Diabetes Guidelines

The Highlights

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Diabetes mellitus is increasing in prevalence in Canada and around the world. The current prevalence in Canada is 7%. Obesity, aging, heredity and growing numbers of high-risk ethnic groups are contributing to the expansion of Type 2 diabetes.

The most recent Canadian Diabetes Guidelines are a call to action for the prevention of Type 2 diabetes and improved management for all people with diabetes.

First, it is important to differentiate between prediabetes and diabetes (Table 1).

What are the risk factors?

Research has identified an increasing number of people at risk for diabetes, however, up to 7% of adults with the condition remain undiagnosed.

Several of the risk factors for Type 2 diabetes (Table 2) are also associated with the metabolic syndrome. The metabolic syndrome is characterized by the combination of abdominal obesity, hypertension, dyslipidemia, insulin resistance and dysglycemia (*e.g.*, impaired fasting glucose). It is highly prevalent and comes with an increased risk for developing diabetes and cardiovascular disease.

What are the recommended targets for glycemic control?

Landmark clinical trials have demonstrated a relationship between glucose levels, glycosylated hemoglobulin (A1C) levels and the risk of vascular complications from

Robert's case

- Robert, 55, is overweight (body mass index 28) with abdominal obesity.
- His diet is high in fat and lacking in fruits and vegetables.
- He quit smoking six months ago, but has 24 alcoholic drinks per week.
- He is not physically active.
- Robert is motivated to get his sugars, which were in the range of 15 mmol/L, under control.
- He is seen at a local diabetes education centre.
- A dietitian provides him with a 1,500-calorie meal plan with increased fibre, low-fat and controlled carbohydrates at each meal, with low glycemic index choices.
- He is asked to limit his alcohol to < 2 drinks per day.
- He is instructed in self-blood glucose monitoring, to be done sometimes before and sometimes after meals.
- Fasting blood work for an A1C, lipid profile, creatinine and liver function tests are done, as well as a urinary microalbumin/creatinine ratio.
- After determining his creatinine and liver function tests are normal, metformin is initiated.
- An exercise electrocardiogram stress test is done and he starts a walking program with a gradual increase in duration and briskness.

Table 1

Glucose levels for diagnosis of prediabetes and diabetes

	FPG		2-hr PG in a 75 g OGTT mmol/L
IFG	6.1-9	and	< 7.8
IGT	< 6.1	and	7.8-11.0
IFG & IGT	6.1-9	and	7.8-11.0
Diabetes	≥ 7.0	or	≥ 11.1

FPG: Fasting plasma glucose
PG: Plasma glucose
OGTT: Oral glucose tolerance test
IFG: Impaired fasting glucose
IGT: Impaired glucose tolerance

diabetes. In the Diabetes Control and Complications Trial (DCCT), a 10% reduction in A1C was associated with a 40% to 50% risk in the progression of retinopathy.

In the U.K. Prospective Diabetes Study (UKPDS), each 1% reduction in A1C was associated with a 37% decrease in the risk of microvascular complications and a 14% reduction in the rate of myocardial infarction.

Glycemic targets should be individualized due to the risks for hypoglycemia and the consideration of other medical factors (Table 3).

Target blood pressure for people with diabetes is < 130/80 mmHg. The lipid goals include a low-density lipoprotein cholesterol (LDL-C) < 2.5 mmol/L and a total cholesterol/high-density lipoprotein cholesterol (TC/HDL-C) ratio of < 4.

How should we monitor patients with diabetes?

Self-monitoring of blood pressure (SMBG) and measurement of A1C monitor variations in glucose and overall glucose control. A1C should be measured about every three months. SMBG should include both pre- and postprandial measurements. The frequency of SMBG will depend on the type of diabetes and the intensity of the management. Results of the SMBG are used to make treatment adjustments with regard to diet, exercise and antihyperglycemic/hypoglycemic medications.

Other important lab parameters to be monitored include:

- serum creatinine,
- urine for microalbumunuria (random urine albumin to creatinine ratio) and
- fasting lipid profile.

Thyroid-stimulating hormone (TSH) levels are checked in people with Type 1 diabetes and as indicated in people with Type 2 diabetes.

Foot exam should be done daily by the patient and as clinically indicated by the health-care provider. The following all provide useful information:

- pulses,
- reflexes,
- temperature,
- skin,
- 10 g monofilament sensation and
- vibration at the great toe.

Useful Web sites:

- www.diabetes.ca
- www.ices.on.ca
- www.healthyeatingisinstore.ca
- www.diabetes-exercise.org

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Eye exam includes:

- pupillary reactions,
- extraocular movements,
- lens and
- fundi.

Retinopathy is assessed by a health-care provider trained in the area. Screening for retinopathy is indicated at the time of diagnosis of Type 2 diabetes and five years after diagnosis of Type 1 diabetes in individuals over 15 years of age. Reassessments are done annually for Type 1 diabetes and every one to two years for Type 2 diabetes. Monitoring will be more frequent in the presence of active retinopathy.

Recommendations for management of hyperglycemia in Type 2 diabetes?

Diet

The basic nutritional tips for both prevention and management of Type 2 diabetes include eating three meals a day; limiting sugars, sweets and high-fat foods; and eating more high-fibre foods.

Choose low and medium glycemic index foods, such as whole wheat bread, all bran or oatmeal, basmati, brown or converted rice and yams, beans and new potatoes. Limit portion size to reach or maintain a healthy weight.

Drink water rather than regular pop or fruit juice. Limit intake of alcohol to one to two drinks a day (less than 14 standard drinks/week for men and less than nine for women).

Exercise

Regular exercise/physical activity improves glucose control. Both aerobic (*e.g.*, walking, jogging, biking, swimming, dancing) and resistance (*e.g.*, weight lifting) exercises are recommended on at least three non-consecutive days of the week. A minimum of 2.5 hours of exercise per week is suggested and four hours of exercise peer week is encouraged. An exercise electrocardiogram stress test should be considered for previously sedentary individuals prior to undertaking a vigorous exercise program.

Table 2

Risk factors for Type 2 diabetes

- Age > 40 years
- First-degree relative with diabetes
- Member of high-risk population (*e.g.*, people of Aboriginal, Hispanic, South Asian, Asian or African descent)
- History of impaired glucose tolerance or impaired fasting glucose
- Presence of complications associated with diabetes
- Vascular disease
- History of gestational diabetes mellitus
- History of delivery of a macrosomic infant
- Hypertension
- Dyslipidemia
- Overweight
- Abdominal obesity
- Polycystic ovary syndrome
- Acanthosis nigricans
- Schizophrenia
- Other

Table 3

Targets for glycemic control

A1C%	FPG/ preprandial PG (mmol/L)	2-hr postprandial PG (mmol/L)
≤ 7	4-7	5-10

A1C: Glycosylated hemoglobulin
FPG: Fasting plasma glucose
PG: Plasma glucose

Table 4

Initial pharmacologic management of hyperglycemia in Type 2 diabetes

	A1C < 9%	A1C > 9%
Overweight	Biguanide ± 1 other agent*	Insulin or 2 agents from different classes**
Not overweight	1-2 agents from different classes	Insulin or 2 agents from different classes

*Insulin sensitizer, insulin secretagogue, insulin or alpha-glucosidase inhibitor

**Biguanide, insulin sensitizer, insulin secretagogue, insulin alpha-glucosidase inhibitor combinations

A1C: Glycosylated hemoglobulin

Medication

The choice of pharmacologic agent in the management of hyperglycemia in Type 2 diabetes depends on the level of A1C and the weight of the individual (Table 4).

Metformin is contraindicated in patients with renal dysfunction. Both metformin and insulin sensitizers are contraindicated if there is hepatic dysfunction or heart failure.

The insulin secretagogues, nateglinide and repaglinide, are associated with less hypoglycemia than the sulfonylureas, particularly in the elderly.

Who is involved in the health-care team?

Optimal care of a person with diabetes involves a number of health-care providers, in addition to family and friends of the patient. The primary care provider may refer to a diabetes educator, registered dietitian, optometrist/ophthalmologist, endocrinologist/internist, cardiologist, nephrologist, podiatrist/foot specialist, urologist and psychiatrist/psychologist/social worker.

Considerable help is also available on-line through a variety of Web sites (see box on page 76). Dx

References available—contact *The Canadian Journal of Diagnosis* at **diagnosis@sta.ca**.