Diabetes Care

Effective Date: September 1, 2010

Scope

This guideline describes the care objectives for the prevention, diagnosis and management of diabetes mellitus (DM) in non-pregnant adults. It focuses on the approaches and systems that are ideally in place to improve care for the majority of patients the majority of the time.

Diagnostic Code: 250 – Diabetes mellitus

Prevention and Risk Factors

Safe and effective therapies for the prevention of type 1 DM have not yet been identified.[1] The risk for developing type 1 DM is influenced by family history of type 1 DM and other autoimmune diseases.

A large proportion of type 2 DM can be prevented using lifestyle modification and/or pharmacologic intervention.[1] Lifestyle modification is particularly important for persons considered at high-risk, and pharmacologic therapy with metformin or acarbose can also be considered for patients with impaired glucose tolerance (IGT).[2,3] Risk factors for type 2 DM include but are not limited to: obesity; age ≥40 years; close relative with type 2 DM; member of a high risk population (Aboriginal, Hispanic, South Asian, Asian, or African descent); history of IGT or impaired fasting glucose (IFG) and other conditions associated with insulin resistance (e.g. dyslipidemia, hypertension, abdominal obesity, vascular disease, schizophrenia and use of antipsychotic medications).[4]

Diagnosis

The classic diagnostic symptoms for DM are polyuria, polydipsia, and unexplained weight loss with a "casual"* plasma glucose (PG) ≥11.1 mmol/L. In the absence of classic symptoms, a fasting† plasma glucose (FPG) is the recommended initial test in the diagnosis of diabetes. Glycosylated hemoglobin (A1C) has been proposed as a diagnostic test for type 2 diabetes; however, has not universally been adopted.[5] See Appendix A Screening Algorithm for Type 2 DM in Adults.

*Casual=any time of day, regardless of the interval since the last meal. †Fasting= no caloric intake for at least 8 hours

Lifestyle Management of DM*

Healthy Living

- Encourage a long-term healthy diet, recognizing diverse diets and needs.
- Calculate and optimize patient's BMI (mass in kilograms/height in metres^2)
  Target BMI: 18.5-24.9 kg/m^2
  Note that desirable BMI range may be lower for certain populations, (e.g. Asian, Pacific).
- Measure and optimize patient's waist circumference (WC).
  Targets for WC: M ≤ 94 cm; F ≤ 80 cm (Europid, Sub-Saharan African, Eastern Mediterranean and Middle Eastern); M ≤ 90 cm; F ≤ 80 cm (South Asian, Chinese, Japanese, South and Central American)[6].
- Encourage aerobic exercise (30 min/day) and resistance exercise (i.e. weights) 3 sessions/week. *Aerobic exercise and/or resistance training may also benefit elderly people with type 2 DM and can be recommended if not contraindicated. Consider an ECG stress test for previously sedentary people with additional risk factors for CVD who wish to undertake exercise more vigorous than brisk walking.*
- At each visit encourage patient to stop smoking; provide support as needed.

Self-Management

- Educate patients regarding basic clinical management measurements such as blood glucose, glycosylated hemoglobin (A1C), BP (blood pressure), and lipid profile. Encourage patients to accept responsibility for the care of their DM and develop a mutually acceptable management plan, including an identified primary care provider and individualized self-monitoring of blood glucose (SMBG). See Controversies in Care: SMBG.
- Consider referral to a Diabetes education clinic.

*See Patient Education and Resources; for practitioners see www.primaryhealthcarebc.ca/phc/gpsc_initiatives.html

Management of Hyperglycemia and Hypoglycemia

- Focus is on achieving target A1C levels and on minimizing symptomatic hyper- and hypoglycemia.

Hyperglycemia

Please refer to Appendix B for the Management of Hyperglycemia in type 2 DM, including details on when to initiate oral hypoglycemic medications or insulin without a 2-3 month trial of lifestyle modifications alone.

Appendix C: Antidiabetic Agents and Adjunctive Agents for Use in Type 2 DM
Appendix D: Insulin Therapeutic Considerations and Availability

Hypoglycemia

- **Hypoglycemia can be serious complication of therapy.** Consider less stringent glycemic targets in patients at risk.
- *Risk factors:* Prior episode of severe hypoglycemia, long-term DM, current low A1C (<6.0%), autonomic neuropathy, hypoglycemia unawareness, current treatment with insulin, and being elderly. Severe hypoglycemia is less common in persons with type 2 DM but the elderly and those on insulin or secretagogues are more vulnerable.
- *Prevention:* Educate patients and families about prevention, detection and treatment of hypoglycemia. See Patient Education and Resources.
- *To reduce the risk of hypoglycemia:* increase the frequency of SMBG (including episodic assessment during sleeping hours), make glycemic targets less stringent, and consider multiple insulin injections.
  Treatment: See Appendix E: Treatment of Hypoglycemia.

Preventing complications and comorbidities of DM

Healthy elderly people with DM may be treated to achieve the same targets as younger people, e.g. glucose control, BP, and lipids. Consider more conservative targets in people with multiple comorbidities, a high level of functional dependency, or limited life expectancy.

Blood Pressure

- BP control is a priority; measure and record at diagnosis and regularly thereafter: optimize to ≤130/80.[7]
- If lifestyle modification is not sufficient, choose from the following first-line agents: a thiazide diuretic, ACEI/ARB, cardioselective B-blocker.

Blood Glucose: Long-term control

Studies suggest there is a long-term "legacy" benefit of glucose lowering early in the course of type 1 & 2 DM.[8,9]

- Measure glycosylated hemoglobin (A1C) every three months to ensure that glycemic goals are being met or maintained. Target for most patients A1C ≤7.0% (See Controversies in Care).
- **Consider testing every 6 months if treatment and lifestyle remains stable and if targets have been consistently met.**
- Focus on minimizing symptomatic hypo- and hyperglycemia, in addition to A1C levels.

Blood Glucose: SMBG*

- Reinforce patient's responsibility for regular monitoring as appropriate; ensure patients can use glucose meter, interpret results and modify treatment as needed. See Controversies in Care.
- Develop a blood glucose-monitoring schedule with patient and review records. SMBG is more important

when using a drug that can cause hypoglycemia. Targets for most patients: Premeal =4.0 – 7.0 mmol/L: 2h Postmeal =5.0 – 10.0 mmol/L (more lenient targets can be used in patients with history of hypoglycemia or the elderly).
- Annual accuracy verification of glucose meter (simultaneous fasting glucose meter/lab comparison within 20%).

* Blood glucose test strips are a Pharmacare benefit for those holding a valid Certificate of Training in self-monitoring of blood glucose from a BC diabetes education centre.

Lipid Profile

- Measure fasting lipid profile (TC, HDL-C, LDL-C, triglycerides) initially. If within target without therapy then consider rechecking q1-3 years as clinically indicated.
- In patients receiving lipid treatment measure lipids within 6 to 8 weeks of initiation or change of pharmacotherapy and every 6 to 8 months thereafter (CK and ALT are the recommended safety tests)
- Apolipoprotein B (ApoB) can be used in place of lipid profiles for ongoing monitoring of therapy.
- Lipid targets must relate to the calculated risk, individualized to each patient, of developing CHD – although the majority of diabetic patients are high risk (see Controversies in Care). To estimate the 10-year risk of CHD for patients with type 2 DM use the UK prospective diabetes (UKPDS) risk calculator or table, available at: www.dtu.ox.ac.uk/riskengine/

Lipid Targets (LDL-C or ApoB) According to CHD Risk Category*		
	LDL-C (mmol/L)	ApoB (g/L)
Moderate risk (<20% 10-year risk)	<3.5	<1.05
High risk (≥20% 10-year risk)	<2.5	<0.85
*LDL-C target of <2.0 or ApoB <0.8 (or a 50% LDL-C decrease from the baseline value) has been suggested by the new CCS guidelines[10] for individuals in the moderate risk category with LDL-C >3.5 or ApoB >1.0. (See Controversies in Care).		

Cardiovascular Disease

- Consider low dose ASA (81-325 mg) for people with stable cardiovascular disease. The decision to prescribe antiplatelet therapy for primary prevention of CV events should be based on individual clinical judgement.[11]
- Consider employing ACEI for any patient over 55 years of age, patients with hypertension or patients with confirmed albuminuria.[12]

Retinopathy

Early recognition and treatment of retinopathy can prevent blindness.

- Ensure patient receives dilated pupil retinal examination at diagnosis, then every one to two years or as indicated (annual referral to optometrist/ophthalmologist).

Nephropathy

- Screen for macroscopic proteinuria & non-renal disease with urine dipstick.
- If protein-negative dipstick measure albumin/creatinine ratio (ACR): If ACR is equivocal, repeat collection; treat ACR if persistently above normal threshold.
- Measure SCr (lab will report eGFR) at least annually. See Chronic Kidney Disease – Identification, Evaluation and Management of Patients.
- Treatment may not normalize subsequent ACRs or eGFR.
- Stages of classic diabetic nephropathy according to ACR (mg/mmol):
  - Normal: M <2.0; F <2.8; Micro-albuminuria (equivocal): M 2-20; F 2.8-28
  - Overt Nephropathy: M >20; F >28

Neuropathy

The best way to prevent diabetic neuropathy is to regularly monitor and manage blood glucose.

- Check annually for symptoms or findings such as peripheral anesthesic neuropathy or pain, or autonomic neuropathy e.g. erectile dysfunction, gastrointestinal disturbance, orthostatic hypotension.
- Include screening via monofilament during foot exam.

Foot Examination

- Examine feet annually, and more frequently for those at high risk (i.e. patients with anesthetic neuropathy).
- Encourage regular self-examination of feet.

Psychosocial Aspects of Diabetes

Challenging psychosocial factors affect many aspects of diabetes management and glycemic control.

- Screen for depression, anxiety and eating disorders. Treatment of these conditions may improve outcomes.[13]
- Cognitive behaviour therapy (CBT) based techniques such as stress management strategies and coping skills can be implemented to improve outcomes.[14]

Vaccinations

- Annual influenza vaccination.
- Pneumococcal vaccination: A single re-vaccination is recommended if the patient is >65 and previous vaccination was more than 5 years ago.

Additional Practice Points

Type 1 DM

- Patients with type 1 diabetes should see an experienced DM care team at diagnosis and at least annually.
- Insulin use: Multiple (3-4) daily injections or the use of continuous subcutaneous insulin infusions (CSII) should be considered as part of an intensive diabetes management program.

Type 2 DM

- See Appendix B Management of Hyperglycemia in Type 2 Diabetes.
- In elderly people with type 2 DM:
  - Polypharmacy: review medication list periodically, particularly if the patient presents with depression, falls, cognitive impairment, perceptual difficulties, or urinary incontinence.
  - Sulfonylureas: (especially glyburide) use with caution because the risk of hypoglycemia increases with age. Generally initial doses can be half of those for younger people and increased more slowly.
  - Monitor for postural BP.

Controversies in Care: Glycemic control

Several large prospective randomized trials have been published that have raised questions about appropriate targets and interventions for glycemic control for sub-populations of people with diabetes.

In support of A1C reduction and clinical complication reduction:

- The DCCT Trial showed that intervention with insulin for a mean of 6.5 years in people with **type 1 diabetes** to lower A1C (7.3% vs. 9.1%) resulted in reduced retinopathy progression, proteinuria progression, and neuropathy progression.[15] A ten-year follow-up study also showed a "legacy" effect of that earlier period of intervention with reduced cardiovascular disease, myocardial infarction and death.[16]
- The UKPDS showed that intervention with metformin, sulfonylureas and/or insulin in patients with newly diagnosed **type 2 diabetes** for a median follow-up of ten years to lower A1C (7.0% vs. 7.9%) resulted in reduced microvascular disease (largely driven by reduced need for retinal photocoagulation).[17] In particular metformin is uniquely effective in decreasing macrovascular outcomes. A ten-year follow-up study also showed a "legacy" effect of that earlier period of intervention with reduced microvascular disease, myocardial infarction and death from any cause.[18]
- A recent meta-analysis appears to show that "more-intensive glycemic control affords a modest but significant cardiovascular benefit in the short-to-medium term…"[19]

Studies with A1C reduction showing either no benefit for complication reduction or harm:

- The VADT trial enrolled 1791 US veterans with **type 2 diabetes**. Coronary artery disease prevalence was 40%. Glycemic targets were A1C <6.0% vs. <9.0% for insulin addition. Achieved A1C was 7.0% vs. 8.5%. Metformin, glimepride and rosiglitazone were oral agents. There was no difference in cardiovascular outcomes or death rate in the two groups and there was significantly higher rate of hypoglycemia in the intensive group.[20]

- The ACCORD study glycemic control arm examined a population of 10,251 people with **type 2 diabetes** at increased risk for cardiovascular complications on the basis of existing cardiovascular disease or risk factors. All patients received blood pressure and lipid lowering therapy. The glycemic targets were A1C <6.0% (intensive-therapy group) vs. 7.0-7.9% (standard-therapy group). Multiple agents were used to achieve the targets, with 77% of the intensive-therapy group receiving insulin and the majority of this group also using at least 3 classes of oral agents. The intensive-therapy group was terminated because of a statistically significant excess mortality compared to the standard-therapy group.[21]

The 2008 CDA Guidelines use a "single A1C target" of ≤7.0% to make it "easier to incorporate into clinical practice" but acknowledge that "clinical judgment is required to determine which people can reasonably and safely achieve these targets".[22] A1C lowering in type 1 DM and newly diagnosed type 2 DM is associated with reduced complications; however, in patients with existing or high risk for CVD there is no evidence that a stringent A1C (less than 6) has a benefit and there are increased side effects.

Controversies in Care: Risk Calculation

Some authorities suggest all patients with diabetes should be considered at high risk (20% ten year risk for a CAD event or 2% per year) for coronary artery disease.[23] This recommendation is often based on an article by Haffner et al. which showed equal risk for death from coronary artery disease in a cohort of diabetic patients who had not had an MI and of non-diabetic patients who had a previous MI.[24] But a recent meta-analysis by Bulugahapityia et al., which included the Haffner data, demonstrated significantly lower risk of CAD for patients with diabetes compared to those with a prior MI.[25]

Recent CDA guidelines recommended that all men with diabetes over age 45 and all women with diabetes over age 50 (and some under those age cut-offs) be considered at high risk for CAD.[26] This recommendation was based on an article by Booth et al. Booth demonstrated that the average man with diabetes in a cohort (Ontario, Canada) became high risk at the age of 49 and the average woman with diabetes at age 56.[27]

The alternative to such broad, population-based, definitions of "high risk" is an individual calculation using a risk calculator (e.g., **UKPDS risk calculator and DiabetesPHD (personal health decisions)**. Many other risk calculators also exist. Risk calculators differ in terms of ease of use and data entered. They may over- or under-estimate a patient's true risk. But, risk calculators provide the clinician the ability to input a variety of patient specific characteristics (more than just age and gender) in order to estimate a patient's risk for a variety of diabetes-related complications.

Controversies in Care: SMBG

SMBG is a commonly recommended medical technology. On a population basis, the majority of glucose test strip use is by people with type 2 diabetes who do not use insulin. A recent meta-analysis of this group showed a slightly lower A1C (-0.25%) in patients who perform SMBG vs no testing.[28] The review found "sparse and inconsistent data" to suggest that SMBG conferred benefit in terms of Health-Related Quality of Life, patient satisfaction, long-term complications and mortality. When economic factors were also reviewed, SMBG was found to be relatively cost-ineffective and routine self-testing of blood glucose was not recommended in this population. The review suggested that the frequency of SMBG be "individualized" in certain groups of people, e.g patients with diabetes who use insulin, patients with gestational diabetes, or those who have special considerations i.e adjustment of medication regimen.[29]

Controversies in Care: Lipid Targets

The issue of lipid targets for patients with diabetes is complicated and often debated in the context of CV risk assessment and clinical trial results. There are several algorithms for the CV risk: UKPDS, Framingham, Procam, Reynold etc. Depending on which one is used, the predicted risk may be remarkably different. The results from prospective, double blind, placebo-controlled statin trials in patients with diabetes show significant benefits of the treatment. Thus the current expert opinion from the Canadian Cardiovascular Society (CCS) and American Diabetes Association (ADA) guidelines state that "most patients with diabetes will benefit from treatment with statins to the high risk LDL-C or ApoB target".[30,31] It is hoped that these numbers guide treatment rather than define an absolute target that must be achieved.

References

1 Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Prevention of Diabetes. Can J Diabetes. 2008;32 (Supp.1):S17-S19.

2 Chiasson JL, Rabasa-Lhoret R. Prevention of type 2 diabetes insulin resistance and β-cell function. Diabetes. 2004;53(S3):S34-S38.

3 Lindstrom J, Ilane-Parikka P, Aunola S, et al. Sustained reduction in the incidence of type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study. Lancet. 2006;368:1674-69.

4 Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Screening for type 1 and type 2 diabetes. Can J Diabetes. 2008;32(Supp.1):S14-S16.

5 International Expert Committee. International Expert Committee report on the role of the A1C assay in the diagnosis of diabetes. Diabetes Care. 2009;32:1327-1334.

6 Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Management of obesity in diabetes. Can J Diabetes. 2008;32(Supp.1):S77-S81.

7 Canadian Hypertension Education Program. 2010 CHEP recommendations for the management of hypertension. 2007. www.hypertension.ca/chep/

8 Nathan DM, Zinman B, Cleary PA. Diabetes control and complications trial/epidemiology of diabetes interventions and complications (DCCT/EDIC) research group. Modern-day clinical course of type 1 diabetes mellitus after 30 years' duration. Arch Intern Med. 2009;169(14):1307-1316.

9 Chalmers J, Cooper ME. UKPDS and the legacy effect. N Engl J Med. 2008;395(15)5:1618-1620.

10 Genest J, McPherson R, Frohlich, J. et al. 2009 Canadian Cardiovascular Society/Canadian guidelines for the diagnosis and treatment of dyslipidemia and prevention of cardiovascular disease in the adult - 2009 recommendations. CJC 2009;25:567-579.

11 Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Management of obesity in diabetes. Can J Diabetes. 2008;32 (Supp.1):S105.

12 The ONTARGET Investigators. Telmisartan, ramipril, or both in patients at risk for vascular events. N Engl J Med. 2008;385:15: 1547-1559.

13 Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Prevention of diabetes. Can J Diabetes. 2008:32(Supp.1):S82.

14 Ismail K, Winkley K, Rabe-Hesketh S. Systematic review and meta-analysis of randomized controlled trials of psychological interventions to improve glycemic control in patients with type 2 diabetes. Lancet. 2004;363:1589-1597.

15 DCCT Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. N Engl J Med. 1993;329:977-86.

16 The Diabetes Control and Complications Trial/ Epidemiology of Diabetes Interventions and Complications (DCCT/EDIC) Study Research Group. N Engl J Med. 2005; 353:2643-2653.

17 United Kingdom Prospective Diabetes Study Group (UKPDS). Intensive blood glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with Type 2 diabetes. Lancet. 1998;352:837-53.

18 The Advance Collaborative Group. Intensive blood glucose control and vascular outcomes in patients with type 2 diabetes. N Engl J Med. 2008;358:2560–2572.

19 Turnbull FM, Abraira C, Anderson RJ. Intensive glucose control and macrovascular outcomes in type 2 diabetes. Diabetologia. 2009 Nov;52(11):2288-98.

20 Duckworth W, Abraira C, Moritz T, et al. Glucose control and vascular complications in Veterans with type 2 diabetes. N Engl J Med. 2009;360:129-39

21 The Action to Control Cardiovascular Risk in Diabetes Study Group. Effects of intensive glucose lowering in type 2 diabetes. N Engl J Med. 2008;358:2545–2559.

22 Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Canadian Diabetes Association 2008 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada. Can J Diabetes. 2008;32(Suppl1) S30.

23 McPherson R, Frolich J, Fodo G, et al. Canadian Cardiovascular Society position statement – recommendations for the diagnosis and treatment of dyslipidemia and prevention of cardiovascular disease. Can J Cardiol. 2006;22:913-27.

24 Haffner SM, Lehto S, Ronnemaa R, et al. Mortality from coronary heart disease in subjects with type 2 diabetes and in non diabetic subjects with and without prior myocardial infarction. New Engl J Med. 1998;339:229-34.

25 Bulugahapitiya U, Siyambalapitiya S, Sithole J, et al. Is diabetes a coronary risk equivalent? Systematic review and meta-analysis. Diabetic Medicine. 2009;16;142-148.

26 Canadian Diabetes Association Clinical Practice Guidelines Expert Committee, Canadian Diabetes Association 2008 clinical practice guidelines for the prevention and management of diabetes in Canada. Can J Diabetes. 2008;32(suppl1):S95.

27 Booth GL, Kapral MK, Fung K, et al. Relation between age and cardiovascular disease in men and women with diabetes compared with non-diabetic people: a population-based retrospective cohort study. Lancet. 368:29-36.

28 Canadian Agency for Drugs and Technology in Health (CADTH). Optimal Therapy Recommendations for the Prescribing and Use of Blood Glucose Test Strips, Volume 3, Issue 6, July 2009.

29 Cameron C, Coyle D, Ur E. et. al. Cost-effectiveness of self-monitoring of blood glucose in patients with type 2 diabetes mellitus managed without insulin. Can. Med. Assoc. J., Jan 2010; 182: 28 - 34
30 Genest J, McPherson R, Frohlich J. et al. 2009 Canadian Cardiovascular Society/Canadian guidelines for the diagnosis and treatment of dyslipidemia and prevention of cardiovascular disease in the adult – 2009 recommendations. Can J Cardio. 2009; 25(10): 567-579.
31 American Diabetes Association: Standards of Medical Care in Diabetes – 2009. Position statement. Diabetes Care. 2009; 32:(1) S13-S61.
32 Douglas IJ, Evans SJ, Pocock S, et al. The Risk of fractures associated with thiazolidinediones: a self-controlled case-series study. PLoS Med. 2009;6(9):e1000154.
33 Nathan DM, Buse MH, Davidson MB. Medical management of hyperglycemia in type 2 diabetes: A consensus algorithm for the initiation and adjustment of therapy. Diabetes Care. 2008; 32:193-203.

Resources

ActNowBC	www.ActNowBC.ca		
Canadian Diabetes Association	www.Diabetes.ca	or	1-(800) 226-8464
HealthlinkBC	www.HealthLinkBC.ca	or	8-1-1; TTY (deaf and hearing impaired) call 7-1-1
Smoking Cessation	www.quitnow.ca	or	1-(877) 455-2233

List of Abbreviations and Acronyms

A1C	glycosylated hemoglobin, formerly known as HbA_{1C}
ACEI	angiotensin-converting enzyme inhibitors
ApoB	apolipoprotein B
ARB	angiotensin II receptor blocker
ASA	acetylsalicylic acid
BID	to be taken twice a day
BMI	body mass index
BP	blood pressure
CHD	coronary heart disease
CHF	congestive heart failure
eCPS	Electronic Compendium of Pharmaceuticals and Specialties
CSII	continuous subcutaneous insulin infusions
CVD	cardiovascular disease
DM	diabetes mellitus
ECG	electrocardiogram
eGFR	estimated glomerular filtration rate
FPG	fasting plasma glucose
HDL-C	high-density lipoprotein cholesterol
IFG	impaired fasting glucose
IGT	impaired glucose tolerance
LDL-C	low-density lipoprotein cholesterol
OD	to be taken once a day
OGTT	oral glucose tolerance test
PG	plasma glucose
SMBG	self-monitoring of blood glucose
TG	triglycerides
TID	to be taken three times a day
TZD	thiazolidinedione
UKPDS	United Kingdom Prospective Diabetes Study
ULN	upper limit of normal

Appendices

Appendix A	Screening Algorithm for Type 2 Diabetes in Adults
Appendix B	Management of Hyperglycemia in Type 2 Diabetes
Appendix C	Antidiabetic Agents and Adjunctive Agents for Use in Type 2 DM
Appendix D	Insulin Therapeutic Considerations and Availability
Appendix E	Treatment of Hypoglycemia

Associated Documents

Diabetes Patient Care flow sheet
Patient Education and Resources

This guideline is based on scientific evidence current as of the Effective Date.

The guideline was developed by the Guidelines and Protocols Advisory Committee, approved by the British Columbia Medical Association and adopted by the Medical Services Commision.

The principles of the Guidelines and Protocols Advisory Committee are to:

- encourage appropriate responses to common medical situations
- recommend actions that are sufficient and efficient, neither excessive nor deficient
- permit exceptions when justified by clinical circumstances

Contact Information

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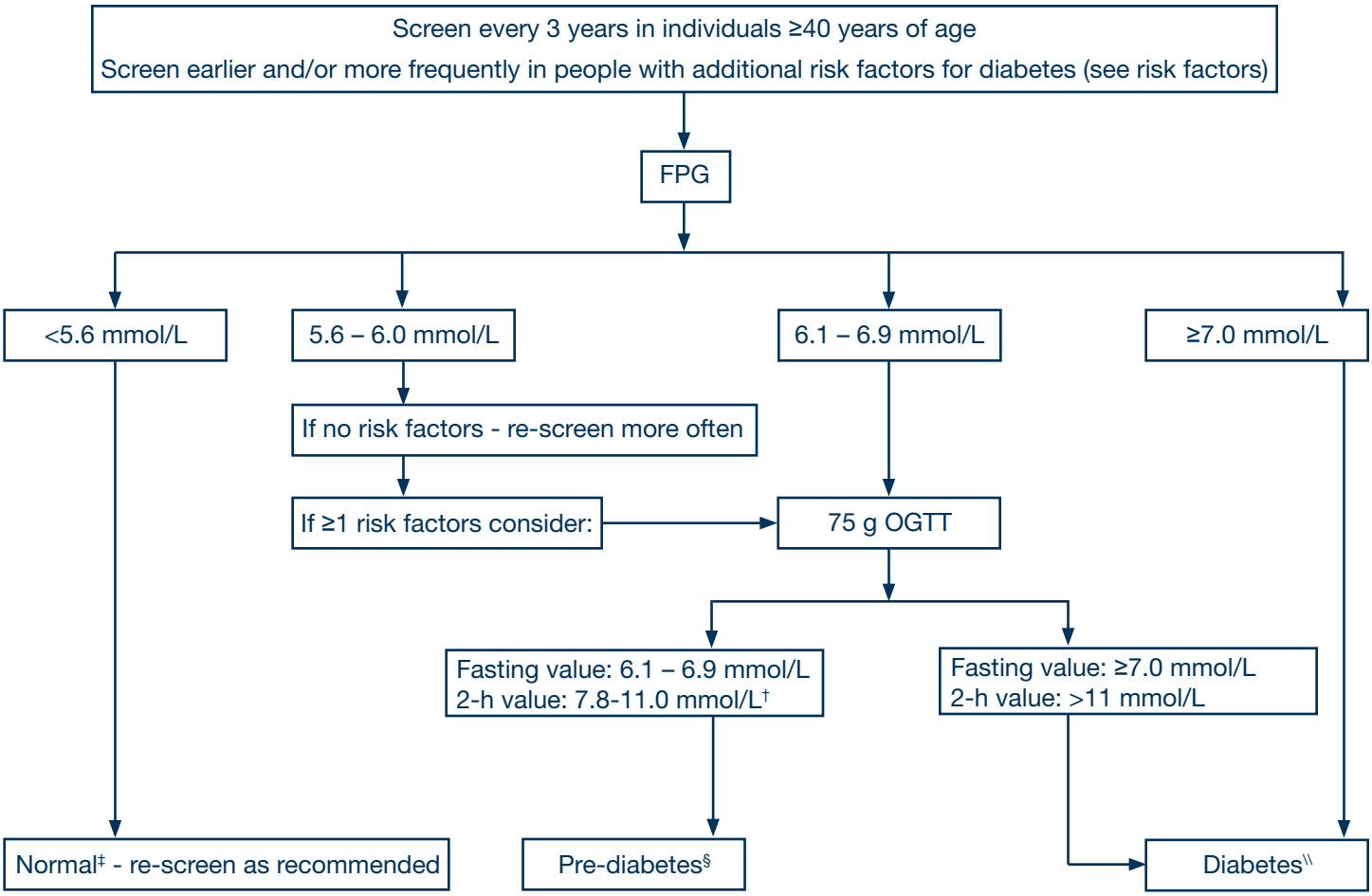
DISCLAIMER

Appendix A: Screening Algorithm for Type 2 Diabetes in Adults*



* Adapted from: Canadian Diabetes Association Clinical Practice Guidelines Expert Committee; Screening for Type 1 and Type 2 Diabetes. Can J Diabetes 2008;32 (Supp.1): S15.

† Isolated IGT: fasting value <6.1 mmol/L and 2-h value 7.8-11.0 mmol/L
Isolated IFG: fasting value 6.1 - 6.9 mmol/L and 2-h value <7.8 mmol/L
IFG and IGT: fasting value 6.1 – 6.9 mmol/L and 2-h value 7.8-11.0 mmol/L

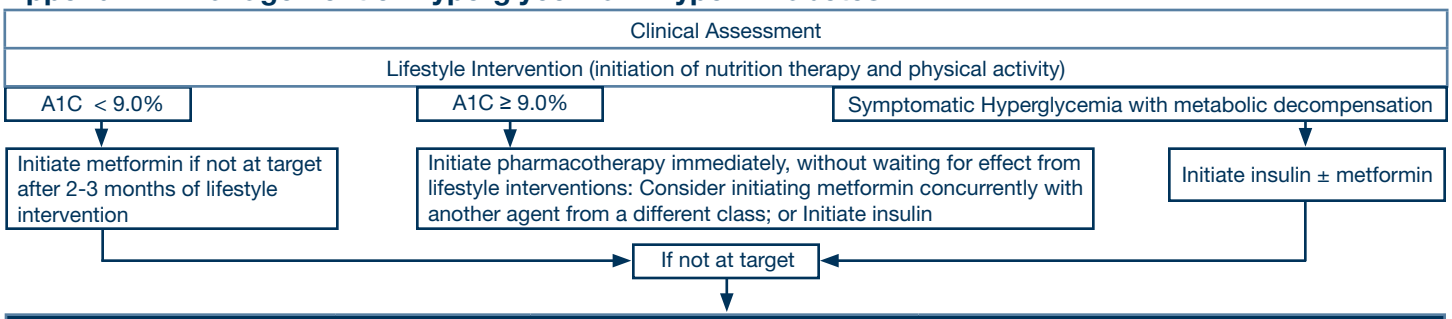
‡ If, despite a normal fasting value, a 75 g OGTT is subsequently performed and the 2hPG value is 7.8- 11.0 mmol/L, a diagnosis of isolated IGT is made.

§ The term "prediabetes" refers to IFG and/or IGT. These individuals are at risk of developing DM, should be monitored regularly, and benefit from CVD risk factor modification.

\\ A confirmatory laboratory glucose test (either a FPG, casual PG or a 2hPG in a 75 g OGTT) must be done on another day in all cases in the absence of unequivocal hyperglycemia accompanied by acute metabolic decompensation.

Key: FPG= fasting blood glucose; 75g OGTT= 75 g oral glucose tolerance test; 2hPG= 2-hour plasma glucose; CVD= cardiovascular disease; IFG= impaired fasting glucose; IGT= impaired glucose tolerance; PG= plasma glucose.

Appendix B: Management of Hyperglycemia in Type 2 Diabetes*



Add an agent best suited to the individual based on advantages/disadvantages listed below and further information (dosage and specific drug cost) in Appendix C and D. Classes listed in order of preferential consideration.

Class	Daily Cost	Advantages	Disadvantages
Biguanide e.g. metformin	$0.39-$1.70	• Weight neutral as monotherapy • Promotes less weight gain when combined with other agents • Negligible risk hypoglycemia • Improved CV outcomes in those overweight	• Contraindicated if CrCL/eGFR < 30 mL/min • Caution if CrCL/eGFR < 60 mL/min or hepatic failure • GI effects (minimize by taking with food and titrating dose slowly q2-4 weeks)
Insulin secretagogue: (sulfonylurea meglitinides)	$0.07-$1.00	• Newer sufonylureas (gliclazide, glimepiride) associated with less hypoglycemia than glyburide • Meglitinides: less hypoglycemia with missed meals and improved postprandial control	• Sulfonylureas: Weight gain especially glyburide • Meglitinides: Require TID to QID dosing • Repaglinide: Contraindicated with gemfibrozil
Insulin	See Appendix D	• No dose ceiling • Many types, flexible regimens	• Weight gain • Significant risk hypoglycemia
Alpha-glucosidase inhibitor e.g. acarbose	$0.83	• Negligible risk hypoglycemia • Improved postprandial control • Weight neutral	• Frequent GI side effects • Not recommended for initial therapy if severe hyperglycemia (A1C≥ 9.0%) • Usually combined with other oral antidiabetics • Modestly effective in the elderly
TZD (Insulin sensitizers) e.g. rosiglitazone, pioglitazone	$2-$3.50	• Durable monotherapy • Negligible risk hypoglycemia	• 6-12 weeks for maximal effect • Weight gain, edema, rare CHF, small increased risk of fractures[32]; question of increased risk of ischemic events[33] • Avoid in patients with heart failure or hepatic dysfunction • Not indicated for triple therapy in combination with metformin and a sulfonylurea • Not currently approved by Health Canada for combination with insulin (increased rates of edema and heart failure)
Combination formulations	$2-$3.25	See metformin, TZDs and sulfonylureas	
Incretin enhancer (DPP-4 inhibitor) e.g. sitagliptin, saxagliptin	$2.84-3.00	• Negligible risk hypoglycemia • Improved postprandial control • Weight neutral	• New agent (unknown long-term safety) • Not recommended in moderate to severe renal failure or severe hepatic failure
Incretin mimetic (GLP-1) e.g. liraglutide	$5.25-7.85	• Glucose dependent insulin secretion • Major hypoglycaemia uncommon • Improved postprandial control • Helps weight loss (average 3-5 kg over 6-12 months)	• New agent (unknown long-term safety) • Requires an injection • Nausea and diarrhea (very common > 1/10), declines with time • Minor hypoglycaemia (common when used with sulfonylureas) • Reports of pancreatitis (causality unknown) • Contraindicated in patients with personal or family history of medullary thyroid carcinoma or patients with Multiple Endocrine Neoplasia syndrome type 2 • Not recommended in moderate to severe renal failure, hepatic failure, inflammatory bowel disease, diabetic gastroparesis; or with concomitant insulin therapy (not approved by Health Canada)

If not at target: Add another drug from a different class; or add a bedtime basal insulin to other agent(s); or intensify insulin regimen

Timely adjustment to and/or addition of antidiabetic agents should be made to attain target A1C within 6-12 months

* Adapted from Canadian Diabetes Association Clinical Practice Guidelines Expert Committee; Pharmacological Management of Type 2 Diabetes. Can J Diabetes 2008;32 (Supp.1): S56

Appendix C: Antidiabetic Agents and Adjunctive Agents for Use in Type 2 DM

Class	Dosage	Cost
Biguanides		
metformin (Glucophage® ‡, generic†)	• 250 or 500 mg PO BID to max. 2.55 g/day (850 mg TID or 5 X 500 mg in divided doses)	$0.86/day (3x500 mg) G: $0.39/day (3x500 mg)
metformin extended-release (Glumetza®) Δ	• 1000 mg PO daily with evening meal, ↑ by 500 mg weekly to max 2000 mg/day	$1.73/day (1500 mg)
Insulin secretagogues – sulfonylureas		
gliclazide (Diamicron®, Diamicron® MR, generic)ϑ	• 80-160 mg PO BID • gliclazide MR: 30-120 mg daily with breakfast	$0.80/day (2x80 mg) G: $0.60/day (2x80 mg) gliclazide MR: $0.15/day (1x30 mg)
glimepiride (Amaryl™, generic) Δ	• 1-8 mg PO daily	$0.87/day (1x1 mg) G: $0.52/day (1x1 mg)
glyburide (Diabeta®‡, Euglucon®†, generic†)	• 5-10 mg PO daily or 2.5 mg BID	$0.25/day (1x5 mg) G: $0.07/day (1x5 mg)
chlorpropamide and tolbutamide are available, but rarely used		
Insulin secretagogues - meglitinides		
nateglinide (Starlix®) Δ	• 60-180 mg PO TID 1-30 min. before meals	$1.73/day (3x120 mg)
repaglinide (GlucoNorm®) Δ	• 0.5 mg PO TID to 4 mg QID 1-30 min. before meals	$0.99/day (3x2 mg)
Insulins		
See Appendix D		
Alpha-glucosidase inhibitor		
acarbose (Glucobay®) †	• 100 mg PO daily slowly titrating to 100 mg TID • taken at beginning of meals	$0.83/day (3x50 mg)
Insulin sensitizers (TZDs)		
pioglitazone (Actos®, generic)ϑ‡	• 15-45 mg PO daily	$3.37/ day (1x30 mg)
rosiglitazone (Avandia®)ϑ §	• 2-8 mg PO daily or 4 mg BID (max daily dose 4 mg when combined with sulfonylurea)	$2.31/day (1x4 mg)
Combination formulation		
rosiglitazone & metformin (Avandamet™)ϑ §	• 2 mg/500 mg PO BID with meals, max 8 mg/ day of rosi or 2500 mg/day of metformin	$2.48/day (2x2 mg/500 mg)
rosiglitazone & glimepiride (Avandaryl™) Δ §	• 4 mg/1mg or 4 mg/2 mg PO daily with meal, max 4 mg/ day rosi and 4 mg/day glimepiride	$3.18/day (1x4 mg/1 mg)
sitagliptin & metformin (Janumet™) Δ	• 50 mg/500 mg PO BID, max 100 mg sitagliptan 2000 mg metformin/day	$3.25/day (2 tablets of any strength)
DPP-4 inhibitor (incretin enhancer)		
sitagliptin (Januvia™) Δ	• 100 mg PO daily	$3.00/day (1x100 mg)
saxagliptin (Onglyza™) Δ	• 5 mg PO daily	$2.84/day (1x5 mg)
Incretin mimetic (GLP-1)		
liraglutide (Victoza®) Δ	• 0.6 mg subcut once daily x 1 week then 1.2 mg subcut once daily, max 1.8 mg once daily.	$ 5.25 (1x1.2 mg) plus $0.40 per needle

Dosage ranges based on expert opinion and the eCPS. Lower dosage range is usual starting dose.
Abbreviations: G = generics; min. = minutes; **MR** = modified release; **rosi** = rosiglitazone
PharmaCare coverage and prices as of December 2009 (subject to revision):
† = regular coverage, ‡ = partial coverage, ϑ = restricted coverage, special authority required, Δ = no coverage,
§ = in Canada, rosiglitazone containing products are indicated as last line oral anti-diabetic agents for patients with type 2 diabetes mellitus. Note new safety and prescribing restrictions: http://www.hc-sc.gc.ca/dhp-mps/alt_formats/pdf/medeff/advisories-avis/public/2010/avandia_6_pc-cp-eng.pdf. Also check Health Canada's MedEffect website for the latest advisories and warnings: www.medeffect.ca

Note: Physicians should refer to the most recent edition of *the Compendium of Pharmaceuticals and Specialties* for product monographs and detailed prescribing information.

References: e-CPS [Internet]. Ottawa (ON): Canadian Pharmacists Association; c2009 [cited 2009 Jun 19]. www.e-cps.ca.
Health Canada MedEffect Website. 2009. www.hc-sc.gc.ca/dhp-mps/medeff/index-eng.php

Appendix D: Insulin Therapeutic Considerations and Availability

Therapeutic Considerations

Type 1 diabetes:
Intensive treatment e.g. basal-bolus regimens (e.g. multiple daily injections or continuous subcutaneous insulin infusion) are the insulin regimen of choice.

1. **Basal insulin: insulin NPH** once or twice daily as first line in addition to bolus insulin. If severe hypoglycemia try **long-acting insulin analogues** (glargine once daily, detemir once daily or bid).
2. **Bolus insulin: either regular human insulin or rapid-acting insulin analogues** bid or tid with meals as first line.
   a. **regular human insulin** if cost is an issue.
   b. **rapid-acting insulin analogues** if:
      - flexibility needed (given just before or within 15 minutes of starting meal),
      - significant hypoglycemia with regular human insulin,
      - concern for hypoglycemia.

Type 2 diabetes:

- Potentially greatest A1C reduction and no maximal dose.
- Increased risk of weight gain (≈2-4 kg) relative to sulfonylureas and metformin.
- Associated with hypoglycemia (long-acting analogues <NPH; Rapid analogues <regular insulin).
- Beneficial effects on triglyceride and HDL cholesterol.
- Avoid insulin in patients on thiazolidinedione (increased heart failure, weight gain and edema). Stop therapy with thiazolidinedione before adding insulin.

1. **Basal insulin:** consider adding bedtime **insulin NPH** as first line to daytime oral antidiabetic.
   - Starting dose: 10 units basal insulin at qhs, increase by 1 unit/day until achieving FPG ≤ 5.5 mmol/L.
   - If severe hypoglycemia to insulin NPH try **long-acting insulin analogues**.
2. **Bolus insulin:** consider intensive insulin with **regular human insulin** if basal insulin regimen fails to attain glycemic targets.
   - If severe hypoglycemia to regular human insulin try **rapid-acting insulin analogue**.

Insulin type/action		Trade names	Approx. price per mL (=100 IU of insulin)
BOLUS	**Fast-acting** (clear): Onset 0.5-1 h. Peak 2-4 h. Duration 5-8 h.	• Humulin®-R (**insulin human**)† • Novolin®ge Toronto (**insulin human**)†	• Vial = $2.00 Cartr = $2.62 • Vial = $2.04 Cartr = $2.66
BOLUS	**Rapid-acting analogue** (clear): Onset 10-15 min. Peak 60-90 min. Duration 4-5 h.	• Apidra™ (**insulin glulisine**) ‡ • Humalog® (**insulin lispro**)‡ • NovoRapid® (**insulin aspart**)‡	• Vial = $2.37 DPen = $3.16 • Vial = $2.69 Cartr = $3.58 DPen = $3.58 • Vial = $2.77 Cartr = $3.70
BASAL	**Intermediate-acting** (cloudy): Onset 1-3 h. Peak 5-8 h. Duration up to 18 h.	• Humulin®-N (**insulin isophane**)† • Novolin®ge NPH (**insulin isophane**)†	• Vial = $2.00 Cartr = $2.62 DPen‡ = $3.36 • Vial = $2.04 Cartr = $2.67
BASAL	**Extended long-acting analogue** (clear): Onset 90 min. Duration 24 h	• Lantus® (**insulin glargine**)ᵒ • Levemir® (**insulin detemir**)ᐞ	• Vial = $5.79 Cartr = $5.79 DPen = $5.79 • Cartr = $7.32
PREMIX	**Premixed** (cloudy): A single vial contains a fixed ratio of insulin (% rapid- or fast-acting to % intermediate-acting insulin)	• Humalog® Mix25™ Mix 50™‡ • Humulin® (30/70)† • Novolin®ge (30/70, 40/60, 50/50)† • NovoMix™ 30‡	• Cartr = $ 3.58 DPen = $4.47 • Vial = $2.00 Cartr = $2.62 • Vial = $2.04 Cartr = $2.66-2.72 • Cartr = $3.46

Abbreviations: Approx. = approximate **Cartr** = Cartridge (for reusable pens); **DPen** = Disposable pens with cartridge
Cost of syringes (used with vials) and needles (used with pens) is approximately equal.
PharmaCare coverage and prices as of December 2009 (coverage subject to revision, manufacturer's price subject to wholesale and retail mark-up):
† = regular coverage; ‡ = partial coverage ᵒ= restricted coverage, special authority required; ᐞ= non benefit.

Appendix E: Treatment of Hypoglycemia

Severity	Definition	How to Treat
Mild	Autonomic symptoms present. Individual able to self-treat.	Oral ingestion of 15 g of carbohydrate, preferably as glucose or sucrose tablets or solution: • 15 g glucose as tablets • 3 teaspoons or 3 packets of sugar dissolved in water • 175 ml of juice or regular soft drink • 6 life savers • 1 tablespoon honey • A snack of 15 g carbohydrate and protein can be used to prevent repeat hypoglycemia if a meal is >1 hour away
Moderate	Autonomic & neuroglycopenic symptoms present. Individual able to self-treat.	

Severe	Individual requires assistance. Unconsciousness may occur. PG typically < 2.8 mmol/L.	• Conscious: Oral ingestion of 20g carbohydrate, preferably glucose tablets.
		• Unconscious:
		  • Seek emergency assistance
		  • In the home situation, support persons should be taught how to administer glucagon by injection
		  • 1 mg glucagon subcutaneously or intramuscularly

Patients on Acarbose		• Glucose (dextrose) or if unavailable honey or milk • Avoid sugar

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DIABETES PATIENT CARE FLOW SHEET

This Flow Sheet is based on the Guideline, *Diabetes Care*
Web site: http://www.bcguidelines.ca

Guidelines & Protocols Advisory Committee
BRITISH COLUMBIA MEDICAL ASSOCIATION

NAME OF PATIENT	SEX ☐ M ☐ F	DIABETES ☐ T1 ☐ T2	DATE OF BIRTH	AGE AT DIAGNOSIS

CARE OBJECTIVES

RISK FACTORS AND CO-MORBID CONDITIONS

☐ Obesity (Measure BMI and waist circumference annually)

HEIGHT (cm)

DATE	BMI	TARGET (kg/m²)
		Normal: 18.5-24.9 Overwt: 25-30 Obese: ≥30

DATE	WAIST CIRC.	Male (cm)
		Caucasian ≤ 94 Asian ≤ 90
		Female (cm) Caucasian ≤ 80 Asian ≤ 80

☐ Hypertension (Target: ≤130/80)
☐ Dyslipidemia
☐ CVD

☐ Renal (microalbuminuria)
• ACR (Target: M: <2.0; F: <2.8)
☐ Smoker
☐ Alcohol (assess/discuss)

SELF MANAGEMENT (Discuss with patient)

☐ Refer to diabetic team/educator
☐ Weight management
- diet/nutrition
- Exercise: 2.5 hrs wk

☐ Smoking cessation: *Quit Now*
Phone toll free in BC: 1 877 455-2233
☐ Glucose meter lab comparison
- within 20%

☐ Patient care plan and resource sheet

VISITS (3 TO 6 MONTHS)

DATE	BP	WEIGHT Lbs | Kg	RECENT A_1C	NOTES (E.G. HYPOGLYCEMIA, GOALS, CLINICAL STATUS)	DM MEDICATION NOTES
			TARGET: ≤7%		BASELINE (Note allergies, side effects & contraindications) *Consider low dose ASA and ACEI/ARB as indicated
					☐ NO CHANGE
					☐ NO CHANGE
					☐ NO CHANGE
					☐ NO CHANGE
					☐ NO CHANGE
					☐ NO CHANGE
					☐ NO CHANGE
					☐ NO CHANGE

REMINDERS: REVIEW BLOOD GLUCOSE RECORDS Target premeal 4-7 mmol/L; 2 h postmeal 5-10 mmo/L

LABORATORY ← ANNUALLY (OR AS INDICATED) → SCREEN FOR DIABETIC COMPLICATIONS

☐ **NEPHROPATHY** (yearly if high risk, q2y if mod. risk)

RENAL		
DATE	ACR	eGFR
TARGETS	M: < 2.0 F: < 2.8	> 60

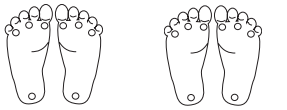
☐ **LIPIDS**

LIPIDS					UKPDS 10-YR RISK
DATE	TC	LDL	TC/HDL	ApoB	%
DESIRABLE		< 3.5	< 5.0	< 1.05	MOD 10-19%
		< 2.5	< 4.0	< 0.85	HIGH ≥ 20%

☐ **NEUROPATHY**

- Check feet for lesions & sensation (128 Hz tuning fork/10g monofilament)
- Check for pain, erectile dysfunction and GI symptoms

DATE DATE



VACCINATIONS

Annual Flu: DATE DATE

Pneumovax: DATE

☐ **RETINOPATHY**

Annual Eye Exam: DATE DATE

NAME OF OPTHALMOLOGIST/OPTOMETRIST

OTHER NOTES

Commonly overlooked conditions:
- cataracts
- carpal tunnel/tendon problems
- dental problems

BILLING CODE: 14050 DIAGNOSTIC CODE: 250 BILLING: DATE DATE

PATIENT EDUCATION AND RESOURCES

A Guide for Patients

What is Prediabetes?

Prediabetes refers to having blood sugar levels that are higher than normal, but not high enough to be considered diabetic. Pre-diabetes is also called impaired glucose tolerance or impaired fasting glucose. Pre-diabetes is treated by lowering high blood sugar levels through exercise and by following a healthy meal plan.

For support see the resources section!

I have type 2 Diabetes – what can I do?

Education: Diabetes education is an important first step. See the resources section and develop a monitoring plan with your care provider to help track your blood sugar, cholesterol, blood pressure etc.

Physical Activity: Regular physical activity helps your body lower blood sugar levels, promotes weight loss, reduces stress and enhances overall fitness.

Nutrition: What, when, and how much you eat all play an important role in regulating blood sugar levels (see Glycemic index section).

Blood Pressure: High blood pressure can lead to eye disease, heart disease, stroke and kidney disease, so people with diabetes should try to maintain a blood pressure level below 130/80. To do this, you may need to change your eating and physical activity habits and/or take medication.

Medication: Besides activity and healthy eating, your doctor may prescribe medications and/or insulin.

What is Hypoglycemia?

Hypoglycemia means that the sugar in your blood has dropped (to less than 4 mmol/L). It can be caused by:

- Doing more physical activity than normal
- Not eating on time or enough
- Taking too much of your diabetes medication
- Drinking alcohol

What are the symptoms of Hypoglycemia?

- Dizziness, shakiness
- Sweating
- Weakness, drowsiness
- Intense hunger
- Headache
- Looking pale
- Sudden moodiness or behaviour changes (e.g. crying for no reason)
- Confusion
- Faster heart rate
- Tingling or numbness on your tongue or lips

If you experience these symptoms, check your blood sugar levels right away. If you don't have your meter with you, play it safe and treat the symptoms anyway.

How do I treat hypoglycemia?

Eat or drink a fast-acting carbohydrate. The best choice is 15g of glucose or sucrose in the form of tablet or solution. If this is not available, try:

- 15ml (3 tsp) or 3 packets of table sugar dissolved in water
- 175ml (3/4 cup) of juice or regular soft drink
- 6 Life Savers® (1=2.5g of carbohydrate)
- 15ml (1 tbsp) of honey

Hypoglycemia happens to everyone with diabetes from time to time, even if you're doing all you can to manage your diabetes. But if you're having frequent episodes, it may mean your medication needs to be adjusted. Be sure to talk to your doctor and always wear your MedicAlert® identification.

Glycemic Index and Diabetes

The glycemic index (GI) is a system of grouping carbohydrate foods (carbs) based on how they affect your blood sugar levels. See the reference in this guide. Carbohydrates are the sugars and starches in the foods you eat. This is what your body uses for energy. Carbohydrates are found in grains and cereals, dried peas and beans, fruits and vegetables, milk and yogurt, as well as sugar and sugar-containing foods. Some carbohydrate foods are broken down and absorbed quickly while others are broken down and absorbed more slowly.

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What are the benefits of using low GI foods?

- Can help to 'even out' the highs and lows (more stable blood sugar)
- Can lower triglycerides & 'bad' cholesterol and may help your 'good' cholesterol
- May help you feel full for longer & eat less at the next meal or snack

Helpful Tips:
Introduce low GI foods gradually - include at least one low GI food at each meal and monitor their effects on your blood sugar level. A high GI food & a low GI food make an intermediate GI meal.

Eat a variety of foods each day - Do NOT exclude foods based only on the GI value. High GI foods are still good sources of energy. Monitor the amount of carbohydrates eaten at each meal and snack.

- Eating large amounts of low GI foods can still make blood glucose levels too high
- Checking your blood glucose before & after meals is the best way to see if you are eating the right amount of type of carbohydrate
- Aim to keep your blood glucose between 5 & 10 one to two hours after meals
- Choose foods from the low GI group more often.
- Monitor the amount of carbohydrates eaten at each meal and snack.

Low GI Menu Suggestions

See below for meal suggestion and the brief GI index reference guide.

Breakfast
- Use a low GI bread or cereal (see GI reference guide). Add some low fat milk or yogurt and fruit to kick start the day.
- Old fashioned oats with low fat milk and raisins.
- Poached egg on multigrain toast with a fresh orange.

Lunch Break
- Soups and sandwiches with a green salad or raw vegetables offer quick lunch solutions all year round.
- Sandwich made with a sprouted grain bread. Fill with tuna, salmon, lean meat or chicken; add lettuce, sprouts tomatoes &/or cucumber.
- Pumpernickel bagel topped with light cream cheese & smoked salmon.

Supper suggestions
- Base your meal on a low GI starch. Add plenty of vegetables & keep protein portions moderate
- Meatloaf made with rolled oats and grated vegetables (carrots & zucchini). Serve with new potatoes.
- Vegetable lasagna made with low fat cheese.

Snacktime!
To keep your energy up between meals, try the following nutritious snacks:
- Low fat milk & low GI cereal.
- Low fat yogurt and fresh fruit.
- Low fat milk & oatmeal cookies.
- Oat or oatbran muffins & fruit.
- Whole wheat pita and hummus.
- Stoned wheat thins or Ryvita™ with low fat cheese.

Resources:

See www.HealthLinkBC.ca or the handbook that was delivered to households throughout the province or call 8-1-1 (for TTY call 7-1-1). Visit the **Canadian Diabetes Association** at www.diabetes.ca or call toll free 1 800 226-8464 for further information. See Canada's Food Guide for healthy eating tips, available in multiple languages.

See www.ActNowBC.ca and Canada's Physical Activity Guide for tips on healthy eating and lifestyle. For assistance to quit smoking, see www.quitnow.ca or call 1 877 455-2233 (toll free in BC) to obtain self help materials.

Your family doctor may refer you to a local **Diabetes Education Clinic**. These clinics have courses and information to help you manage your diabetes. In addition to your family physician, in some parts of the province there are a number of other professionals who may assist you in the management of diabetes (**A Diabetes Team**).

Members of your diabetes team may include: Nurse educators, Nutritionists &/or specialists (example eye &/or foot doctors), Community programs etc. Your doctor will provide a referral if necessary.

A brief Glycemic Index (GI) reference guide			
	Low GI Foods (55 or less) **These give a slow rise in blood glucose levels**	**Medium GI Foods (56-69)** **These give a medium rise in blood glucose levels**	**High GI Foods (70+)** **These give a quick rise in blood glucose levels**
Breads	• Mixed grain • Whole grain • 100% Stone ground (Dempsters™) • Pumpernickel • Sprouted grain** (Silver Hills™, Healthy Way™)	• Whole wheat • Pita • Rye	• White bread • White bagel • Kaiser roll
Cereals	• All Bran™ • Bran Buds with psllium™ • Large flake oats • Oat bran • Red River™	• Bran Buds™ • Bran Chex™ • Grapenuts™ • Life™ • Shredded wheat™ • Quick cooking oats • Cream of wheat	• Bran flakes • Corn Chex™ • Cornflakes • Cheerios™ • Rice Krispies™ • Rice Chex™ • Instant cream of wheat
Grains	• Parboiled rice • Uncle Ben's converted rice™ • Barley • Bulgar (cracked wheat) • Buckwheat • Pasta/Noodles	• Basmati rice • Brown rice • Corn meal • Couscous • Wild rice	• White rice • Jasmine rice • Glutinous rice • Short grain rice • Instant rice
Starchy vegetables	• Sweet potatoes • Yams • Taro	• New potato • White potato • Sweet corn	• Baking, Russet, Idaho potatoes • Instant potatoes • French fries
Other	Legumes • Chick peas (garbanzo beans) • Chana dal • Kidney beans • Lentils • Soy beans • Split peas • Baked beans	• Black bean soup • Green pea soup • Arrowroot biscuits • Breton crackers • Oatmeal cookies • Social tea biscuits • Ryvita™ • Stoned wheat thins • Popcorn	• Vanilla wafers • Graham wafers • Rice cakes • Soda crackers • Pretzels

Adapted from: Practice-Based Learning Programs. *Diabetes Type 2: What's New?* Hamilton, Ontario: The Foundation for Medical Practice Education. 2009. Patient Handout, How to Handle Hypoglycemia, p18. www.fmpe.org; Vancouver General Hospital Diabetes Centre GI Index and Diabetes.