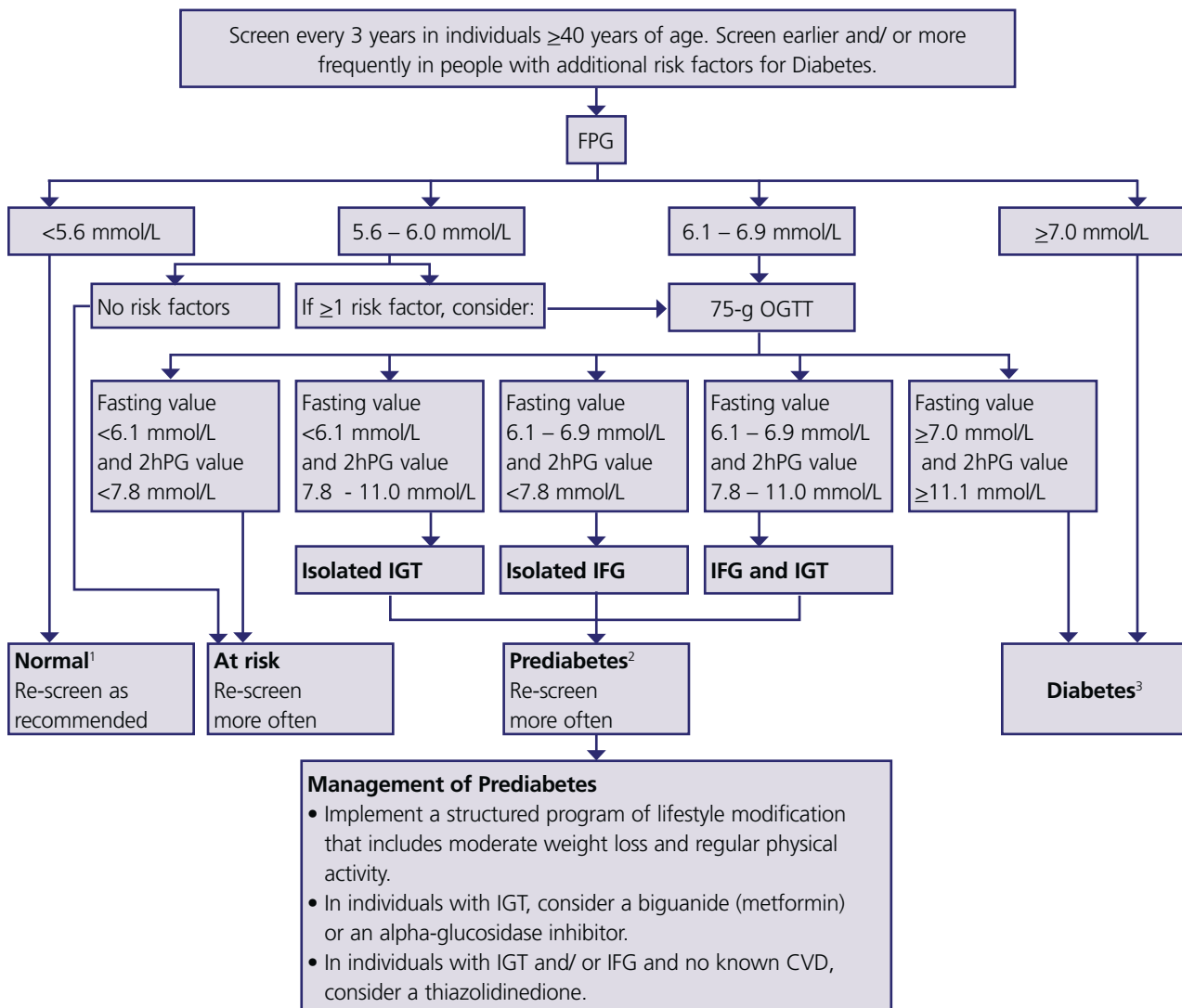




DIABETES MELLITUS

Source: Adapted from Canadian Diabetes Association Clinical Practice Guideline Expert Committee. Canadian Diabetes Association 2008 clinical practice guidelines for the prevention and management of Diabetes in Canada. Can J Diabetes 2008;32(supp 1):S1-S201.²⁹

DIAGNOSIS OF DIABETES



¹ If, despite a normal fasting value, an OGTT is subsequently performed and the 2hPG value is 7.8 – 11.0 mmol/L, a diagnosis of isolated IGT is made.

² Prediabetes: individuals with isolated IGT, isolated IFG, or both IGT and IFG are considered to have Prediabetes.

³ A confirmatory laboratory glucose test (either an FPG, a 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.

2hPG = 2 hour plasma glucose

CVD = cardiovascular disease

FPG = fasting plasma glucose

IFG = impaired fasting glucose

IGT = impaired glucose tolerance

OGTT = oral glucose tolerance test

PG = plasma glucose

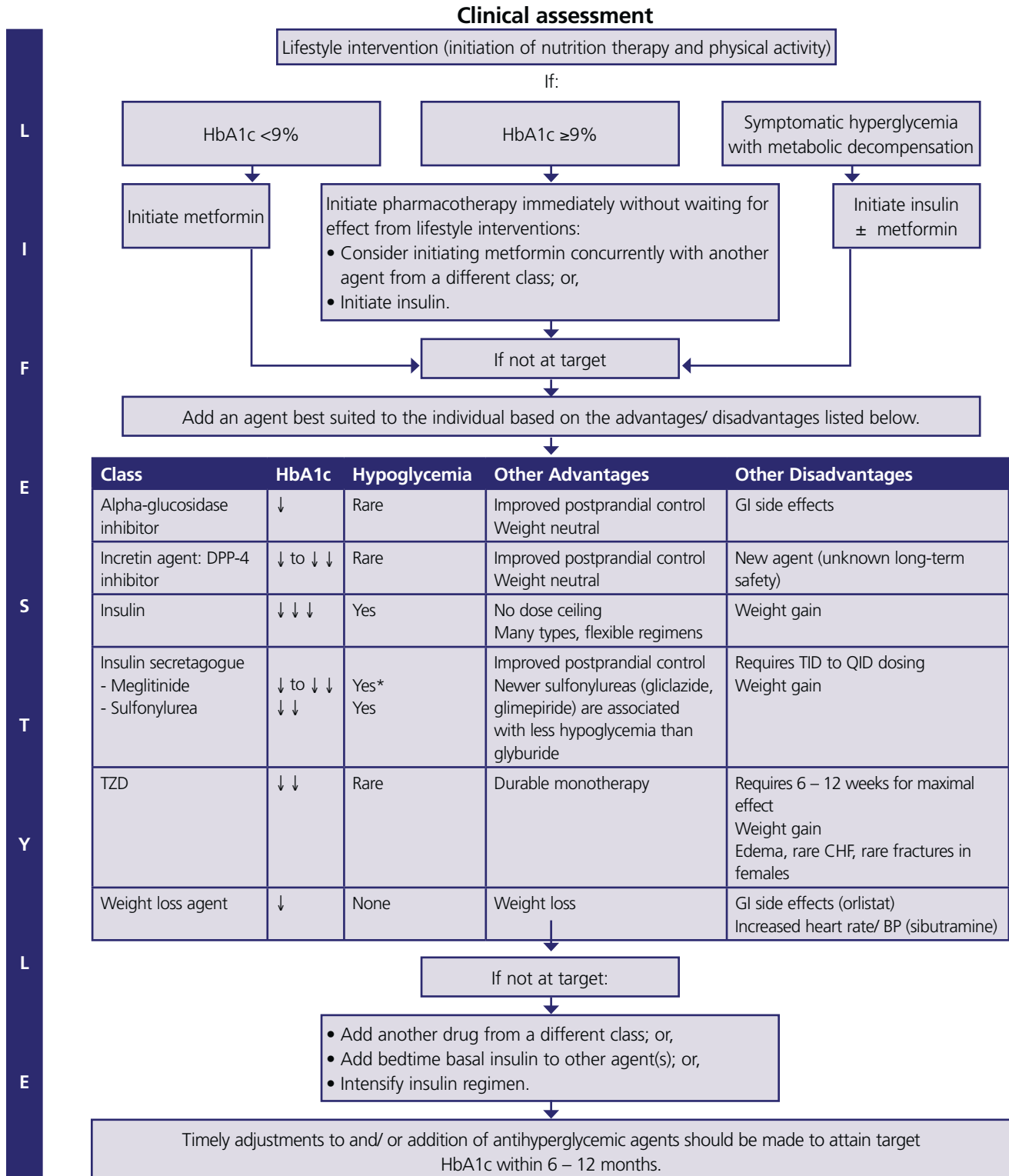


MANAGEMENT OF DIABETES

| RISK FACTOR | TARGET | PRACTICE RECOMMENDATIONS |
|---------------------------|---|---|
| Self-management education | All individuals referred to Diabetes education programs that are tailored to enhance self-care practices | <ul style="list-style-type: none"> Refer individuals with Diabetes to self-management, diabetic education programs at diagnosis and as required – see Community Resources (page 69). Refer all newly diagnosed diabetics to nutrition counselling by a registered dietitian. |
| Smoking | Smoke-free | <ul style="list-style-type: none"> See Smoking Cessation Guideline (page 29). Ask about tobacco use status at every visit. Advise every tobacco user to quit. Assess the tobacco user's willingness to quit. Assist by individual or group counselling and pharmacotherapy. Arrange follow up, referral to specialized programs or community programs. Urge avoidance of exposure to environmental tobacco smoke at work and home. |
| Physical Activity | 30 – 60 minutes moderate to vigorous intensity aerobic exercise, 5 – 7 days/ week; Resistance exercise 3 times/ week | <ul style="list-style-type: none"> Encourage brisk walking on most days of the week, supplemented by an increase in daily lifestyle activities. Identify problems/ barriers to starting and maintaining an exercise program and discuss possible solutions. Refer to suitable community program for initial instruction and periodic supervision. |
| Weight Management | BMI: 18.5 – 24.9 kg/m ² Waist circumference: Men <102 cm (40"); Women <88 cm (35") Start with targeting weight loss of 5 – 10% of body weight. | <ul style="list-style-type: none"> Assess BMI and/ or waist circumference (see Appendix B for instructions on proper waist line measurement). Discuss weight issues with patients who are outside of the BMI and waist circumference limits. Encourage weight maintenance or reduction through appropriate balance of physical activity, caloric intake. Refer to behavioural programs as necessary. See specific obesity/ overweight recommendations (page 43). |
| Hypertension | <130/80 mmHg | <ul style="list-style-type: none"> Assess BP every 3 to 6 months. Ensure patient knows his/ her BP values and targets. Initiate or maintain lifestyle modification (page 12). Add BP medication as needed to achieve targets (page 12). |
| Dyslipidemia | LDL-C <2 mmol/L or a 50% decrease in LDL-C; TC/ HDL-C ratio <4 | <ul style="list-style-type: none"> Assess fasting lipid profile in all patients every 1 to 3 years as indicated. Ensure patient knows his/ her lipid values and targets. If required, initiate LDL-lowering drug therapy (page 21). Ensure adequate titration to achieve targets. Start recommended dietary therapy (page 21). Promote daily physical activity and weight management. After obtaining required target, recheck annually. |
| Glycemic Control | HbA1c ≤7.0% Consider targeting HbA1c ≤6.5% to lower risk of nephropathy (if possible without hypoglycemia) | <ul style="list-style-type: none"> To achieve target, aim for: <ul style="list-style-type: none"> BG = 4.0 – 7.0 mmol/L before meals; and, BG = 5.0 – 10.0 mmol/L after meals (5.0 – 8.0 mmol/L if not meeting HbA1c target). Glycemic control assessed every 3 – 6 months or as clinically indicated. Consider using medical directives to maximize RN/ RD scope of practice. Initiate pharmacotherapy (page 68): <ul style="list-style-type: none"> Concomitantly with lifestyle management if patient has marked hyperglycemia (HbA1c >9%); and, Within 2 – 3 months if glycemic targets not achieved with lifestyle management, adjust pharmacotherapy to attain HbA1c within 6 – 12 months. |
| Nephropathy | ACR: Men: <2.0 mg/mmol Women: <2.8 mg/mmol eGFR: >60 ml/min/1.73 m ² | <ul style="list-style-type: none"> Screen at diagnosis and annually with ACR and eGFR; repeat if targets exceeded. If persistent albuminuria (ACR >2.0 mg/mmol in males, >2.8 mg/mmol in females), prescribe ACE inhibitor or ARB to delay progression, even in the absence of hypertension. Monitor ACR and eGFR at least every 6 months. Refer to Chronic Kidney Disease (CKD) recommendations (page 27). |
| Antiplatelet | ASA 81 – 325 mg daily in people with stable CVD | <ul style="list-style-type: none"> Prescribe low dose ASA therapy in individuals with stable CVD. Clopidogrel 75 mg may be considered if unable to tolerate ASA. The use of antiplatelet therapy for primary prevention of CVD in high risk individuals should be considered on an individual basis. |
| ACE Inhibitors/ ARB | In individuals considered at high risk for CVD | <ul style="list-style-type: none"> Individuals with Diabetes at high risk for CV events should receive an ACE inhibitor or ARB at doses that have demonstrated vascular protection. |
| Influenza Vaccinations | Annually | <ul style="list-style-type: none"> Prescribe influenza vaccination on an annual basis. Pneumococcal vaccination once in a lifetime. |
| Neuropathy | Screen using 10 g monofilament or 128-Hz tuning fork | <ul style="list-style-type: none"> Screen peripheral neuropathy by assessing loss of sensitivity to the 10 g monofilament or loss of sensitivity to vibration at the dorsum of the great toe. Intensify glycemic control to prevent the onset and progression of neuropathy. |
| Retinopathy | Eye Examination | <ul style="list-style-type: none"> Refer to expert professional for screening and evaluation for diabetic retinopathy at least every 1 – 2 years. Intensify glycemic, blood pressure, and lipid control if abnormal. |
| Foot Care | Foot Examination | <ul style="list-style-type: none"> Annually or more often if clinically indicated. Instruct all patients on proper foot care. |
| Referral | Specialty Clinic | <ul style="list-style-type: none"> Refer to specialty clinic when the management of the patient exceeds the comfort level of the family physician. |



MANAGEMENT OF HYPERGLYCEMIA IN TYPE 2 DIABETES



HbA1c = glycated hemoglobin
BP = blood pressure
CHF = congestive heart failure
* Less hypoglycemia in the context of missed meals

DPP-4 = dipeptidyl peptidase-4
GI = gastrointestinal
TZD = thiazolidinedione

↓ = <1.0% decrease in HbA1c
↓ ↓ = 1.0–2.0% decrease in HbA1c
↓ ↓ ↓ = >2.0% decrease in HbA1c



ANTIHYPERGLYCEMIC AGENTS FOR USE IN TYPE 2 DIABETES

| Class | Brand Name | Expected ↓ in HbA1c with Monotherapy | Hypoglycemia | Other Therapeutic Considerations |
|-----------------------------|--|---------------------------------------|---|---|
| Alpha-glucosidase inhibitor | Acarbose (Glucobay) | ↓ | Negligible risk as monotherapy | <ul style="list-style-type: none"> Not recommended as initial therapy in people with marked hyperglycemia (HbA1c ≥9). Often used in combination with other oral antihyperglycemic agents. Weight neutral as monotherapy. GI side effects. |
| Incretin agent | DPP-4 inhibitor Sitagliptin (Januvia) | ↓ to ↓↓ | Negligible risk as monotherapy | <ul style="list-style-type: none"> Weight neutral. Improved postprandial control. Newer agent with unknown long-term safety. |
| Insulin | Rapid-acting analogues: <ul style="list-style-type: none"> Aspart (NovoRapid) Glulisine (Apidra) Lispro (Humalog) Short-acting: <ul style="list-style-type: none"> Regular (Humulin-R, Novolin geToronto) Intermediate-acting: <ul style="list-style-type: none"> NPH (Humulin-N, Novolin ge NPH) Long-acting basal analogues: <ul style="list-style-type: none"> Detemir (Levemir) Glargine (Lantus) Premixed: <ul style="list-style-type: none"> Premixed Regular-NPH (Humulin 30/70) Novolin ge 30/70, 40/60, 50/50 Biphasic insulin aspart (NovoMix 30) Insulin lispro/ lispro protamine (Humalog Mix25, Mix50) | Depends on regimen, but up to ↓ ↓ ↓ ↓ | Significant risk | <ul style="list-style-type: none"> Potentially greatest HbA1c reduction and no maximal dose. Numerous formulations and delivery systems (including subcutaneous-injectable) allow for regimen flexibility. Hypoglycemia risk highest with regular and NPH insulin. When initiating insulin, consider adding bedtime intermediate-acting insulin or long-acting insulin analogue to daytime oral antihyperglycemic agents (although other regimens can be used). Intensive insulin therapy regimen recommended if above fails to attain glycemic targets. Increased risk of weight gain relative to sulfonylureas and metformin. |
| Insulin secretagogues | Sulfonylureas: <ol style="list-style-type: none"> Gliclazide (Diamicon, Diamicon MR, generic) Glimepiride (Amaryl) Glyburide (Diabeta, Euglucon, generic) • NB: chlorpropamide and tolbutamide are still available in Canada but rarely used Meglitinides: <ul style="list-style-type: none"> Nateglinide (Starlix) Repaglinide (GlucoNorm) | ↓ ↓ ↓ ↓ ↓ | <ol style="list-style-type: none"> Minimal/moderate risk Moderate risk Significant risk Minimal/moderate risk | <ul style="list-style-type: none"> Relatively rapid BG-lowering response. All insulin secretagogues reduce glycemia similarly (except nateglinide, which is less effective). Postprandial glycemia is especially reduced by nateglinide and repaglinide. Hypoglycemia and weight gain are especially common with glyburide. Consider using other class(es) of antihyperglycemic agents first in patients at high risk of hypoglycemia (e.g. the elderly, renal/hepatic failure). If a sulfonylurea must be used in such individuals, gliclazide is associated with the lowest incidence of hypoglycemia and glimepiride is associated with less hypoglycemia than glyburide. Nateglinide and repaglinide are associated with less hypoglycemia in the context of missed meals. |
| Metformin | Glucophage, Glumetza, generic | ↓ ↓ | Negligible risk as monotherapy | <ul style="list-style-type: none"> Improved cardiovascular outcomes in overweight subjects. Contraindicated if eGFR <30 ml/min or hepatic failure. Caution if eGFR <60 ml/min. Weight neutral as monotherapy, promotes less weight gain when combined with other antihyperglycemic agents, including insulin. GI side effects. |
| TZDs | Pioglitazone (Actos) Rosiglitazone (Avandia) | ↓ ↓ | Negligible risk as monotherapy | <ul style="list-style-type: none"> Longer duration of glycemic control with monotherapy compared to metformin or glyburide. Mild BP lowering. Between 6 and 12 weeks required to achieve full glycemic effect. Weight gain (waist-to-hip ratio not increased). May induce edema and/ or heart failure. Avoid in patients with heart failure. Higher rates of heart failure when combined with insulin. Rare occurrence of macular edema. Rare occurrence of fractures in females. |
| Weight loss agents | Orlistat (Xenical) Sibutramine (Meridia) | ↓ | None | <ul style="list-style-type: none"> Promotes weight loss. Glycemic benefit may be limited to those who actually lose weight. Orlistat can cause diarrhea and other GI side effects. Sibutramine can increase heart rate and BP. |
| Combined formulations | Avandamet (metformin + rosiglitazone) Avandaryl (glimepiride + rosiglitazone) | ↓ ↓ ↓ ↓ ↓ ↓ | Negligible risk as monotherapy Moderate risk | <ul style="list-style-type: none"> See metformin, TZDs, and sulfonylureas. |