

10.2 Diabetes Clinical Practice Guidelines*

This guideline is intended to assist the practitioner in clinical decision making and attempt to define clinical practices that apply to most patients in most circumstances. The treating practitioner should make the ultimate decision regarding the care of a particular patient.

SCREENING FOR DIABETES

Testing to detect pre-diabetes and type 2 diabetes should be considered in adults who have a BMI > 25 kg/m² and have one or more additional risk factors for diabetes. In those without risk factors, testing should begin at age 45. If tests are normal, repeat testing should be carried out at least every 3 years.

Criteria for Diagnosis of Diabetes

1. FPG >126 mg/dl (7.0 mmol/l). Fasting is defined as no caloric intake for at least 8h.*
OR
2. Symptoms of hyperglycemia and a casual plasma glucose >200 mg/dl (11.1 mmol/l). Casual is defined as any time of day without regard to time since last meal. The classic symptoms of hyperglycemia include polyuria, polydipsia, and unexplained weight loss.
OR
3. 2-h plasma glucose >200 mg/dl (11.1 mmol/l) during an OGTT. The test should be performed as described by the World Health Organization, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*

*In the absence of unequivocal hyperglycemia, these criteria should be confirmed by repeat testing on a different day.

PRE-DIABETES

Pre-diabetes is the state that occurs when a person's blood glucose levels are higher than normal but not high enough for a diagnosis of diabetes. Doctors sometimes refer to this state of elevated blood glucose levels as Impaired Glucose Tolerance or Impaired Fasting Glucose (IGT/IFG), depending on which test was used to detect it.

- IFG = Fasting Plasma Glucose (FPG) 100 mg/dl (5.6 mmol/l) to 125 mg/dl (6.9 mmol/l)
- IGT = 2-h plasma glucose 140 mg/dl (7.8 mmol/l) to 199 mg/dl (11.0 mmol/l)

The recently completed Diabetes Prevention Program study conclusively showed that people with pre-diabetes can prevent the development of type 2 diabetes by making changes in their diet and increasing their level of physical activity. Just 30 minutes a day of moderate physical activity, coupled with a 5-10% reduction in body weight, produced a 58% reduction in diabetes.

In addition to lifestyle counseling, metformin may be considered in those who are at very high risk (combined impaired fasting glucose [IFG] and impaired glucose tolerance [IGT] plus other risk factors) and who are obese and under 60 years of age.

OLDER POPULATION

Older individuals with diabetes have higher rates of premature death, functional disability, and coexisting illnesses such as hypertension, CHD, and stroke than those without diabetes. Older adults with diabetes are also at greater risk than other older adults for several common geriatric syndromes, such as polypharmacy, depression, cognitive impairment, urinary incontinence, injurious falls, and persistent pain. For patients with advanced diabetes complications, life limiting comorbid illness, or cognitive or functional impairment, it is reasonable to set less intensive glycemic target goals.

RECOMMENDATIONS FOR GLYCEMIC CONTROL 1

<i>Test</i>	<i>Goal</i>
A1c	<7.0%*
Preprandial capillary plasma glucose	70–130 mg/dl (3.9–7.2 mmol/l)
Peak postprandial capillary plasma glucose†	<180 mg/dl (<10.0 mmol/l)

*Referenced to a nondiabetic range of 4.0–6.0% using a DCCT-based assay.

†Postprandial glucose measurements should be made 1–2 h after the beginning of the meal, generally peak levels in patients with diabetes.

LIPID AND BLOOD PRESSURE GOALS **

Blood Pressure (mmHg)	Lipids (mg/dl)
Systolic <130	LDL-C <100 adults
Diastolic <80	HDL-C >40 in men and >50 in women
	Triglycerides <150

KEY TESTS AND EXAMS

<i>Test/Exam</i>	<i>Frequency</i>
Hemoglobin A1c (Glycated hemoglobin)	<ul style="list-style-type: none"> Quarterly if treatment changes or is not meeting goals. 2 times /year if stable.
Dilated eye exam	<p>Patients with type 1 diabetes should have an initial dilated and comprehensive eye examination by an ophthalmologist or optometrist within 3-5 years after the onset of diabetes.</p> <p>Patients with type 2 diabetes should have an initial dilated and comprehensive eye examination by an ophthalmologist or optometrist shortly after the diagnosis of diabetes.</p> <p>Annual comprehensive exam by an eye care professional thereafter for all diabetic patients.</p>
<i>Test/Exam</i>	<i>Frequency</i>
Foot exam	<p>All patients with diabetes should have an annual comprehensive foot examination to identify factors predictive of ulcers and amputations. The foot examination should include the use of a monofilament, tuning fork, palpation, and a visual examination.</p> <p>Provide general foot self-care education to all patients with diabetes.</p> <p>Provide a visual foot exam at each regular visit.</p>
Urinalysis: protein, glucose, ketones, sediment	Yearly in adults
Lipid profile ²	Yearly in adults, more often if needed to achieve goals.
Microalbuminuria ³	Perform an annual test for the presence of microalbuminuria in type 1 diabetic patients with diabetes duration of >5 years and in all type 2 diabetic patients, starting at diagnosis.
Serum Creatinine	Measure serum creatinine at least annually in all adult diabetics regardless of the degree of urine albumin excretion. The serum creatinine should be used to estimate GFR and stage the degree of Chronic Kidney Disease if present.
Blood pressure	Each regular diabetes visit.
Weight	Each regular diabetes visit.
Height	At least one time per year.

Aspirin Therapy (75-162mg/day)	<ul style="list-style-type: none"> Use aspirin therapy (75–162 mg/day) as a secondary prevention strategy in those with diabetes with a history of cardiovascular disease (CVD). Use aspirin therapy (75–162 mg/day) as a primary prevention strategy in those with type 1 or 2 diabetes at increased cardiovascular risk, including those who are < 40 years of age or who have additional risk factors (family history of CVD, hypertension, smoking, dyslipidemia, or albuminuria).
ACE Inhibitors (Angiotensin-Converting Enzyme) ARB (Angiotensin receptor blockers)	<p>In the treatment of both micro- and macroalbuminuria, either ACE inhibitors or ARBs should be used.</p> <ul style="list-style-type: none"> In patients with type 1 diabetes, with hypertension and any degree of albuminuria, ACE inhibitors have been shown to delay the progression of nephropathy. In patients with type 2 diabetes, hypertension, and microalbuminuria, ACE inhibitors and ARBs have been shown to delay the progression to macroalbuminuria. In patients with type 2 diabetes, hypertension, macroalbuminuria, and renal insufficiency (serum creatinine > 1.5 mg/dl), ARBs have been shown to delay the progression of nephropathy. If one class is not tolerated, the other should be substituted. If ACE inhibitors, ARB's or diuretics are used, monitor renal function and serum potassium levels.

NUTRITIONAL / TEACHING GOALS

Medical nutrition therapy as indicated.	Review treatment plan at each regular visit.
Balance food intake with drug therapy & exercise.	Influenza vaccine annually.
Maintain reasonable weight by monitoring calorie intake. Saturated fat intake should be <7% of total calories. Intake of trans fat should be minimized. Monitoring Carbohydrates remains a key strategy in achieving glycemia control.	At least one lifetime pneumococcal vaccine as recommended.
Diabetes self-care education as indicated. (<i>Refer to item 4 below</i>)	Advise all patients not to smoke.
Reduction of protein intake to 0.8-1.0- g/kg-body weight per day in individuals with diabetes and the earlier stages of chronic kidney disease (CKD). In later stages of CKD reducing intake to 0.8-g/kg-body weight per day is recommended and may improve measures of renal function.	150 min/week of moderate-intensity aerobic physical activity (50–70% of maximum heart rate) and/or at least 90 min/week of vigorous aerobic exercise (> 70% of maximum heart rate).

Key concepts in setting glycemic goals:***

- A1c is the primary target for glycemic control. Lowering A1C to an average of 7% has clearly been shown to reduce microvascular and neuropathic complications of diabetes and possibly macrovascular disease.
- Goals should be individualized. A1C goal for selected individual patients is as close to normal (<6%) as possible without significant hypoglycemia.
- Certain populations (children, pregnant women, and elderly) require special considerations.
- Less stringent A1C goals may be appropriate for patients with a history of severe hypoglycemia, patients with limited life expectancies, children, individuals with comorbid conditions, and those with longstanding diabetes and minimal or stable microvascular complications
- Postprandial glucose may be targeted if A1c goals are not met despite reaching preprandial glucose goals.

2. In adult with low-risk lipid values (LDL <100 mg/dl, HDL >50 mg/dl, triglycerides <150), repeat fasting lipid assessment every two years.

3. Screening for microalbuminuria can be performed by three methods:

- Measurement of the albumin to-creatinine ratio in a random, spot collection (preferred method)
- 24-h collection with creatinine, allowing the simultaneous measurement of creatinine clearance
- Timed (e.g, 4-h or overnight) collection

The analysis of a spot sample for the albumin-to-creatinine ratio is strongly encouraged. The other two alternatives are rarely necessary.

4. Perform annual reassessment of self-management skills. Assess need for knowledge and skills in the following areas:

- Diabetes disease process and progression
- Nutritional management
- Medications
- Monitoring of blood glucose and urine ketone levels
- Frequency of acute complications: Preventing, detecting, and treating
- Psychosocial adjustment
- Alcohol and tobacco use
- Dental, foot and skin care
- Importance of annual dilated retinal exam
- Physical activity and weight management
- Cognitive ability

***Referenced to a nondiabetic range of 4.0-6.0% using a DCCT-based assay.

**Values are for non-pregnant adults and children

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