



Keeping the diabetic heart healthy

BACKGROUND Cardiovascular disease (CVD) is an important and preventable complication and major cause of death in diabetes.

OBJECTIVE This article outlines the prevention and early detection of CVD in people with type 2 diabetes.

DISCUSSION Diabetes is a major risk factor for CVD, both independently and because it tends to occur in association with other behavioural and physiological risk factors. There is good evidence that careful control of these risk factors can significantly delay the development of heart disease, and that this is possible to achieve in general practice. Key interventions are smoking cessation; diet and physical activity; targeted use of medications to achieve glycaemic, blood pressure and lipid control; and aspirin. Interventions require a whole practice approach involving practice staff, practice systems and links with other care providers.

Diabetes is on the rise – current estimates indicate about 150 million people worldwide have type 2 diabetes and this figure is expected to double by 2025.^{1,2} The most life threatening consequences of diabetes are heart disease and stroke. People with diabetes are 2–4 times more likely to develop cardiovascular disease (CVD),³ and about 65% of people with diabetes die from it.⁴ The mortality rates from CVD for people with diabetes without previous CVD are similar to those with previous myocardial infarction.⁵ Even before the development of diabetes, people with pre-diabetes are at higher cardiovascular risk and, once they do develop frank diabetes, heart disease is an important complication. As the majority of diabetic patients are treated by primary care physicians, caring for our diabetic patients' hearts should be an important goal in general practice.

Case study – Jim

Medical history

Jim, 55 years of age, is married with two adult children. He works as an accountant for a retail chain. Jim has had type 2 diabetes for 5 years and his treatment includes diet and metformin 500 mg twice per day. He has no CVD, but has a family history of heart disease (his father died at the age of 65 years from a heart attack). Jim's blood pressure is 135/85 mmHg, TC 6.1 mmol/L, LDL 3 mmol/L, HDL 0.8 mmol/L, and his HbA1c is 8.1%. He is overweight (BMI 29.5 kg/m²) and does not smoke.

How do you estimate Jim's risk of heart disease?



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Risk factors for CVD in people with diabetes

Diabetes in itself is a major cardiovascular risk factor.^{6,7} There is evidence for an association between hyperglycaemic and macrovascular disease including myocardial infarction (although this has not been shown in all studies).^{8,9} Patients with poor glycaemic control are at greater risk.

In addition, diabetes and CVD share many risk factors for their development. People with type 2 diabetes are more likely to suffer from a range of cardiovascular risk factors (other than diabetes) than people who do not have CVD. These risk factors include obesity, physical inactivity, dyslipidaemia and hypertension. In the Australian Diabetes, Obesity and Lifestyle study (AusDiab),¹⁰ among patients with type 2 diabetes:

- 62% of men and 43% of women over 25 years of age were obese
- 28% of men and 12% of women over 25 years of age were sedentary
- 61% of men and 32% of women aged 25–59 years had high blood pressure (BP)
- 22% of men and 24% of women had low HDL cholesterol, and
- the rate of hypertriglyceridaemia was 4 times higher for men and 2 times higher for women when compared to the general population.

Smoking rates for people with diabetes are comparable with people who do not have diabetes. However this is strong contributor to cardiovascular risk.

Cardiovascular risk factors tend to cluster together epidemiologically. In 2001, 53% of the Australian adult population had two or three, and 16% had four or more of the following risk factors: tobacco smoker, physical inactivity, high BP, high blood cholesterol, obesity, low fruit or vegetable consumption, risky alcohol consumption, or diabetes.¹¹ Multiple risk factors also accelerate the development of atherosclerosis. Therefore, it is important to assess what contribution all the factors have to a patient's absolute risk of CVD. This can be achieved by using an absolute risk assessment tool. Although there are some concerns that the United Kingdom Prospective Diabetes Study (UKPDS) data may overestimate risk in Australian people with diabetes (based on the AusDiab study), the UKPDS calculator is still a useful guide to decisions about interventions for this group of patients (*Figure 1, Resource*).

Case study (continued)

Jim's CVD risk factors and absolute risk

Jim has a few cardiovascular risk factors: older age, male, diabetes, normal-high BP, abnormal blood lipids, overweight and family history. Using the UKPDS calculator we would calculate his 10 year risk of coronary heart disease (CHD) to be 29.3% (*Figure 1*). Even allowing for differences between the UK and Australian population with diabetes, he has more than a one in 4 chance of developing CHD before the age of 65 years.

Explaining this to Jim, brings home to him just what his risk is. He asks what he can do to prevent this.

Prevention of CVD in diabetic patients

Reducing CVD risk is crucial in keeping a healthy heart and preventing a cardiovascular event. Diabetic patients tend to have more CVD risk factors, thus prevention of CVD involves both lifestyle change and medication.

Lifestyle change

Smoking makes a very large contribution to cardiovascular risk. Brief smoking cessation advice, tailored to the patient's readiness to change, is effective in people with diabetes.^{11,12} Dietary education and a physical activity prescription is also important for people with diabetes (although their impact on weight reduction in this group is at best modest). In preventing behavioural risk factors, the *SNAP (Smoking, Nutrition, Alcohol and Physical activity) guidelines* provide a detailed guide to be followed in practice.¹³ Patients should be alerted to the importance of regular follow up visits for monitoring and managing their CVD risk.

Medication

Glycaemic control

Glycaemic control is thought to contribute to a lowering of CVD risk. Therefore, strict glycaemic control is part of the prevention of heart disease. The HbA1c target for glycaemic control is <7%, and should be checked at least twice a year. However, it is important not to have a 'glucocentric' view of diabetes, and to ensure that other risk factors are actively managed.¹⁴

Blood pressure control

People with diabetes in the Hypertension Optimal Treatment (HOT) study and the UKPDS had fewer cardiovascular events if their BP was less than or equal to 130/80 mmHg.^{15,16} Treatment of BP should be tailored

to reduce absolute risk but should also include reduced dietary salt, physical activity and weight reduction. Most patients with elevated BP will require antihypertensive treatment. Unless contraindicated or not tolerated, this should preferentially be with an angiotensin converting enzyme (ACE) inhibitor. The target level of BP control is <130/85 mmHg or <125/75 mmHg if proteinuria were present. In patients with hypertension in the target range, BP should be checked at every doctor's visit and at least every 3 months (those with poorly controlled BP may need to be checked more frequently). Angiotensin converting enzyme inhibitors have also been demonstrated to reduce diabetic kidney, foot and eye damage, and all cause and cardiovascular related mortality, even in patients with type 2 diabetes without hypertension.¹⁷

Lipid control

The most common lipid abnormalities in people with type 2 diabetes are elevated triglycerides and low HDL cholesterol. These may be ameliorated by physical activity and dietary changes. Although statin therapy mainly reduces LDL cholesterol, it has also been shown to lower heart disease risk in people with type 2 diabetes (even when they do not have a high cholesterol).¹⁸ Current Pharmaceutical Benefits Scheme guidelines are largely based on lipid level, despite increasing evidence that multifactorial risk is a better guide to those who will benefit most from therapy.¹⁹ Blood lipids should be checked at least once a year and the target is TC <4.0 mmol/L, LDL <2.5 mmol/L, TG <2.0 mmol/L, and HDL \geq 1.0 mmol/L.²⁰

Aspirin

Aspirin has been recommended as a primary and secondary strategy in the prevention of cardiovascular events in nondiabetic and diabetic people.²¹ The optimal dose is unclear, but low doses in the range of 75–325 mg per day have been used. The evidence for the use of other antiplatelet agents is less clear.

Others

Chinese herbs (eg. green tea, Dan Shen) are used by some patients, but these need more evidence to prove they are cardioprotective and safe.²² There is insufficient evidence to support the use of vitamins or supplements in the prevention of heart disease with people with diabetes. Hormone therapy is not recommended to prevent CVD.

Case study (continued)

Treatment and goals for Jim's CVD risk factors in diabetes:

- moderate intensity physical activity for 30 minutes 5–6 days per week
- dietary change including reduced dietary saturated fat and salt, and seven portions of fruit and vegetables per day
- aim for a modest weight reduction of 1–2 kg per month
- aspirin and medications if necessary in order to achieve:

HbA1c <7%

BP <130/85 mmHg (or <125/75 mmHg if proteinuria were present)

total cholesterol <4 mmol/L

triglycerides <2 mmol/L

HDL cholesterol >1.0 mmol/L

LDL cholesterol <2.5 mmol/L.

Jim agrees to try to change his lifestyle and follow the treatment plan. He asks how he would know if he had developed heart disease.

Early detection of CVD in diabetic patients

Coronary heart disease is often silent in people with diabetes. Therefore there is a need to have a high index of suspicion, especially in diabetic patients with high absolute risk or those who have had previous evidence of macrovascular disease. The draft National Health and Medical Research Council *Guidelines for macrovascular disease in diabetes* recommends that patients over 50 years of age who have diabetes and other risk factors (hypertension, hyperlipidaemia, smoking or proteinuria) should have a resting electrocardiogram (ECG) every 2 years.²³ In this group of patients, the test has acceptable sensitivity and good specificity and is easy to perform.²⁴ Exercise ECG is more sensitive (and detects more positive cases) but is costly to perform and is slightly less specific (ie. more false positive).²⁵ Stress testing may be appropriate in those with symptoms (typical or atypical) or with ECG or other evidence of cardiac disease, especially left ventricular hypertrophy.^{26,27}

Treatment of diabetic patients with existing CVD

In patients with diabetes and existing CVD, all the preventive strategies mentioned above still need to be adopted. The use of beta blockers has been associated



Figure 1. UKPDS absolute risk calculator of CHD and stroke for a single individual with type 2 diabetes

with a reduced risk of re-infarction and lowered mortality. In hospital patients, other treatments such as an ACE receptor inhibitor, thrombocyte glycoprotein IIb/IIIa receptor blockers, percutaneous coronary intervention or coronary artery bypass grafting are very important in preventing a re-occurrence of infarction.

Practice systems for a healthy heart

Like all diabetes care, caring for the diabetic heart requires an organised and systematic approach to patient support to ensure all elements of care are provided. This whole practice approach should include the involvement of practice nurses, receptionists, and practice managers.

Assessment tools such as the absolute risk assessment tools should be available to all involved in the care of these patients, as should patient education materials (available from Diabetes Australia and the National Heart Foundation) that help patients understand their risk factors and their management, as well as the importance of monitoring and presenting early with any symptoms of CVD.

It is very important that these patients are carefully followed up and that time is taken to explain the importance of compliance with treatment regimens and what to do if symptoms occur. A computer register and record system is required to ensure that patients with diabetes are tracked so they do not miss key elements of management, and that their risk factors

and disease control are monitored. Patients who are poorly controlled, or who miss monitoring visits, may require reminders. Recalls for overdue patients should be issued every 6 months for uncomplicated patients, and every 3 months for those with physiological risk factors or CVD.

The practice also needs to have effective links with other providers and services which may be involved or should be involved in the care of patients with cardiovascular risk or early disease. In complex cases (especially if there are complications or an absolute risk of a cardiovascular event above 15%) a shared care approach between the general practitioner, hospital, cardiovascular specialist, cardiac rehabilitation services, and diabetes services is essential as many of these patients benefit from a care plan coordinated among these services.

Resource

UKPDS Risk Engine: type 2 diabetes specific cardiovascular risk calculator: www.dtu.ox.ac.uk/index.html?maindoc=/uk/pds

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