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# Challenges in diabetes management

## Background

Type 2 diabetes and its macro- and micro-vascular complications are increasingly common in general practice.

## Objective

This article outlines the early detection and management of type 2 diabetes in general practice.

## Discussion

The use of new risk questionnaires and screening tests will provide opportunities for prevention and allow earlier diagnosis of diabetes, before the development of complications. Achieving optimal metabolic control (including control of glucose, blood pressure, lipids and weight) remains a challenge for up to half of patients. Improved diet and physical activity; targeted use of medications to achieve glycaemic, blood pressure and lipid control; and the use of aspirin are key interventions. Achievement of these goals needs to be underpinned by organisational changes both within general practice and between it and other services, to provide self management education, create effective teamwork, and improve decision support and information systems.

■ **Type 2 diabetes affects 7.1% of the Australian adult population and this prevalence is increasing both as a result of the aging of the population and changing prevalence of risk factors, including being overweight.<sup>1,2</sup> In 2005, diabetes was an underlying or associated cause of 8% of deaths in Australia.<sup>1</sup> Type 2 diabetes accounted for 1.6% of total health expenditure in 2004–2005 (\$824 million); much of it on hospital care.<sup>1</sup>**

The high prevalence of type 2 diabetes is reflected in general practice where 2.5% of encounters are for diabetes.<sup>3</sup> General practitioners can provide comparable long term care for patients with diabetes to that provided by specialist services and the significance of their role is increasingly recognised within the health system.<sup>4</sup>

## Early detection

Type 2 diabetes may be asymptomatic for prolonged periods of time before diagnosis. Up to half of people with diabetes have not been diagnosed and many have complications at the time of diagnosis. For example 6.2% of people have diabetic retinopathy at the time of diagnosis.<sup>5</sup> Early treatment of type 2 diabetes can decrease or delay the onset of complications including retinopathy, nephropathy, neuropathy and cardiovascular disease (CVD). Barriers to early detection include the complexity of screening tests (especially if an oral glucose tolerance test is used),<sup>6</sup> patients being missed because their fasting blood glucose was in the intermediate range,<sup>7</sup> and patient underestimation of their risk.<sup>8</sup>

Risk factors for diabetes include age, ethnicity, family history, hypertension and being overweight (*Table 1*). These and other risk factors have been incorporated into diabetes risk questionnaires. Risk questionnaires provide patients with a risk score, which can help identify those with impaired glucose tolerance or impaired fasting glycaemia for preventive interventions.

The AUSDRISK questionnaire (*Figure 1*)<sup>9</sup> is the first measure in a stepped approach to screening patients for type 2 diabetes (see



Table 1. Risk factors for diabetes

| Demographic  | Genetic   | Behaviour   | Physiological  |
|--|---|---|--|
| <ul style="list-style-type: none"> <li>Age &gt;40 years</li> </ul> | <ul style="list-style-type: none"> <li>Ethnicity (Aboriginal or Torres Strait Islander, Pacific Islander or those from the Indian subcontinent or China)</li> <li>First degree relative family history</li> </ul> | <ul style="list-style-type: none"> <li>Diet (high fat, high energy density, high calories)</li> <li>Physical inactivity</li> <li>Smoking</li> </ul> | <ul style="list-style-type: none"> <li>Hypertension or existing cardiovascular disease</li> <li>Overweight (BMI <math>\geq 30</math>)</li> <li>Central obesity (waist circumference &gt;100 cm for European men and &gt;90 cm for European women)</li> <li>Impaired glucose tolerance or impaired fasting glycaemia</li> <li>Gestational diabetes</li> <li>Polycystic ovarian disease</li> </ul> |

*Resources*). At risk patients (risk score >15) should be screened by measuring plasma glucose levels by laboratory test on a fasting sample of venous blood. A capillary blood test using a properly calibrated point of care device (glucometer) may be used in screening as long it is subsequently confirmed on laboratory test.<sup>10</sup> Venous blood sugar levels can be interpreted according to the following ranges:

- <5.5 mmol/L – diabetes unlikely
- 5.5–6.9 mmol/L fasting – diabetes uncertain; may need to perform an oral glucose test
- 7.0 mmol/L or more fasting (>11.1 nonfasting) – diabetes likely; repeat fasting blood sugar to confirm on a separate day (this not required if the patient is symptomatic).

Although not yet recommended for use in Australia, there is also increasing evidence that HbA1c may be useful as a screening test for both diabetes and metabolic syndrome.<sup>11</sup>

## Assessment

The assessment and monitoring of patients with diabetes should include measurement of metabolic control and the early detection of diabetes complications. These are summarised in the routine 'annual cycle of care for diabetes' (Table 2). Unfortunately less than 50% of patients are assessed in accordance with this schedule.<sup>12</sup> Patients should also have their smoking status reviewed as they may require support to stop smoking. Many patients will also require annual influenza and 5 yearly pneumococcal vaccinations. High risk patients are those patients with multiple risk factors, especially obesity, smoking, dyslipidaemia, poor glycaemic and blood pressure (BP) control and/or early complications.

## Metabolic control

Diabetes is a major CVD risk factor.<sup>13,14</sup> People with diabetes are 2–4 times more likely to suffer cardiac infarction or stroke.<sup>15</sup> About 65% of people with diabetes die from CVD,<sup>16</sup> and diabetes shortens life expectancy by up to 15 years.<sup>2</sup> It is also a risk factor for microvascular disease. Among patients with known type 2 diabetes over the age of 45 years in the AusDiab study<sup>5</sup>:

- 22% had retinopathy and 7% had visual impairment
- 6% had renal disease
- 9% had clinical signs of neuropathy, and

Figure 1. The AUSDRISK questionnaire

- 19.1% were at risk of a foot ulcer.

Diabetes is 2–4 times more prevalent among indigenous people.<sup>1</sup> Approximately 53% of Aboriginal people and Torres Straits Islanders with diagnosed diabetes have CVD and 10% have renal disease. Hospitalisations for complications of diabetes are 5–30 times the rate for nonindigenous people and mortality rates seven times higher. Therefore, achieving metabolic control is an urgent challenge for most Aboriginal people and Torres Strait Islanders with diabetes.

These complications can be prevented or at least delayed by optimal control of glycaemia and BP as evidenced in the UKPDS.<sup>17,18</sup> Control of lipids, especially low density lipoprotein (LDL), high density lipoprotein (HDL) and triglycerides, also makes an important contribution to the prevention of both macro- and micro-vascular complications.

Key lifestyle changes are increased physical activity, including both aerobic and resistance exercise, and a change in diet to increase dietary fibre, decrease fat, and reduce energy intake in order to achieve a 10% reduction in body weight (if body mass index [BMI] is >25) (Table 3). Unless glucose levels are >20 mmol/L or the patient is symptomatic (in which case medication should be started earlier), medication should be introduced after a trial of diet and physical activity aiming to achieve a 10% weight reduction.<sup>19–21</sup> This type of weight reduction can be expected to reduce HbA1c by 1–2%.



However, most patients will require medications to achieve control. Metformin is the oral hypoglycaemic agent (OHA) of choice unless contraindicated by renal failure. In 2004–2005 half of people with type 2 diabetes reported that they were on metformin; 26% were on other OHAs.<sup>1</sup> If adequate control is not achieved on the maximal dose of metformin, the addition of acarbose or sulphonylurea drugs may be required. Fifteen to twenty percent of patients will require insulin, and this increases with duration of diabetes. Although there has been much debate about tighter treatment targets, the current recommended target is <7% (Table 3).<sup>22,23</sup>

Table 2. Annual cycle of care for diabetes<sup>42</sup>

|                                    |  |
|------------------------------------|--|
| <b>Minimum interval assessment</b> |  |
| <b>At least every 6 months</b>     |  |
| •                                  | Review of weight (BMI) and waist circumference   |
| •                                  | Measure of BP  |
| •                                  | Examine feet examination for ulcers, infections, callouses, vascular changes, neuropathy |
| <b>At least every 12 months</b>    |  |
| •                                  | Review smoking, physical activity, diet and self care education                          |
| •                                  | Review medication  |
| •                                  | Measure HbA1c  |
| •                                  | Measure blood lipids (LDL, HDL, TG)  |
| •                                  | Measure microalbuminuria (urinary microalbumin/creatinine ratio)                         |
| <b>At least every 24 months</b>    |  |
| •                                  | Examine eyes for retinopathy   |

Table 3. Behavioural and metabolic goals of management<sup>43</sup>

|                       |  |
|-----------------------|--|
| Fasting blood glucose | 4–6 mmol/L   |
| HbA1c                 | ≤7%  |
| LDL                   | < 2.5 mmol/L   |
| Total cholesterol     | <4.0 mmol/L  |
| HDL                   | >1.0 mmol/L  |
| Triglycerides         | <1.5 mmol/L  |
| Blood pressure        | ≤130/80 mmHg or <120/75 if renal disease   |
| BMI                   | <25 kg/m <sup>2</sup> ; a reduction in weight of 10%   |
| Smoking               | Cessation  |
| Alcohol               | <2 standard drinks in males and <1 standard drink in females per day                         |
| Diet                  | High fibre, low fat (<30% kJ from fat and <10% from saturated fat), low glycaemic load diet  |
| Physical activity     | At least 30 minutes walking (or equivalent) on 5 or more days/week (total >150 minutes/week) |

Patients should be prescribed aspirin (75–150 mg/day) unless contraindicated by allergies or intolerance, active peptic ulceration, uncontrolled BP or major bleeding risk.<sup>23</sup> They also require the following if their absolute cardiovascular risk is >15%, which is the case for most patients with type 2 diabetes:

- antihypertensive therapy preferably using an angiotensin converting enzyme inhibitor (ACEI) or A2 receptor blocker drugs<sup>12,24,25</sup>
- statin therapy (+/- fibrates if the triglyceride is high).<sup>26</sup>

The STENO II study demonstrates that treatment to target goals – using behavioural and multiple pharmacological interventions, including aspirin, hypoglycaemic agents, ACEI and statin – can reduce cardio- and micro-vascular events in high risk patients with type 2 diabetes.<sup>27</sup> The goals for management of patients with complications such as nephropathy are to maintain function, reduce further deterioration, and reduce the risk of macrovascular events (eg. stroke and myocardial infarction) by active treatment to more stringent targets, especially BP.

### Organisation of care

Although the principles of care for people with type 2 diabetes are well known, there is a gap between the current quality of care provided in general practice and optimal care with up to 50% of patients being poorly controlled.<sup>28,29</sup> There are a large number of barriers to optimal care including the capacity of practices and work pressures on practitioners. The chronic care model for patients with chronic conditions<sup>30</sup> describes the elements essential for improvements in the care of people with chronic conditions. These include supporting patient self management, patient care teams and decision support.

### Education for self management

Advice or education is frequently given in general practice. However, this is usually brief advice related to weight, medication or exercise.<sup>3</sup> There is only limited evidence that on its own, printed material is effective in controlling diabetes.<sup>31</sup> More extensive patient education programs designed to develop self management skills have been demonstrated to improve diabetes control (including HbA1c and BP).<sup>32,33</sup> Group self management support programs are generally more effective than those offered on a one-to-one basis.<sup>34,35</sup> Although a new Medicare item for group education was introduced in 2007, uptake has been low, due in part to administrative and organisational barriers in setting up group programs among private allied health providers. A number of divisions of general practice have established programs which provide or broker group self management education for patients with, or at risk of, type 2 diabetes.<sup>36</sup>

### Multidisciplinary team care

Wagner describes multidisciplinary care as ‘a team comprising diverse health care professionals who communicate regularly about the care of a defined group of patients and participate in that care



on a continuing basis'.<sup>37</sup> Implementing multidisciplinary team care arrangements has been demonstrated to improve adherence to guidelines and metabolic control, especially where patients are involved in setting their own treatment goals.<sup>38,39</sup> Practice nurses can play an important role in the assessment and education of patients, monitoring medication adherence, coordination and review of care plans and liaison with other multidisciplinary care providers. Systems for training and monitoring staff performance and involvement of administrative staff in care – such as in organising case conferences, ordering patient education materials and maintaining directories – are associated with the provision of evidence based chronic care.<sup>40</sup>

### Decision support and clinical information systems

Decision support and information systems have been demonstrated to improve quality of care and some patient outcomes.<sup>41</sup> These include patient registers, systems to recall patient to the practice, templates for care plans and guidelines for health professionals (see *Resources*).

### Conclusion

Early detection of type 2 diabetes and active metabolic control in general practice can reduce complications, improve quality of life and reduce mortality. While this is still a challenge, we know both the specific behavioural and therapeutic interventions required to achieve this, and also the organisational approaches to enable these to occur. A systematic approach to diabetes care in the general practice setting is needed to more consistently implement this for all patients.

### Summary of important points

- The new AUSDRISK questionnaire is the first step in screening most patients for diabetes. Those at high risk should then be tested using fasting blood glucose.
- Optimal metabolic control (including control of glucose, BP, lipids and weight) requires education and support to improved diet and physical activity and reduce weight. Pharmacotherapy should include aspirin with medications to achieve glycaemic, BP and lipid control.
- Targets for management include weight reduction (5–10%), HbA1c <7 mmol/L, LDL <2.5, BP ≤130/80 mmHg or <120/75 if the patient has renal disease.
- These need to be underpinned by self management education and multidisciplinary teamwork within the practice and between it and other services.

### Resources

- AUSDRISK questionnaire: [www.health.gov.au/internet/main/publishing.nsf/Content/Diabetes-Risk\\_Evaluation](http://www.health.gov.au/internet/main/publishing.nsf/Content/Diabetes-Risk_Evaluation)
- Diabetes management in general practice (13th edn): Guidelines for type 2 diabetes: [www.racgp.org.au/guidelines/diabetes](http://www.racgp.org.au/guidelines/diabetes)
- Guidelines for preventive activities in general practice: [www.racgp.org.au/guidelines/redbook](http://www.racgp.org.au/guidelines/redbook)
- Diabetes Australia: [www.diabetesaustralia.com.au/](http://www.diabetesaustralia.com.au/) including information on the National Diabetes Services Scheme: [www.diabetesaustralia.com.au/en/NDSS/](http://www.diabetesaustralia.com.au/en/NDSS/)
- Patient registers, system recalls, templates, guidelines: [www.racgp.org.au](http://www.racgp.org.au).

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