiography and PCI with insertion of a stent to a stenotic lesion in the left anterior descending artery. The procedure is uncomplicated and Richard is discharged

home the following day after an uncomplicated period of observation.

You receive the pathology test results as below:

- fasting glucose: 4.9 mmol/L (normal 3.0–5.9 mmol/L)
- fasting lipids:
 - TC: 4.2 mmol/L (normal <5.5 mmol/L)
 - LDL-C: 2.9 mmol/L (normal <3.5 mmol/L)
 - HDL-C: 1.1 mmol/L (normal >1.0 mmol/L)
 - TG 1.1: mmol/L (normal <2.0 mmol/L).

QUESTION 5   

What is your approach to secondary prevention for Richard's coronary artery disease (to reduce the risk of progressive coronary artery disease and cardiovascular events)?

FURTHER INFORMATION

Richard consults you for follow up and review 1 week following PCI. He feels 'really well' and he is 'itching' to get back to his regular exercise regime. He is grateful to you for detecting his blocked artery before it caused a disaster.

QUESTION 6 

Richard has some questions for you and he would like your advice. One of his questions is whether there any limitations on his exercise.

FURTHER INFORMATION

Three months after his PCI, Richard consults you complaining of 2 weeks of episodic burning epigastric pain that radiates behind his lower sternum. This occurs after eating and when lying flat. It never occurs with exertion. He is worried that it is his heart. On examination, there is slight epigastric tenderness. You assess that it is likely that he has functional dyspepsia or gastro-oesophageal reflux. You provide advice on eating habits and posture. You consider medication.

QUESTION 7 

What are the potential interactions with prescribing a proton pump inhibitor (PPI) to treat Richard's symptoms?

FURTHER INFORMATION

Six months after his PCI, Richard consults you with a 4 week history of increasing fatigue. He tends to wake early in the morning and although tired he cannot get back to sleep. Everything seems to be an enormous effort. He has lost interest in running and cycling and, although he continues these activities, he no longer enjoys them. He has difficulty concentrating at work. Louise says that he has become 'irritable and withdrawn'. Over the past couple of months he's had difficulty obtaining an erection, but this doesn't bother him as he has no interest in sex. He has never felt like this before. He has wondered at times if it would have been better if he'd had a heart attack and died, but he would never harm himself.

QUESTION 8 

What is the diagnosis and how does this relate to coronary heart disease?

QUESTION 9 

What is your approach to managing Richard's depression?

CASE 6 ANSWERS

ANSWER 1

Focused history taking could include questions such as: has the 'tight sensation' occurred at rest or at night? Has there been any trauma to the chest wall – either a direct injury, or any strenuous activity that might have caused a musculoskeletal strain? Does Richard have a history of high blood pressure or high cholesterol? Are there any other first or second degree relatives who have, or who have had, coronary heart disease?

Focused physical examination could include checking Richard's BMI, waist circumference, pulse (rate and rhythm) and blood pressure, as well as auscultation of his heart and lung fields and checking for peripheral pulses.

ANSWER 2

Richard has described the features of typical angina (retrosternal discomfort/pain – which is tight, heavy or compressive in nature – brought on by exertion and relieved by rest). Differential diagnoses are pericarditis (chest pain is typically sharp, postural and nonexertional), coronary artery spasm (not consistently related to exertion) and musculoskeletal chest pain (costochondritis, intercostal strain).

FEEDBACK

Atypical chest pain describes symptoms that have some, but not all, of the features of typical angina. Unstable angina describes angina that occurs at rest or with rapidly increasing frequency and severity.

ANSWER 3

Angina is a clinical diagnosis. Investigations are not usually required to confirm the diagnosis, but are directed at further evaluation of the angina and assessment of cardiovascular risk factors. The most appropriate investigations are a resting electrocardiograph (ECG), a stress ECG or a stress echocardiogram, and a fasting pathology test for lipids and glucose. There is no place for myocardial perfusion

imaging or coronary CT scan/coronary artery calcium scoring in this situation.

A semi-urgent stress test was arranged for Richard because he presented with stable, typical angina that occurred with high intensity exercise, with no pain occurring in the week before presentation.

ANSWER 4

Coronary angiography defines the site and extent of coronary artery disease as well as the potential for revascularisation to improve symptoms and prognosis. Revascularisation procedures are percutaneous coronary intervention (PCI) (angioplasty and/or stent insertion) and coronary artery bypass grafting.

ANSWER 5

Using the pathology test results, as well as the other information required in the absolute risk of cardiovascular disease calculator, Richard's risk is low at 3%. However, coronary angiography confirms a diagnosis of coronary artery disease. Richard's risk may have been underestimated as the calculation does not factor in variables such as family history. Also, the calculation indicates low risk, but not zero risk. Richard requires aggressive management of his risk factors. Your approach to his management could include:

- Education (including 'Chest pain action plan')
- Lifestyle management – SNAP² (smoking, nutrition, alcohol and physical activity)
- Cardiac rehabilitation if available
- Treat risk factors to targets⁴²
 - blood pressure <130/80 mmHg
 - lipids:
 - :LDL: C <2.0 mmol/L
 - :HDL: C >1.0 mmol/L
- Medication management⁴²
 - aspirin 75–150 mg daily
 - clopidogrel 75 mg daily (this is not indicated for patients who have not had PCI unless aspirin is contraindicated or not tolerated).
 - statin
 - angiotensin converting enzyme inhibitor (or angiotensin II receptor antagonist if an angiotensin converting enzyme inhibitor is not tolerated)
 - beta-blocker
- Although not secondary prevention, provide Chest pain action plan and short acting nitrate
- GP Management Plan (informal or formal – a suitable template for use in clinical software is available via the NHF website, see *Resources*)
 - regular review (eg. 3 monthly) for symptoms, medications, mental state, weight and blood pressure
 - annual pathology test for lipids, glucose, UEC, LFT, CK and FBE.

FEEDBACK

The key components of a Chest pain action plan are recognition of symptoms, rest, obtaining help, self-administering GTN, and calling 000. A standard plan is available via the NHF website. See *Resources*.

Cardiac rehabilitation is a structured multidisciplinary program of patient education, advice (lifestyle factors and medication), physical exercise and psychological support. It empowers patient self management. It is appropriate for all patients with coronary heart disease – not just those who have had myocardial infarction, coronary intervention or surgery. Programs may be funded through health services.

If a program is not available, GPs can construct a proxy cardiac rehabilitation program involving a team approach with GP, practice nurse, dietician and physiotherapist.

Patients who participate in cardiac rehabilitation have been shown to experience reduced cardiovascular morbidity, mortality and risk factors and have improved medication compliance.^{43–46}

ANSWER 6

Exercise training (aerobic and resistance) is safe for patients with stable coronary heart disease. Exercise has been shown to reduce mortality and myocardial infarction and to improve risk factors, function and psychological wellbeing.⁴⁷

As Richard may be at risk of overexercise, he should be advised to consult an exercise physiologist, or a sports physician to develop a program that is appropriate and safe.

He should limit his exertion to fairly light exercise for the first 2 weeks after PCI. After this, Richard may gradually return to his previous level of exercise, up to a level of perceived exertion that is somewhat hard (13/20 on the Borg scale – a 15 point scale from 6 to 20 – that rates perceived exertion); his heart rate should not exceed 165 beats/min (220 beats minus his age/min), although this may not be appropriate for patients on a beta blocker. He should be aware of warning signs of overexertion including any chest discomfort, breathlessness that is more than moderate, feeling cold and clammy and delayed recovery (greater than 5 minutes). If any of these occur, he should cease activity and consult his GP to review his exercise program before resuming this. He should not exercise when systemically unwell.⁴⁷

ANSWER 7

In general PPIs may reduce the conversion of clopidogrel to its biologically active form and therefore reduce its clinically efficacy. It is preferable to use an alternative to a PPI – eg. a H₂-receptor antagonist if possible.⁴⁸ If treatment with a PPI is essential, pantoprazole may be used.

ANSWER 8

Richard describes the features of major depression, which is a common association with coronary heart disease. Anaemia, diabetes, hypothyroidism and renal impairment should be excluded by appropriate clinical assessment and investigations. Beta blockers can precipitate and exacerbate depression in some individuals and this may be relevant for Richard. Erectile dysfunction may be secondary to depression, or in this context it may be due to medication such as an antihypertensive. Alternatively, it may reflect atherosclerosis.

ANSWER 9

Richard's depression could be managed by:

- supportive psychotherapy (including psycho-education and regular review)
- cognitive behavioural therapy
- continued regular exercise, but at reduced intensity until improving
- relaxation strategies and scheduling of pleasant activities
- antidepressant medication – selective serotonin reuptake inhibitors antidepressants are the first line medication for patients with coronary heart disease (eg. sertraline 100 mg daily for 6–12 months)
- developing a mental health treatment plan and arranging referral to a psychologist.

CASE 6

WEIPING GETS BREATHLESS WHEN WALKING UP STAIRS

Weiping, aged 78 years, is a widow who lives alone. Her first language is Mandarin Chinese and she has very limited communication in English. Weiping is independent in the activities of daily living. She is well supported by her family who live nearby. She consults you every 2 months for review of her multisystem diseases, which are generally stable and well controlled.

Weiping consults you today with a 3–4 week history of increasing breathlessness on exertion. She becomes breathless after walking one block on the flat, or after walking up a flight of stairs in her townhouse. She is not breathless at rest or when lying flat. She’s had no chest pain, no palpitations and no swelling of her ankles. She has a chronic daily productive cough – but this has not changed in character or severity.

Her medical history includes:

- NSTEMI 5 years ago – stent inserted
- mild chronic obstructive pulmonary disease (COPD)
- type 2 diabetes (well controlled with diet)
- hypertension
- hypercholesterolaemia
- mild stable renal impairment
- exsmoker (ceased aged 60 years).

Her current medications are:

- aspirin 100 mg daily
- simvastatin 40 mg nocte
- ramipril 5 mg daily
- tiotropium bromide – 1 capsule inhaled via device daily
- fluticasone 100 mcg/salmeterol 50 mcg metered dose inhaler

She has no known allergies to any medications.

QUESTION 1  

What further history and what physical examination are appropriate in your focused clinical assessment for Weiping?

FURTHER INFORMATION

Weiping feels more tired than usual, but otherwise she feels ‘okay’. She’s had no wheezing and there has been no change in her weight. There are no other significant symptoms. She is taking her medication as prescribed (she uses a Webster pack). For the past 2 months Weiping has been taking some traditional Chinese herbal medicine, which was recommended by her daughter. She does not know its name or its active ingredients. Weiping takes fish oil 3 g daily, Co-Enzyme Q10 150 mg daily and olive leaf extract 1 capsule daily. She also consumes the equivalent of three teaspoons of Logicol® margarine on most days.

Weiping continues her usual activities, including a daily walk and twice weekly visits to the social club.

On examination, Weiping’s colour and hydration status appear normal. Her BMI is 24 kg/m², her pulse is 72 beats/min and regular and her BP is 140/80 mmHg (with no postural drop). Her heart sounds are normal and there are no murmurs, her lung fields are clear and there is no ankle oedema. SpO₂ is 96%.

QUESTION 2 

What are your differential diagnoses for Weiping’s presentation?

QUESTION 3 

What investigations are indicated?

FURTHER INFORMATION

You arrange the following investigations and the results are as follows:

- CXR: hyperinflated lung fields consistent with COPD, no other abnormality
- spirometry: moderate obstructive airways disease, unchanged from spirometry 18 months ago
- UEC: electrolytes normal, urea 10 mmol/L, creatinine 130 umol/L (all stable and unchanged)

- FBE: normal
- D-Dimer: negative
- ECG: sinus rhythm, 72/min, left axis deviation and left ventricular hypertrophy
- echocardiogram: normal valve function, normal ventricular function, satisfactory ejection fraction.

Weiping returns for review. Her symptoms are unchanged.

QUESTION 4 

What is your interpretation of these results and how do you explain this to Weiping?

QUESTION 5 

What do you do now?

FURTHER INFORMATION

You refer Weiping to a cardiologist with an appointment scheduled for next week. In the interim you recommend no change in Weiping's management.

QUESTION 6  

Weiping asks you to explain what the cardiologist will do. How do you respond to this question?

FURTHER INFORMATION

Weiping consults the cardiologist, who arranges a coronary angiogram. Her angiogram demonstrates diffuse coronary artery disease, which is not amenable to PCI or bypass surgery.

QUESTION 7 

What steps could be taken to optimise the medical management of Weiping's coronary artery disease?

QUESTION 8  

Weiping takes fish oil, CoQ10, olive leaf extract and she uses a phytosterol enriched margarine. What is the evidence for using these nutritional products to reduce the symptoms and/or the risks of coronary heart disease?

CASE 6 ANSWERS

ANSWER 1

Unless you are fluent in Mandarin Chinese, you should schedule long consultations and arrange a prebooked telephone interpreter via the Australian Government's free Translating and Interpreting Service (TIS) (see *Resources*). It is important to use an accredited interpreter, rather than a friend or relative.

Focused history taking could include asking Weiping about symptoms of fever, fatigue, drowsiness, light headedness, anorexia, nausea and any change in bowel or bladder function. Has she gained or lost weight? Has her fluid intake changed? Is she taking her medications as prescribed? Is she taking any traditional or complementary medications?

Key features to assess on focused examination are colour, hydration status, temperature, pulse oximetry, respiratory rate, pulse (rate and rhythm), blood pressure (sitting and standing), heart sounds, lung fields, periphery for oedema and cognitive function.

ANSWER 2

One or more of the following conditions may be causing Weiping's symptoms:

- heart failure (secondary to hypertension, diabetes and coronary heart disease)
- an exacerbation of chronic obstructive pulmonary disease (COPD)
- progressive myocardial ischaemia
- paroxysmal arrhythmia
- anaemia
- renal failure
- carcinoma of lung (as she is an exsmoker)
- recurrent pulmonary embolism
- an adverse effect of medication (prescribed, herbal or complementary).

Weiping has several risk factors for ongoing coronary artery disease (diabetes, hypertension, renal impairment, treated hypercholesterolaemia, treated hypertension, previous NSTEMI and being an exsmoker).

ANSWER 3

Appropriate investigations could include pathology tests such as an FBE (to look for anaemia), UEC (to look for an electrolyte disturbance or renal failure) and D Dimer (to help exclude pulmonary embolus if within normal limits), an ECG (to look for evidence of ischaemic heart disease, arrhythmia or complications of hypertension), a CXR (to look for pneumonia, COPD and carcinoma of the lung), spirometry (to assess lung function) and an echocardiogram (to assess for valve disease and heart failure).

ANSWER 4

The clinical, imaging and pathology findings are consistent with stable multi system disease. There are no indicators to explain her recent progressive exertional dyspnoea. Heart failure, progressive renal failure, exacerbation of COPD and anaemia are reasonably excluded.

Inform Weiping that the test results are essentially reassuring in that they do not indicate any new disease, or any change in her ongoing medical conditions. However, as her symptoms are continuing and unexplained further assessment will be required.

ANSWER 5

Weiping has increasing exertional dyspnoea in the context of known coronary artery disease. This may be an atypical presentation of increasing myocardial ischaemia. Although her symptoms may be due to an adverse effect of medication, myocardial ischaemia needs to be considered and either excluded or treated. Weiping should be referred to a cardiologist.

FEEDBACK

Silent myocardial ischaemia is a well recognised phenomenon that presents in the absence of chest pain or chest discomfort. It is more likely to occur in older patients and in patients with diabetes. Symptoms may include dyspnoea, light headedness, fatigue and delirium (especially in older persons).

ANSWER 6

You explain to Weiping that the cardiologist will arrange further investigations, which may include stress echocardiography and a catheter coronary angiogram. If the findings confirm significant coronary artery disease, Weiping may be referred for PCI or coronary artery bypass grafting, or increased medical management for coronary artery disease may be indicated.

ANSWER 7

Weiping is likely to benefit from an exercise program and referral to an exercise physiologist (if available) would be appropriate.

Weiping could be referred to a pharmacist for a home medication review assessing her use of complementary and herbal therapies and optimising compliance.

The following anti-anginal medications could be introduced:³²

- glyceryl trinitrate 400 mcg SL as required for symptoms of angina (for Weiping her symptom is dyspnoea)
- monotherapy, using one of the following drugs should be the aim, although combinations may be required. The combination of nondihydropyridine and dihydropyridine calcium channel blockers is contraindicated, as is the combination of nondihydropyridine calcium channel blockers and beta blockers.
 - beta blockers (atenolol 50 mg daily, metoprolol 50 mg twice daily) – to reduce myocardial oxygen demand. COPD is a relative contraindication to beta blocker medication. Atenolol is excreted renally, so a dose of 25 mg daily would be appropriate for Weiping

- nondihydropyridine calcium channel blockers (verapamil SR 160–320 mg daily, diltiazem SR 180 mg daily) – vasodilator; also negative inotropic effect and slowing of sinus rhythm and AV conduction; contraindicated in cardiac failure and with beta blocker medication
- dihydropyridine calcium channel blockers (amlodipine 5–10 mg daily, felodipine SR 5–10 mg daily) – vasodilator, specific for smooth muscle; adverse effects include peripheral oedema, flushing and headache
- nitrate (glyceryl trinitrate transdermal 25–50 mg/12 hour, isosorbide mononitrate SR 60–120 mg daily) – vasodilator; adverse effects include headache; interaction with PDE5 (phosphodiesterase type 5) inhibitors (hypotension)
- potassium channel activator (nicorandil) – vasodilator.

ANSWER 8

Marine omega-3 fatty polyunsaturated fatty acids (PUFAs) have been shown to reduce the risks of cardiovascular morbidity and mortality.^{32,49,50} The mechanism of action is thought to be due to anti-platelet, anti-thrombotic, anti-inflammatory and lipid modifying effects. The principal marine omega-3 PUFAs are docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA).

Plant based omega 3 PUFAs (eg. alpha linolenic acid (ALA)) are also beneficial, but less so than marine sourced omega-3 PUFAs.

The NHF recommends that all Australians should consume about 500 mg per day of combined DHA and EPA to reduce the risk of coronary heart disease.⁴⁹ The NHF recommends that individuals with coronary heart disease should consume about 1000 mg per day of combined DHA and EPA. These recommendations can be met via a combination of 2–3 serves of oily fish per week and fish oil supplements.

There is 300 mg of combined DHA and EPA in one standard 1000 mg fish oil capsule.

Consuming omega-3 PUFAs reduces serum triglyceride levels and increases serum HDL-cholesterol levels – these effects are additive to statin therapy.

The NHF recommends that Australians at high risk of cardiovascular disease consume 2–3 g of phytosterols per day (equivalent to 2–3 serves per day of phytosterol enriched foods such as some margarine spreads, some low fat products and breakfast cereals, all of which must be labelled as such.⁵¹ This will reduce LDL cholesterol levels by about 10% and this is additive to the effects of any statin therapy. As phytosterols reduce blood carotenoids, an additional daily serve of high-carotenoid fruit or vegetables (eg. carrot, broccoli) is recommended.

About 1 clove of garlic daily may have benefits in lowering blood pressure (by up to 5%) and lowering cholesterol (by up to 9%). However, there is no evidence for efficacy in improving cardiovascular outcomes.⁵²

There is no evidence to support the use of olive leaf extract (olive polyphenols) or co-enzyme Q10 for reducing risk factors for cardiovascular disease or risk of cardiovascular disease.

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RESOURCES FOR DOCTORS

Australian absolute cardiovascular disease risk calculator, available at www.cvdcheck.org.au. New guidelines for the management of absolute cardiovascular disease risk are due for release in March 2012.

GP Management Plan for coronary heart disease (Heart Foundation, 2009) – available at www.heartfoundation.org.au/information-for-professionals/Clinical-Information/Pages/gp-management-plan-chd.aspx

National Heart Foundation: Acute coronary syndromes treatment algorithm, 2011. Available at www.heartfoundation.org.au/SiteCollectionDocuments/ACS%20therapy%20algorithm-WEB-secure.pdf.

Heart Foundation and the Cardiac Society of Australia and New Zealand. Reducing risk in heart disease 2007 (updated 2008). This provides a summary of lifestyle changes to recommend as well as guidelines and targets for the management of blood pressure, lipids and diabetes, and a summary of medications used in heart disease. It is available at www.heartfoundation.org.au/SiteCollectionDocuments/Reduce-risk-in-heart-disease-guideline.pdf

The RACGP's 'red book' provides detailed information on evidence based preventive activities and includes the Australian cardiovascular risk charts. Available at www.racgp.org.au/guidelines/redbook

Lifescrpts resources include information on raising and discussing lifestyle changes with patients using the 5As methodology (ask, assess, advise, assist and arrange), written advice in the form of prescription pads, patient brochures and waiting room posters. They are available at www.health.gov.au/lifescrpts

Australian Government Department of Immigration and Citizenship free Translating and Interpreting Service (TIS). National telephine number is 1300 131450. It is available at www.immi.gov.au/living-in-australia/help-with-english/help_with_translating

Medicare Australia provides a quick reference guide to prescribing under the PBS. This guide is available at www.medicareaustralia.gov.au/provider/business/education/files/2599-qrg-prescribing-lipid-lowering-medicine-under-the-pbs.pdf.

RESOURCES FOR PATIENTS

The Victorian Government Department of Health's 'Better Health Channel' provides comprehensive patient information on a wide range of topics related to cardiovascular disease and cardiovascular risk factors www.betterhealth.vic.gov.au

The National Heart Foundation provides information on reducing the risk of developing a heart condition, healthy eating, food labels, physical activity and walking groups near you as well as warning signs of a heart attack and a chest pain action plan. It is available at www.heartfoundation.org.au

British Heart Foundation website provides general information on a range of issues relating to heart disease such as prevention, symptoms and tests. It is available at www.bhf.org.uk

Heart attack facts website provides information on warning signs and recognising a heart attack as well as an action plan. It is available at www.heartattackfacts.org.au.

Appendix 1

MANAGING MY HEART HEALTH (A PATIENT RECORD CARD)

My medical risk factors at a glance

Work with your doctor to determine your goals and how often your risk factors should be checked. Record and monitor your progress in this table.

Note: < means less than, > means greater than, and ≥ means greater than or equal to.
The page numbers referred to in this table are from the booklet *Managing my heart health*. For people with or at high risk of coronary heart disease.

Risk factor	Heart Foundation goal	My levels					
Cholesterol and triglycerides	Maintain healthy blood cholesterol and triglycerides levels (pages 36–39)	Date:	Date:	Date:	Date:	Date:	Date:
LDL cholesterol	< 2.0 mmol/L for people with coronary heart disease < 2.5 mmol/L for other people at high risk of coronary heart disease						
HDL cholesterol	> 1.0 mmol/L						
Triglycerides	< 1.5 mmol/L						
Blood pressure	Maintain a healthy blood pressure (pages 40–43)	Date:	Date:	Date:	Date:	Date:	Date:
Adults	See page 40 for more information. Write your goal here:						
Diabetes	Maintain optimal blood sugar levels (pages 44–47)	Date:	Date:	Date:	Date:	Date:	Date:
HbA1c	Less than or equal to 7%						
Psychosocial	Maintain psychological and social health (pages 48–51)	Date:	Date:	Date:	Date:	Date:	Date:
Depression	Self-monitor for depression*						
Social support	Monitor levels of social support**						

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* Write D and tell your doctor or health professional if you feel depressed.

** Write X and ask for help if you feel you don't have enough social support.

General practitioner

Name: _____
 Address: _____
 Phone: _____
 Other: _____

Cardiologist

Name: _____
 Address: _____
 Phone: _____
 Other: _____

My significant heart health history

Record any heart events that you have had below. For example, a heart attack, bypass surgery, admission to hospital.

Date	Event



Managing my heart health

For people with, or at high risk of, coronary heart disease

At a glance

Name: _____

When you have completed the tables in this record card, you can order a new card from our Health Information Service by calling 1300 36 27 87. Alternatively, you can photocopy the tables before you start filling them in.

For heart health information
 1300 36 27 87
www.heartfoundation.org.au

Appendix 1

My lifestyle risk factors at a glance

Keep a monthly record of your progress over a one-year period. Reviewing your progress regularly will help to keep you on track.

Write your start date under month 1, then each month monitor and record your progress in relation to the instructions column.

Lifestyle factors	Heart Foundation goal	Instructions	Month	1	2	3	4	5	6	7	8	9	10	11	12
Smoking (pages 11–13)															
Active smoking	Quit smoking	Non-smoker, write NS; current smoker, write number smoked per day (or each week, if irregular smoker)													
Passive smoking	Avoid second-hand smoke	Not exposed to second-hand smoke, write N/E; exposed to second-hand smoke, write where, e.g. Home, Work or Social													
Nutrition (pages 14–19)															
Healthy eating	Enjoy healthy eating; eat less saturated and trans fats	Write the number of actions from pages 16–19 that you have established and maintained													
Alcohol (pages 20–25)															
Number of standard drinks per day	Limit how much alcohol you drink	Non-drinker, write N/D; regular drinker, write number per day, e.g. 2/d; irregular drinker, write number per week, e.g. 3/w													
Physical activity (pages 26–31)															
Number of minutes/week in past month	At least 30 minutes of moderate-intensity physical activity on most, if not all, days of the week														
Physical activity level	Be physically active	See page 26 to determine your physical activity level and write Sufficient, Insufficient, None (sedentary)													
Weight (pages 32–35)															
Weight (in kg)	Achieve and maintain a healthy weight	Write your weight in kilograms (kg)													
Waist	Men < 94 cm Women < 80 cm	Write your waist measurement in centimetres (cm)													
BMI	BMI 18.5–24.9	See page 32 to calculate your BMI													
BMI category		See page 32 to determine your risk category. Write Underweight, Normal range, Pre-Obese (PO), Obese I (O1), Obese II (O2) or Obese III (O3)													

The page numbers referred to in this table are from the booklet *Managing my heart health. For people with or at high risk of coronary heart disease.*

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Ischaemic heart disease

In order to qualify for 6 Category 2 points for the QI&CPD activity associated with this unit:

- read and complete the unit of *check* in hardcopy or online at the *gplearning* website at www.gplearning.com.au, and
- log onto the *gplearning* website at www.gplearning.com.au and answer the following 10 multiple choice questions (MCQs) online
- complete the online evaluation.

If you are not an RACGP member, please contact the *gplearning* helpdesk on 1800 284 789 to register in the first instance. You will be provided with a username and password that will allow you access to the test.

The expected time to complete this activity is 3 hours.

Do not send answers to the MCQs into the *check* office.

This activity can only be completed online at www.gplearning.com.au.

If you have any queries or technical issues accessing the test online, please contact the *gplearning* helpdesk on 1800 284 789.

QUESTION 1

Amelia, aged 16 years, presents with an upper respiratory tract infection, which you discuss with her. You notice she appears overweight, and this is confirmed on measuring her height and weight. Her body mass index is 28 kg/m², which is above the 95th percentile (obese), and her waist circumference is also above the 95th percentile. She does not smoke or drink alcohol, she eats junk food on a daily basis and participates in very little physical activity.

Amelia has no family history of heart disease. A psychosocial assessment reveals no particular concerns. The next step in her management would be to:

- advise Amelia to lose weight
- use a tool such Lifescrpts to 'prescribe' physical activity
- advise Amelia to avoid all sugar
- ask Amelia how being overweight affects her
- refer Amelia to a dietician.

QUESTION 2

Michelle, aged 66 years, has type 2 diabetes treated with metformin. She has a total cholesterol of 5.6 mmol/L with an HDL of 1.0 mmol/L. You commenced her on atorvastatin recently. Her blood pressure is 125/80. She is a non-smoker. You consider Michelle's cardiovascular risk and contemplate using the Australian absolute cardiovascular risk calculator. Use of the Australian absolute cardiovascular risk calculator may not be appropriate in Michelle because:

- her LDL cholesterol level is not known
- her body mass index is not known
- her family history is not known
- an electrocardiograph has not been reviewed
- she is already known to be at high risk of cardiovascular disease.

QUESTION 3

Pascale, aged 68 years, presents to you in your metropolitan practice with left sided chest pain, which he describes as tightness. It can be precipitated by walking 200 metres to the local shops, but can also occur at rest. The pain lasts 10 minutes at a time. He has a past history of hypertension for which he is on ramipril. His father died of a heart attack at age 62 years. The last episode of chest pain occurred 5 hours ago, and he is currently pain free. On examination, his pulse rate is 68 beats/min. and his blood pressure is 138/72. Heart sounds are normal, lung fields are clear and there is no chest wall tenderness. An electrocardiograph is normal. You administer chewable aspirin 300 mg. The most appropriate management is to:

- call an ambulance
- request a troponin level
- arrange for a stress ECG
- arrange for routine cardiologist appointment
- commence anti-anginal medication.

QUESTION 4

Regarding evidence based primary and secondary prevention of ischaemic heart disease, which of the following is true?

- Aspirin is recommended for primary prevention, irrespective of the level of cardiovascular risk
- Clopidogrel is recommended for primary prevention in individuals who are unable to tolerate aspirin
- Angiotensin converting enzyme (ACE) inhibitors are recommended for primary prevention for patients whose blood pressure levels are within target levels
- Statins are recommended for secondary prevention, irrespective of cholesterol levels
- Ezetimibe is recommended for secondary prevention, irrespective of cholesterol levels.

QUESTION 5

Which of the following is true regarding investigations for the diagnosis and/or evaluation of symptoms that relate, or could relate, to ischaemic heart disease?

- The predictive values for stress ECG and stress echocardiography are optimised for patients with an intermediate pretest probability of having coronary artery disease
- Myocardial perfusion imaging is useful in cases of typical angina to confirm the diagnosis

- C. Coronary CT angiography is appropriate for symptomatic patients at high risk of coronary artery disease
- D. Catheter coronary angiography is the first line investigation for patients stratified to low risk Non ST elevation acute coronary syndrome
- E. Coronary artery calcium score (Agatston score) is useful in both asymptomatic and symptomatic patients with typical angina.

QUESTION 6

Tring, aged 46 years, presents with severe retrosternal chest pain associated with sweating and vomiting, which began one hour ago. An ECG is shown in *Figure 8*.

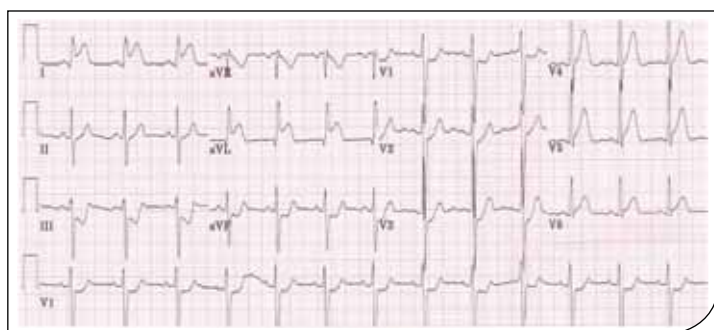


Figure 8. Reproduced with permission from *The Journal of Invasive Cardiology*. Available at <http://lifeinthefastlane.com/ecg-library/lateral-stemi/>

This ECG is consistent with:

- A. an acute inferior myocardial infarct
- B. an acute septal myocardial infarct
- C. an acute lateral myocardial infarct
- D. an acute posterior myocardial infarct
- E. left ventricular hypertrophy.

QUESTION 7

Which of the following applies to the acute management of Tring's chest pain?

- A. Aspirin 150–300 mg should be given unless contraindicated
- B. Oxygen should not be given unless Tring arrests
- C. Glyceryl trinitrate can lead to hypertension
- D. Metoclopramide 1 mg IV should be administered
- E. Morphine 20 mg IV can be given every 5 minutes titrated to pain relief.

QUESTION 8

You discuss Tring's case with the cardiology registrar of the nearest tertiary hospital. He recommends that Tring be transferred to the nearest tertiary hospital for primary percutaneous coronary intervention unless there is likely to be a significant delay, in which case you should consider fibrinolysis. Which of the following are contraindications to fibrinolysis?

- A. Current menstruation
- B. Any prior intracranial haemorrhage
- C. Major surgery more than 3 months ago
- D. Hypotension with a blood pressure of 100/60
- E. Known benign intracranial neoplasm.

QUESTION 9

David, aged 56 years, has hypertension treated with perindopril, and hyperlipidaemia treated with a simvastatin. He is a nonsmoker and does not have diabetes or renal disease. You use the Australian absolute cardiovascular risk calculator and determine that his 5 year risk of getting cardiovascular disease is high. According to the National Heart Foundation of Australia's recommendations regarding management of cardiovascular risk factors, David should aim for:

- A. girth (waist circumference) of less than 86 cm
- B. a diet low in polyunsaturated and monounsaturated fats
- C. physical activity of at least 30 minutes three times per week
- D. blood pressure of less than 140/90
- E. total cholesterol less than 5.0 mmol/L.

QUESTION 10

You are giving a talk at the local community health centre about ischaemic heart disease when someone from the audience asks about angina occurring without pain. Which of the following is true of silent myocardial ischaemia?

- A. It is more likely to occur in older patients and diabetics
- B. It can present as dyspnoea, lightheadedness, fatigue or delirium
- C. A resting ECG may be normal
- D. Multiple investigations may be necessary
- E. All of the above.