

# What's Up?

## Prevention and Management of Diabetes in Canada

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**What's Up?** has been created for primary care physicians and allied health care providers to serve as a quick reference of selected key points from the recently released *2008 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada*. In *What's Up*, you will find discussions on:

- Preventing type 2 diabetes
- Screening for type 2 diabetes
- Blood glucose monitoring
- Blood glucose targets
- Pharmacologic management
- Vascular protection

### Risk factors – type 2 diabetes

- Age ≥40 years
- 1st-degree relative with type 2 diabetes
- Member of high-risk population
- History of IGT or IFG
- Presence of complications associated with diabetes
- Vascular disease (coronary, cerebrovascular or peripheral)
- History of gestational diabetes
- History of delivery of a macrosomic infant
- Hypertension
- Dyslipidemia
- Overweight
- Abdominal obesity
- Polycystic ovary syndrome
- Acanthosis nigricans
- Schizophrenia
- Other  
(see Appendix 1 of the full guidelines)

### Diagnosing diabetes

The criteria for diagnosing diabetes remain unchanged from 2003:

Fasting\* plasma glucose ≥7.0 mmol/L  
**or**  
 Casual† PG ≥11.1 mmol/L + symptoms of diabetes‡  
**or**  
 2hPG in a 75-g OGTT ≥11.1 mmol/L

\* Fasting = no caloric intake for at least 8 hours

† Casual = any time of the day, without regard to the interval since the last meal

‡ Symptoms of diabetes = polyuria, polydipsia and unexplained weight loss

2hPG = 2-hour plasma glucose

OGTT = oral glucose tolerance test

PG = plasma glucose

Also, as before, a diagnosis of diabetes requires a second, confirmatory plasma glucose level on another day. This can be either:

- A fasting plasma glucose
- A casual plasma glucose, or
- A 2 hr plasma glucose in a 75-g OGTT

Important exceptions to the usual need for a second, confirmatory test are when there is unequivocal hyperglycemia accompanied by acute metabolic decompensation, or in younger or lean older individuals in whom type 1 diabetes is a possibility. In either of these cases, treatment should be initiated *immediately* (that is, without performing a second, confirmatory test) as delaying therapy could lead to rapid deterioration.

### Diagnosing prediabetes

Prediabetes is the presence of impaired fasting glucose and/or impaired glucose tolerance. The criteria for diagnosing prediabetes remain unchanged from 2003:

#### PG levels for diagnosis of IFG, IGT

	FPG (mmol/L)		2hPG in the 75-g OGTT (mmol/L)
IFG	6.1 – 6.9	–	NA
IFG (isolated)	6.1 – 6.9	and	< 7.8
IGT (isolated)	< 6.1	and	7.8 – 11.0
IFG and IGT	6.1 – 6.9	and	7.8 – 11.0

2hPG = 2-hour plasma glucose  
 FPG = fasting plasma glucose  
 IFG = impaired fasting glucose  
 IGT = impaired glucose tolerance  
 OGTT = oral glucose tolerance test  
 NA = not applicable

Members of high-risk ethnic populations should be screened for type 2 diabetes using ethnic-specific waist circumference values (see page S78).

## Prevention

In people at risk of developing type 2 diabetes, **lifestyle modification including healthy eating, physical activity and achieving a healthy weight can reduce the risk of progression from prediabetes to type 2 diabetes by almost 60%.**

Lifestyle modification is, of course, always best; however, several drugs have been found to either prevent type 2 diabetes or delay its onset. These pharmacologic options are discussed in detail in the guidelines (S17-19).

The most important reason for determining whether a person has prediabetes is that this diagnosis means the affected person is at very high risk for developing diabetes over the next 5 to 10 years and thus, needs to follow preventative measures and also needs more frequent screening for diabetes. Also, people with prediabetes are at increased risk of cardiovascular disease.

## Screening for type 2 diabetes

As a rule, all patients  $\geq 40$  years of age should be screened for diabetes every 3 years using a fasting plasma glucose (FPG) test. There are, however, important exceptions:

- Those with additional risk factors for diabetes (see the sidebar) should generally be screened earlier (i.e., before they reach the age of 40) and more frequently (i.e., more often than every 3 years).
  - Aboriginal peoples are at especially high risk of type 2 diabetes. Therefore:
    - Aboriginal adults with one or more risk factors should be screened every 1 to 2 years.
    - Aboriginal children with one or more risk factors should be screened every 2 years after the age of 10.
  - People with:
    - An FPG of 6.1 to 6.9 mmol/L should be followed up with a 75-g oral glucose tolerance test (OGTT)\*.
    - An FPG of 5.6 to 6.0 mmol/L and risk factors for type 2 diabetes may also be followed up with a 75-g OGTT\*.
  - Women who have had gestational diabetes should be screened prior to their next pregnancy.
- \* The reason for recommending the OGTT in these situations is to identify those individuals that may already have diabetes but, because their FPG had not risen above 7.0 mmol/L, would not be otherwise discovered. (Also, if a person has a FPG of 5.6-6.0 mmol/L they may have IGT which will be discovered on a OGTT.)

The A1C is not recommended as a screening tool for diabetes at this time.

## Self-management education

It is not enough that people with diabetes be educated about their condition – they need to be empowered. As a result, the guidelines discuss “self-management education” which “goes beyond a focus on adherence to guidelines and treatment prescriptions” and “incorporates didactic and... active, participatory education, as well as social, behavioural and psychological interventions.” To achieve this level of self-management education requires the active involvement of physicians, nurse educators, dietitians, other allied health care professionals and, most important of all, the person with diabetes. The guidelines emphasize the importance of referring patients to diabetes educators.

## Organization of diabetes care

Diabetes care depends upon the daily commitment of the person with diabetes to self-management with the support of an integrated, multi- and interdisciplinary team. Since 80% of people with diabetes receive their predominant diabetes care through the primary care physician, people with diabetes will have better outcomes if primary care providers:

- Identify patients with diabetes in their practice.
- Schedule diabetes-focused visits.
- Use diabetes patient care flow sheets (see appendix #2, page S195).
- Have systematic recall of their patients with diabetes.

## Blood glucose testing

The frequency with which people with diabetes should test their blood glucose (using a blood glucose meter) depends on their particular circumstance. For most adults with diabetes, the CPGs recommend the following schedule:

Treatment	Frequency of testing
Lifestyle alone	Individualized
Lifestyle and oral antihyperglycemic agents	Individualized
Multiple daily injections of insulin	At least 3x daily
T2DM treated with insulin and oral antihyperglycemic agents	At least 1x daily

A few important additional points should be considered:

- Testing should include both preprandial and 2-hour postprandial measurements.
- In many situations, more frequent testing should be undertaken; for example, when therapeutic decisions need to be made or, especially, if a person is ill (particularly if a person has type 1 diabetes).

One of the most important – and sometimes overlooked – aspects of blood glucose testing is that the frequency with which testing should be done relates directly to how important the information is and how it will be used. An 85 year old with type 2 diabetes and excellent blood glucose control on lifestyle therapy alone clearly needs far less testing than does a 16 year old with type 1 diabetes on insulin pump therapy. Ideally, our patients should be taught how to interpret the information they are gathering or, at the very least, what numbers should alert them to seek medical attention.

## Blood glucose targets

Compared with the 2003 Clinical Practice Guidelines, blood glucose targets for most adults remain the same, with the exception that the postprandial target is now dependent on the individual's A1C:

## Overweight/obesity

When it comes to type 2 diabetes, the bad news is that 80 to 90 per cent of affected individuals are overweight (defined as a BMI of 25 or greater) or obese (BMI of 30 or greater). The good news, however, is that even modest weight loss of 5 to 10% of body weight can substantially improve insulin sensitivity and glycemic, blood pressure and lipid control. Nonetheless, as we (both health care providers and patients alike) well know, successful weight loss and maintenance is a huge challenge.

The CPGs explore various successful methods with which we may assist our patients in the quest for successful weight control. The key to success is a “comprehensive healthy lifestyle intervention program (including a hypocaloric, nutritionally balanced diet, regular physical activity or exercise, and behavioural modification techniques).” The guidelines also recommend that “in overweight or obese adults with type 2 diabetes, a pharmacologic agent such as orlistat or sibutramine should be considered.” Lastly, for certain individuals, bariatric surgery may be a consideration.

	A1C (%)	FPG or preprandial PG (mmol /L)	2-hour postprandial PG (mmol/L)*
Type 1 & 2 diabetes	≤7.0 **	4.0 – 7.0	5.0 – 10.0 (5.0 – 8.0 if A1C targets not being met)

*Targets for pregnant women and children 12 years of age and under are different  
A1C = glycated haemoglobin FPG = fasting plasma glucose PG = plasma glucose*

*\* 2-hour postprandial refers to 2 hours after the start of a meal.*

*\*\* A target A1C of ≤6.5% may be considered in some patients with type 2 diabetes to further lower the risk of nephropathy.*

As the CPGs note, “when setting treatment goals and strategies, consideration must be given to individual risk factors such as age, prognosis, presence of diabetes complications or comorbidities, and the (individual’s) risk for and ability to perceive hypoglycemia.” By way of example, a 21 year-old, otherwise healthy person with diabetes will need “tighter” control than an 85 year-old nursing home resident with dementia.

As with the 2003 CPGs, the A1C test remains of paramount importance. For most patients with diabetes, the A1C should be measured every 3 months. Testing the A1C less often (at least every 6 months) may, however, be considered in adults during periods of treatment and lifestyle stability when glycemic targets have been consistently achieved.

## Healthy lifestyle

### Nutrition therapy

Nutrition therapy is a cornerstone to successful diabetes management. Here are a few important considerations from the CPGs:

- Nutrition therapy can reduce A1C by 1.0 to 2.0%. This is at least as powerful as nearly all our pharmacologic options (save, perhaps, insulin).
- Consistency in carbohydrate intake, and spacing and regularity in meal consumption may help control blood glucose and weight.
- Individuals with diabetes should be encouraged to follow *Eating Well with Canada’s Food Guide*.
- A “diabetic diet” is, in reality, a healthy diet for all people.

### Physical activity

The guidelines note the benefits to be accrued by physical activity. In particular, “moderate to high levels of physical activity and cardiorespiratory fitness are associated with substantial reductions in morbidity and mortality in both men and women and in both type 1 and type 2 diabetes.”

Some important points about exercise:

- People with diabetes should accumulate a minimum of 150 minutes of moderate- to vigorous-intensity aerobic exercise each week, spread over at least 3 days of the week, with no more than 2 consecutive days without exercise.

The guidelines advocate nutrition counselling by a registered dietitian. There are numerous ways in which this can help our patients, not the least of which is that a patient who is knowledgeable about and uses nutrition therapy may reduce his or her A1C levels considerably.

- People with diabetes (including elderly people) should also be encouraged to perform resistance exercise 3 times per week

A couple of precautions do need to be undertaken:

- Initial instruction and periodic supervision by an exercise specialist are recommended.
- An exercise ECG stress test should be considered for previously sedentary individuals with diabetes at high risk for CVD who wish to undertake exercise more vigorous than brisk walking.

## Insulin therapy in type 1 diabetes

Insulin therapy is the cornerstone of treatment for type 1 diabetes. Nowhere is self-management education more important than having our patients with type 1 diabetes become knowledgeable about how to adjust their insulin based on food intake, exercise, current and recent blood glucose levels, illness, etc.

The preferred treatment strategy is “basal-prandial” (also known as “basal-bolus”) insulin. This can be administered either via

- Insulin pump, or
- Multiple daily injections. This consists of mealtime (“prandial” or “bolus”) insulin plus basal insulin once or, sometimes, twice daily.

Rapid-acting insulin (aspart, glulisine, lispro) is the preferred mealtime insulin over regular insulin. Long-acting insulin (detemir, glargine) may be considered over NPH as the basal insulin to reduce the risk of nocturnal and symptomatic hypoglycemia.

All insulin regimens should be tailored to the patient’s treatment goals, lifestyle, diet, age, general health, motivation, hypoglycemia awareness status and ability for self-management.

## Complementary and alternative medicines

Although up to 30% of patients with diabetes use complementary and alternative (CAM) medicines, there is insufficient evidence of benefit to recommend their use. Moreover, some CAMs have been associated with severe adverse effects. For these reasons, patients with diabetes should be routinely asked if they are using CAMs.

## Assessment Tool

The 2008 CPGs explore in detail both the assessment of vascular risk and the means available to reduce this risk. Vascular protection is of paramount importance, given that the substantial majority of people with diabetes die from vascular disease. On the next page, you will find a vascular assessment tool and recommendations to reduce that risk.

Many people with type 2 diabetes are unaccustomed to performing regular exercise. With our encouragement, this can change. A key point to success: making sure our patients know that they don’t have to become marathon runners; even a few minutes of exercise performed regularly is a great start to future success.

# Assessment Tool

## Is this patient at high risk for a vascular event?

### Step 1: Is the patient...

Male  $\geq$  45 years  
Female  $\geq$  50 years

IF NO

IF YES

### Step 2: Has the patient had...

Diabetes > 15 years AND is age > 30

IF NO

IF YES

### Step 3: Any of the following?

#### Macrovascular disease? ( $\geq$ 1)

Cardiac ischemia (silent or overt)  
Peripheral arterial disease  
Carotid disease  
Cerebrovascular disease

OR

#### Microvascular disease? ( $\geq$ 1)

Retinopathy  
Nephropathy  
(ACR  $\geq$  2.0 in men  
or  $\geq$  2.8 in women)  
Neuropathy

OR

#### Multiple risk factors? ( $\geq$ 2)

Family history of premature  
CHD or stroke  
Smoking  
Hypertension (treated or untreated)  
Dyslipidemia (treated or untreated)

OR

#### Extreme single risk factor?

Example:  
systolic BP > 180 mmHg  
LDL > 5.0 mmol/L

IF YES

IF YES

IF YES

IF YES

HIGH RISK • HIGH RISK • HIGH RISK

## Recommendations for vascular protection

### For all patients with diabetes:

- A1C  $\leq$  7%
- BP < 130/80 mmHg
- Smoking cessation
- Physical activity  
(goal of  $\geq$  150 minutes of aerobic exercise per week)
- Healthy body weight
- Healthy diet

### For high risk patients, include:

- ACE-inhibitor or ARB
- Statin\*
- Anti-platelet agent\*\*

\* Statin indicated for all high risk patients. Dose change or additional lipid therapy warranted if lipid targets (LDL  $\leq$  2.0 mmol/L AND total cholesterol / HDL ratio < 4) not being met.

\*\* Anti-platelet agent should be considered for secondary prevention. For primary prevention of cardiovascular events (with no other indication for its use), individual clinical judgment is required.

## Screening for coronary artery disease (CAD)

### Any one of:

- Age > 40
- DM > 15 years
- Hypertension (regardless of age)
- Nephropathy (ACR  $\geq$  2.0 in men, ACR  $\geq$  2.8 in women)
- Reduced pulses
- Vascular bruits

#### Resting ECG

- At diagnosis (baseline)
- Every 2 years (if high risk)

- Symptoms possibly due to CAD (including unexplained dyspnea)
- Abnormal resting ECG (Q-waves, ST-T abnormalities)
- Any vascular disease (Peripheral arterial disease, Carotid bruit, TIA, Stroke)

#### Stress test

- Exercise ECG or
- Nuclear imaging or
- Pharmacologic stress echocardiography

- Ischemia at low exercise capacity on stress testing (< 5 METS)

Refer to Cardiac specialist

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## 2008 Clinical Practice Guidelines Committee

The Canadian Diabetes Association 2008 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada were developed under the auspices of the Clinical & Scientific Section of the Canadian Diabetes Association. The following committee members contributed to these guidelines. Committee members were volunteers and received no remuneration or honoraria for their participation.

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