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Ministry of Health

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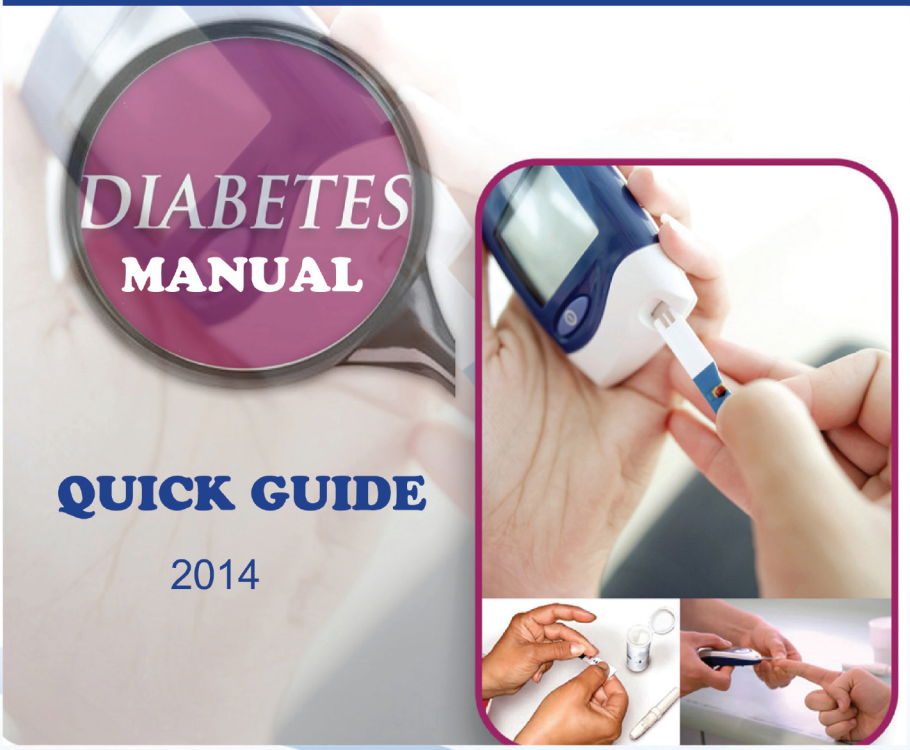
Ministry of Health

Saudi
National Reference of Clinical Guidelines
FOR CARE OF DIABETIC PATIENTS



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National Reference of clinical Guidelines
FOR CARE OF DIABETIC PATIENTS

QUICK GUIDE
2014

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I. Classification & Diagnosis of Diabetes Mellitus

The classification of diabetes includes four clinical classes:

- Type 1 diabetes (results from b-cell destruction, usually leading to absolute insulin deficiency)
- Type 2 diabetes (results from a progressive insulin secretory defect on the background of insulin resistance)
- Other specific types of diabetes due to other causes, e.g., genetic defects in b-cell function, genetic defects in insulin action, diseases of the exocrine pancreas (such as cystic fibrosis), and drug- or chemical-induced (such as in the treatment of HIV/AIDS or after organ transplantation)
- Gestational diabetes mellitus (GDM) (diabetes diagnosed during pregnancy that is not clearly overt diabetes)

Criteria for the diagnosis of diabetes:

- A1C ≥ 6.5%. The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.
  OR
- FPG ≥ 126 mg/dL (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h.*
  OR
- 2-h plasma glucose≥200mg/dL (11.1mmol/L) during an OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*
  OR
- In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L).

*In the absence of unequivocal hyperglycemia, result should be confirmed by repeat testing.

Categories of increased risk for diabetes (prediabetes)*

- FPG 100 mg/dL (5.6 mmol/L) to 125 mg/dL (6.9 mmol/L) (IFG)
  OR
- 2-h plasma glucose in the 75-g OGTT 140 mg/dL (7.8 mmol/L) to 199 mg/dL (11.0 mmol/L) (IGT)
  OR
- A1C 5.7–6.4%

*For all three tests, risk is continuous, extending below the lower limit of the range and becoming disproportionately greater at higher ends of the range.

II. Screening for Diabetes Mellitus

- Testing to detect type 2 diabetes and prediabetes in asymptomatic people should be considered in adults of any age who are overweight or obese (BMI ≥ 25 kg/m2) and who have one or more additional risk factors for diabetes such as
  - physical inactivity
  - first-degree relative with diabetes
  - high-risk race/ethnicity (e.g., Arab, African American, Latino, Native American, Asian American, Pacific Islander)
  - women who delivered a baby weighing > 9 lb or were diagnosed with GDM
  - hypertension (≥ 140/90 mmHg or on therapy for hypertension)
  - HDL cholesterol level < 35 mg/dL (0.90 mmol/L) and/or a triglyceride level >250 mg/dL (2.82 mmol/L)
  - women with polycystic ovary syndrome
  - A1C ≥ 5.7%, IGT, or IFG on previous testing
  - other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)
  - history of CVD

- In those without these risk factors, testing should begin at age 45.
- If tests are normal, repeat testing at least at 3-year intervals is reasonable with consideration of more frequent testing depending on initial results (e.g., those with prediabetes should be tested yearly)
- To test for diabetes or prediabetes, the A1C, FPG, or 75-g 2-h OGTT are appropriate.
- In those identified with prediabetes, identify and, if appropriate, treat other CVD risk factors.

III. Gestational Diabetes Mellitus – Diagnosis

- Screen for undiagnosed type 2 diabetes at the first prenatal visit in those with risk factors, using standard diagnostic criteria.
- In pregnant women not previously known to have diabetes, screen for GDM at 24–28 weeks of gestation, using a 75-g 2-h OGTT performed in the morning after an overnight fast of at least 8 h. The diagnosis of GDM is made when any of the following plasma glucose values are exceeded:
  - Fasting: ≥ 92 mg/dL (5.1 mmol/L)
  - 1 h: ≥ 180 mg/dL (10.0 mmol/L)
  - 2 h: ≥ 153 mg/dL (8.5 mmol/L)
- Screen women with GDM for persistent diabetes at 6–12 weeks postpartum, using the OGTT and nonpregnancy diagnostic criteria.
- Women with a history of GDM should have lifelong screening for the development of diabetes or prediabetes at least every 3 years.
- Women with a history of GDM found to have prediabetes should receive lifestyle interventions or metformin to prevent diabetes. (A)

IV. Prevention and delay of type 2 Diabetes Mellitus

- Patients with IGT, IFG, or an A1C of 5.7–6.4% should be referred to an effective ongoing support program targeting weight loss of 7% of body weight and increasing physical activity to at least 150 min/week of moderate activity such as walking.
- Follow-up counselling appears to be important for success
- Metformin therapy for prevention of type 2 diabetes may be considered in those with IGT, IFG, or an A1C of 5.7–6.4%, especially for those with BMI > 35 kg/m2, aged < 60 years, and women with prior GDM
- At least annual monitoring for the development of diabetes in those with prediabetes is suggested
- Screening for and treatment of modifiable risk factors for CVD is suggested

V. Management of Diabetes Mellitus

a. Self-monitoring of blood glucose (SMBG)

- Patients on multiple-dose insulin (MDI) or insulin pump therapy should do SMBG at least prior to meals and snacks, occasionally postprandially, at bedtime, prior to exercise, when they suspect low blood glucose, after treating low blood glucose until they are normoglycemic, and prior to critical tasks such as driving.
- When prescribed as part of a broader educational context, SMBG results may be helpful to guide treatment decisions and/or patient self-management for patients using less frequent insulin injections or noninsulin therapies.
- When prescribing SMBG, ensure that patients receive ongoing instruction and regular evaluation of SMBG technique and SMBG results, as well as their ability to use SMBG data to adjust therapy.
- Continuous glucose Monitoring CGM: may be a supplemental tool to SMBG in those with hypoglycaemia unawareness and/or frequent hypoglycaemic episodes. In conjunction with intensive insulin regimens, CGM can be a useful tool to lower A1C in selected adults (aged ≥ 25 years) with type 1 diabetes

b. A1C and Glycemic targets

- Glycaemic targets in most non-pregnant adults

A1C < 7%

- Preprandial capillary plasma glucose 70–130mg/dL (3.9–7.2mmol/L)
- Peak postprandial capillary plasma glucose < 180 mg/dL (<10.0 mmol/L) - postprandial glucose
- measurements should be made 1–2 h after the beginning of the meal

Perform the A1C test at least two times a year in patients who are meeting treatment goals (and who have stable glycemic control)

- Perform the A1C test quarterly in patients whose therapy has changed or who are not meeting glycemic goals

Lowering A1C to below or around 7% has been shown to reduce microvascular complications of diabetes and if implemented soon after the diagnosis of diabetes is associated with long-term reduction in macrovascular disease. Therefore, a reasonable A1C goal for many nonpregnant adults is < 7%

- Providers might reasonably suggest more stringent A1C goals (such as < 6.5%) for selected individual patients, if this can be achieved without significant hypoglycemia or other adverse effects of treatment. Appropriate patients might include those with short duration of diabetes, long life expectancy, and no significant CVD
- Less stringent A1C goals (such as < 8%) may be appropriate for patients with a history of severe hypoglycaemia or hypoglycaemia unawareness, limited life expectancy, advanced microvascular or macrovascular complications, extensive comorbid conditions, and those with long-standing diabetes in whom the general goal is difficult to attain despite Diabetes Self-Management Education, appropriate glucose monitoring, and effective doses of multiple glucose-lowering agents including insulin

I. Pharmacological management

Type 1 diabetes

- Most people with type 1 diabetes should be treated with MDI injections (three to four injections per day of basal and prandial insulin) or continuous subcutaneous insulin infusion (CSII)
- Most people with type 1 diabetes should be educated in how to match prandial insulin dose to carbohydrate intake, premeal blood glucose, and anticipated activity
- Insulin analogs can be used in patients with recurrent hypoglycaemia on human insulin
- Consider screening those with type 1 diabetes for other autoimmune diseases (thyroid, vitamin B12 deficiency, celiac) as appropriate

Type 2 diabetes

- Diet, exercise, and education remain the foundation of any type 2 diabetes treatment program
- Metformin, if not contraindicated and if tolerated, is the preferred initial pharmacological agent for type 2 diabetes
- After metformin, there are limited data to guide us. Combination therapy with an additional 1–2 oral or injectable agents is reasonable, aiming to minimize side effects where possible.

- In newly diagnosed type 2 diabetic patients with markedly symptomatic and/or elevated blood glucose levels or A1C, consider insulin therapy, with or without additional agents, from the outset

- If noninsulin monotherapy at maximal tolerated dose does not achieve or maintain the A1C target over 3–6 months, add a second oral agent, a glucagon-like peptide-1 (GLP-1) receptor agonist, DPP4 Inhibitors, S6LT Inhibitory or Insulin.

- A patient-centered approach should be used to guide choice of pharmacological agents. Considerations include efficacy, cost, potential side effects, effects on weight, comorbidities, hypoglycaemia risk, and patient preferences

- Due to the progressive nature of type 2 diabetes, insulin therapy is eventually indicated for many patients with type 2 diabetes

Class	Compounds	Cellular mechanism	Primary physological actions	Advantages	Disadvantages	Cost
bigunides	metformin	Activates AMP kinase	↓ Hepatic glucose production	-Extensive experience - No weight gain - No hypoglycemia - Likely ↓ CVD events (UKPDS)	- Castro intestinal side effects (diarrhea, abdominal cramping) -Lactic acidosis risk (rare) -Vitamin B12 deficiency -Multiple contraindications: CKD, acidosis, hypoxia, dehydration, etc	Low
sulfonylyreas	2nd generation - gelibenclamide - gliclazide -glimebiride -rebaglinide	Closes K atp channels on β-cell plasma members	↑ Insulin secretion	- Extensive experience - ↓ Microvascular risk (UKPDS)	-Hypoglycemia - Weight gain -? Blunts myocardial ischemic preconditioning -Low durability	Low
meglinides	Re paglinide	Closes k channels on β-cell plasma members	↑ Insulin secretion	- ↓ Postprandial glucose excursions -Dosing flexibility	- Hypoglycemia - Weight gain -? Blunts myocardial ischemic preconditioning -Frequent dosing scheduale	High
thiazolidinediones	pigliazone	Activates the nuclear transcription factor PPAR-	↑ Insulin sensitivity	- No hypoglycemia -Durability -↑ HDL-C -↓ Triglycerides(pigliazone) -? CVD events (ProACTIVE,) -pioglitazone	- weight gain -Edema/ heart failure -Bone fractures -↑ Bladder cancer (pigliazone)	High *
α-glucosidase G inhibitors	Acarbose	Inhibits intestinal glucosidase	Slows intestinal carbohydrate digestion/absorption	-No hypoglycemia -↓ postprandial glucose excursions -?↓ CVD events (STOP-NIDDM) -Nonsystemic	-Generally modest HbAa1c efficacy - Castro intestinal side effects (flatulence ,diarrhea) -Frequent dosing schedule	Moderate
DPP-4 inhibitors	sitaglibtin vil daglibtin saxaglibtin linaglibtin aloglibtin	Inhibitors DPP-4 activity, increasing postprandial active incretin (GIP-1, GIP) concentrations	-↑ Insulin secretion (glucose – dependent) -↓ Glucagon secretion (glucose – dependent)	-No hypoglycemia -Well tolerated	-Generally modest HbA efficacy -urticaria /ongioedemia -?pancreatitis	High

SGLT2-Inhibitors	-Canagliflozin** -Dapagliflozin**	Inhibition of glucose re-absorption in the proximal tubules of the kidneys	Induce urinary glucose excretion	-Insulin independent -Low risk of hypoglycemia -Weight loss -BP reduction	-Low risk -Modest risk Genital mycotic infection -Osmotic dieresis related AE	High
GLP-1 receptor agonists	- Exenatide exetended release - liraglutide	Activates GLP-1 receptors	-↑ Insulin secretion (glucose – dependent) -↓ Glucagon secretion (glucose – dependent) -Slows gastric emptying -↑ Safety	-No hypoglycemia -Weight reduction -? Potential for Improved β-cell mass/fraction -? Cardiovascular protective actions	- Castro intestinal side effects (nausea/ vomiting) -? Acute pancreatitis -C-cell hyperplasia/ medullary thyroid tumors in animals -Injectable -Training requirements	High
Insulin's	-Human NPH -Human Regular -Lispro -Aspart -Glulisine -Glargine -Detemir -Premixed (several types)	Activates insulin receptors	-↑ Glucose disposal -↓ Hepatic glucose production	-Universally effective -Theoretically unlimited efficacy -↓ Microvascular risk (UKPDS)	-Hypoglycemia - Weight gain -? Mitogenic effects -Injectable -Training requirements -"Stigma" (for patients)	Variable

a. Medical Nutrition Therapy (MNT)

- Individuals who have prediabetes or diabetes should receive individualized MNT as needed to achieve treatment goals, preferably provided by a skilled dietitian familiar with the components of diabetes MNT
- Weight loss is recommended for all overweight or obese individuals who have or are at risk for diabetes
- For weight loss, either low-carbohydrate, low-fat calorie-restricted, or Mediterranean diets may be effective in the short-term (up to 2 years)

For patients on low-carbohydrate diets, monitor lipid profiles, renal function, and protein intake (in those with nephropathy) and adjust hypoglycaemic therapy as needed

- Monitoring carbohydrate, whether by carbohydrate counting, choices, or experience-based estimation, remains a key strategy in achieving glycemic control
- Saturated fat intake should be < 7% of total calories
- Although numerous studies have attempted to identify the optimal mix of macronutrients for meal plans of people with diabetes, a recent systematic review
- confirms that there is no most effective mix that applies broadly, and that macronutrient proportions should be individualized
- It must be clearly recognized that regardless of the macronutrient mix, total caloric intake must be appropriate to weight management goal.
- Reducing intake of trans fat lowers LDL cholesterol and increases HDL cholesterol; therefore, intake of trans fat should be minimized
- Routine supplementation with antioxidants, such as vitamins E and C and carotene, is not advised because of lack of evidence of efficacy and concern related to long-term safety
- It is recommended that individualized meal planning include optimization of food choices to meet recommended dietary allowance (RDA)/dietary reference intake (DRI) for all macronutrients.

d. Diabetes Self-management Education (DSME) & Support DSMS

- People with diabetes should receive DSME and diabetes self-management support (DSMS) according to National Standards for Diabetes Self-Management Education and Support when their diabetes is diagnosed and as needed thereafter
- Effective self-management and quality of life are the key outcomes of DSME and DSMS and should be measured and monitored as part of care
- DSME and DSMS should address psychosocial issues, since emotional well-being is associated with positive diabetes outcomes
- DSME and DSMS programs are appropriate venues for people with prediabetes to receive education and support to develop and maintain behaviors that can prevent or delay the onset of diabetes

e. Bariatric surgery

- Bariatric surgery may be considered for adults with BMI ≥ 35 kg/m2 and type 2 diabetes, especially if the diabetes or associated comorbidities are difficult to control with lifestyle and pharmacological therapy
- Patients with type 2 diabetes who have undergone bariatric surgery need lifelong lifestyle support and medical monitoring
- Although small trials have shown glycemic benefit of bariatric surgery in patients with type 2 diabetes and BMI 30–35 kg/m2, there is currently insufficient evidence to generally recommend surgery in patients with BMI < 35 kg/m2 outside of a research protocol
- The long-term benefits, cost-effectiveness, and risks of bariatric surgery in individuals with type 2 diabetes should be studied in well-designed controlled trials with optimal medical and lifestyle therapy as the comparator.

f. Physical Activity

- Adults with diabetes should be advised to perform at least 150 min/week of moderate-intensity aerobic physical activity (50–70% of maximum heart rate), spread over at least 3 days/week with no more than two consecutive days without exercise
- In the absence of contraindications, adults with type 2 diabetes should be encouraged to perform resistance training at least twice per week
- In individuals taking insulin and/or insulin secretagogues, physical activity can cause hypoglycemia and added carbohydrate should be ingested if pre-exercise glucose levels are < 100 mg/dL (5.6 mmol/L)
- In type 1 diabetes mellitus, vigorous activity should be avoided in the presence of ketosis. However, it is not necessary to postpone exercise based simply on hyperglycemia, provided the patient feels well and urine and/or blood ketones are negative

g. Psychosocial care

- It is reasonable to include assessment of the patient's psychological and social situation as an ongoing part of the medical management of diabetes
- Psychosocial screening and follow-up may include, but is not limited to, attitudes about the illness, expectations for medical management and outcomes, affect/mood, general and diabetes- related quality of life, resources (financial, social, and emotional), and psychiatric history
- Screen for psychosocial problems such as depression and diabetes-related distress, anxiety, eating disorders, and cognitive impairment when self management is poor

h. Hypoglycaem ia

- Individuals at risk for hypoglycaemia should be asked about symptomatic and asymptomatic hypoglycemia at each encounter
- Glucose (15–20 g) is the preferred treatment for the conscious individual with hypoglycemia, although any form of carbohydrate that contains glucose may be used. If SMBG 15 min after treatment shows continued hypoglycemia, the treatment should be repeated. Once SMBG glucose returns to normal, the individual should consume a meal or snack to prevent recurrence of hypoglycemia
- Glucagon should be prescribed for all individuals at significant risk of severe hypoglycemia, and caregivers or family members of these individuals should be instructed on its administration. Glucagon administration is not limited to health care professionals
- Hypoglycemia unawareness or one or more episodes of severe hypoglycaemia should trigger re-evaluation of the treatment regimen
- Insulin-treated patients with hypoglycaemia unawareness or an episode of severe hypoglycemia should be advised to raise their glycemic targets to strictly avoid further hypoglycemia for at least several weeks, to partially reverse hypoglycaemia unawareness, and to reduce risk of future episodes
- Ongoing assessment of cognitive function is suggested with increased vigilance for hypoglycemia by the clinician, patient, and caregivers if low cognition and/or declining cognition is found

i. Immunization

- Annually provide an influenza vaccine to all diabetic patients ≥ 6 months of age
- Administer pneumococcal polysaccharide vaccine to all diabetic patients ≥ 2 years of age. A one-time revaccination is recommended for individuals > 64 years of age previously immunized when they were < 65 years of age if the vaccine was administered > 5 years ago. Other indications for repeat vaccination include nephrotic syndrome, chronic renal disease, and other immunocompromised states, such as after transplantation
- Administer hepatitis B vaccination to unvaccinated adults with diabetes who are aged > 19

VI. Diabetes Mellitus Complications – Prevention & Management

a. CVD

i. Blood Pressure Control

- Blood pressure should be measured at every routine visit. Patients found to have elevated blood pressure should have blood pressure confirmed on a separate day
- People with diabetes and hypertension should be treated to a systolic blood pressure goal of < 140 mmHg

- Lower systolic targets, such as < 130 mmHg, may be appropriate for certain individuals, such as younger patients, if it can be achieved without undue treatment burden
- Patients with diabetes should be treated to a diastolic blood pressure < 80 mmHg
- Patients with a blood pressure > 120/80 mmHg should be advised on lifestyle changes to reduce blood pressure
- Patients with confirmed blood pressure ≥ 140/80 mmHg should, in addition to lifestyle therapy, have prompt initiation and timely subsequent titration of pharmacological therapy to achieve blood pressure goals
- Lifestyle therapy for elevated blood pressure consists of weight loss, if overweight; Dietary Approaches to Stop Hypertension (DASH)-style dietary pattern including reducing sodium and increasing potassium intake; and increased physical activity
- Pharmacological therapy for patients with diabetes and hypertension should be with a regimen that includes either an ACE inhibitor or an angiotensin receptor blocker (ARB). If one class is not tolerated, the other should be substituted
- Multiple-drug therapy (two or more agents at maximal doses) is generally required to achieve blood pressure targets
- Administer one or more antihypertensive medications at bedtime
- If ACE inhibitors, ARBs, or diuretics are used, serum creatinine/estimated glomerular filtration rate (eGFR) and serum potassium levels should be monitored
- In pregnant patients with diabetes and chronic hypertension, blood pressure target goals of 110–129/65–79 mmHg are suggested in the interest of longterm maternal health and minimizing impaired fetal growth. ACE inhibitors and ARBs are contraindicated during pregnancy. We can use safely ALDOMET

ii. Dyslipidemia management

- In most adult patients with diabetes, measure fasting lipid profile at least annually
- In adults with low-risk lipid values (LDL cholesterol < 100 mg/dL, HDL cholesterol > 50 mg/dL, and triglycerides < 150 mg/dL), lipid assessments may be repeated every one year
- Lifestyle modification focusing on the reduction of saturated fat, trans fat, and cholesterol intake; increase of omega n-3 fatty acids, viscous fiber, and plant stanols/ sterols soya; weight loss (if indicated); and increased physical activity should be recommended to improve the lipid profile in patients with diabetes and to increase HDL
- Statin therapy should be added to lifestyle therapy, regardless of baseline lipid levels, for diabetic patients with overt CVD and those without CVD who are over the age of 40 years and have one or more other CVD risk factors (family history of CVD, hypertension, smoking, dyslipidemia, or albuminuria)
- For lower-risk patients than the above (e.g., without overt CVD and under the age of 40 years), statin therapy should be considered in addition to lifestyle therapy if LDL cholesterol remains above 100 mg/dL or in those with multiple CVD risk factors
- In individuals without overt CVD, the goal is LDL cholesterol < 100 mg/dL (2.6 mmol/L)
- In individuals with overt CVD, a lower LDL cholesterol goal of < 70 mg/dL (1.8 mmol/L), using a high dose of a statin, is an option
- If drug-treated patients do not reach the above targets on maximal tolerated statin therapy, a reduction in LDL cholesterol of ~ 30–40% from baseline is an alternative therapeutic goal
- Triglycerides levels < 150 mg/dL (1.7 mmol/L) and HDL cholesterol > 40 mg/dL (1.0 mmol/L) in men and > 50 mg/dL (1.3 mmol/L) in women are desirable. However, LDL cholesterol–targeted statin therapy remains the preferred strategy

- Combination therapy has been shown not to provide additional cardiovascular benefit above statin therapy alone and is not generally recommended
- Statin therapy is contraindicated in pregnancy

iii. Anti-platelet therapy

- Consider aspirin therapy (81 mg/day) as a primary prevention strategy in those with type 1 or type 2 diabetes at increased cardiovascular risk (10-year risk > 10%). This includes most men aged > 50 years or women aged > 60 years who have at least one additional major risk factor (family history of CVD, hypertension, smoking, dyslipidemia, or albuminuria)
- Aspirin should not be recommended for CVD prevention for adults with diabetes at low CVD risk (10-year CVD risk < 5%, such as in men aged < 50 years and women aged < 60 years with no major additional CVD risk factors), since the potential adverse effects from bleeding likely offset the potential benefits
- In patients in these age-groups with multiple other risk factors (e.g., 10- year risk 5–10%), clinical judgment is required
- Use aspirin therapy (81 mg/day) as a secondary prevention strategy in those with diabetes with a history of CVD
- For patients with CVD and documented aspirin allergy, clopidogrel (75 mg/day) should be used
- Combination therapy with aspirin (81 mg/day) and clopidogrel (75mg/day) is reasonable for up to a year after an acute coronary syndrome

iv. Smoking cessation

- Advise all patients not to smoke or use tobacco products like Hable Buble (Shesha)
- Include smoking cessation counselling and other forms of treatment as a routine component of diabetes care

v. CHD screening and treatment

- In asymptomatic patients, routine screening for CAD is not recommended, as it does not improve outcomes as long as CVD risk factors are treated
- In patients with known CVD, consider ACE inhibitor therapy and use aspirin and statin therapy (if not contraindicated) to reduce the risk of cardiovascular events. In patients with a prior MI, b-blockers should be continued for at least 2 years after the event
- Avoid thiazolidinedione treatment in patients with symptomatic heart failure
- Metformin may be used in patients with stable CHF if renal function is normal. It should be avoided in unstable or hospitalized patients with CHF or renal impairment

b. Nephropathy screening and treatment

- To reduce the risk or slow the progression of nephropathy, optimize glucose and blood pressure control
- Perform an annual test to assess urine albumin excretion in type 1 diabetic patients with diabetes duration of ≥ 5 years and in all type 2 diabetic patients starting at diagnosis
- Measure serum creatinine at least annually in all adults with diabetes regardless of the degree of urine albumin excretion. The serum creatinine should be used to estimate GFR and stage the level of chronic kidney disease (CKD), if present
- In the treatment of the nonpregnant patient with modestly elevated (30–299 mg/day "microalbuminuria") or higher levels (≥ 300 mg/day "macroalbuminuria") of urinary albumin excretion, either ACE inhibitors or ARBs are recommended
- Reduction of protein intake to 0.8–1.0 g/kg body wt per day in individuals with diabetes and the earlier stages of CKD and to 0.8 g/kg body wt per day in the later stages of CKD may improve measures of renal function (urine albumin excretion rate, GFR) and is recommended

- When ACE inhibitors, ARBs, or diuretics are used, monitor serum creatinine and potassium levels for the development of increased creatinine or changes in potassium
- Continued monitoring of urine albumin excretion to assess both response to therapy and progression of disease is reasonable
- When eGFR < 60 mL/min/1.73 m2, evaluate and manage potential complications of CKD
- Consider referral to a physician experienced in the care of kidney disease for uncertainty about the etiology of kidney disease (duration of type 1 diabetes < 10 years, heavy proteinuria, abnormal findings on renal ultrasound, resistant hypertension, rapid fall in GFR, or active urinary sediment on ultrasound), difficult management issues, or advanced kidney disease

c. Retinopathy screening and treatment

- To reduce the risk or slow the progression of retinopathy, optimize glycemic and blood pressure control
- Adults and children aged ≥ 10 years with type 1 diabetes should have an initial dilated and comprehensive eye examination by an ophthalmologist or optometrist within 5 years after the onset of diabetes
- 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
- Subsequent examinations for type 1 and type 2 diabetic patients should be repeated annually by an ophthalmologist or optometrist. Less frequent exams (every 2–3 years) may be considered following one or more normal eye exams. Examinations will be required more frequently if retinopathy is progressing
- High-quality fundus photographs can detect most clinically significant diabetic retinopathy. Interpretation of the images should be performed by a trained eye care provider. While retinal photography may serve as a screening tool for retinopathy, it is not a substitute for a comprehensive eye exam, which should be performed at least initially and at intervals thereafter as recommended by an eye care professional
- Women with pre-existing diabetes who are planning pregnancy or who have become pregnant should have a comprehensive eye examination and be counseled on the risk of development and/or progression of diabetic retinopathy. Eye examination should occur in the first trimester with close follow-up throughout pregnancy and for one year postpartum
- Promptly refer patients with any level of macular edema, severe NPDR, or any PDR to an ophthalmologist who is knowledgeable and experienced in the management and treatment of diabetic retinopathy
- Laser photocoagulation therapy is indicated to reduce the risk of vision loss in patients with high-risk PDR, clinically significant macular edema, and in some cases of severe NPDR
- Anti–vascular endothelial growth factor (VEGF) therapy is indicated for diabetic macular edema
- The presence of retinopathy is not a contraindication to aspirin therapy for cardioprotection, as this therapy does not increase the risk of retinal hemorrhage but it should be discussed with the ophthalmologist

d. Neuropathy screening and treatment

- All patients should be screened for distal symmetric polyneuropathy (DPN) starting at diagnosis of type 2 diabetes and 5 years after the diagnosis of type 1 diabetes and at least annually thereafter, using simple clinical tests
- Electrophysiological testing is rarely needed, except in situations where the clinical features are atypical
- Screening for signs and symptoms of cardiovascular autonomic neuropathy (CAN) should be instituted at diagnosis of type 2 diabetes and 5 years after the

diagnosis of type 1 diabetes. Special testing is rarely needed and may not affect management or outcomes

- Medications for the relief of specific symptoms related to painful DPN and autonomic neuropathy are recommended, as they improve the quality of life of the patient

e. Foot Care

- For all patients with diabetes, perform an annual comprehensive foot examination to identify risk factors predictive of ulcers and amputations. The foot examination should include inspection, assessment of foot pulses, and testing for loss of protective sensation (LOPS) (10-g monofilament plus testing any one of the following: vibration using 128-Hz tuning fork, pinprick sensation, ankle reflexes, or vibration perception threshold)
- Provide general foot self-care education to all patients with diabetes
- A multidisciplinary approach is recommended for individuals with foot ulcers and high-risk feet, especially those with a history of prior ulcer or amputation
- Refer patients who smoke, have LOPS and structural abnormalities, or have history of prior lower-extremity complications to foot care specialists for ongoing preventive care and lifelong surveillance
- Initial screening for peripheral arterial disease (PAD) should include a history for claudication and an assessment of the pedal pulses. Consider obtaining an ankle-brachial index (ABI), as many patients with PAD are asymptomatic
- Refer patients with significant claudication or a positive ABI for further vascular assessment and consider exercise, medications, and surgical options

VII. Assessment of Co-morbid conditions

For patients with risk factors, signs or symptoms, consider assessment and treatment for common diabetes-associated conditions such as:

a. Hearing impairment
b. Obstructive Sleep Apnea
c. Fatty liver disease
d. Low testosterone in men
e. Periodontal disease
f. Certain cancers
g. Fractures
h. Cognitive impairment
i. Depression

VIII. Specific populations

a. Adolescents (13-19 yrs)
    i. Target A1C < 7% is reasonable if it can be achieved without excessive hypoglycemia
b. Pre-conception care
    i. A1C levels should be as close to normal as possible (<7%) in an individual patient before conception is attempted
    ii. Starting at puberty, preconception counseling should be incorporated in the routine diabetes clinic visit for all women of childbearing potential
    iii. Women with diabetes who are contemplating pregnancy should be evaluated and, if indicated, treated for diabetic retinopathy, nephropathy, neuropathy, and CVD
    iv. Medications used by such women should be evaluated prior to conception, since drugs commonly used to treat diabetes and its complications may be contraindicated or not recommended in pregnancy, including statins, ACE inhibitors, ARBs, and most noninsulin therapies

v. Since many pregnancies are unplanned, consider the potential risks and benefits of medications that are contraindicated in pregnancy in all women of childbearing potential and counsel women using such medications accordingly

c. Older adults
   i. Older adults who are functional, cognitively intact, and have significant life expectancy should receive diabetes care with goals similar to those developed for younger adults
   ii. Glycemic goals for some older adults might reasonably be relaxed, using individual criteria, but hyperglycemia leading to symptoms or risk of acute hyperglycemic complications should be avoided in all patients
   iii. Other cardiovascular risk factors should be treated in older adults with consideration of the time frame of benefit and the individual patient. Treatment of hypertension is indicated in virtually all older adults, and lipid and aspirin therapy may benefit those with life expectancy at least equal to the time frame of primary or secondary prevention trials
   iv. Screening for diabetes complications should be individualized in older adults, but particular attention should be paid to complications that would lead to functional impairment.

IX. Strategies for improving diabetes care

a. Care should be aligned with components of the Chronic Care Model (CCM) to ensure productive interactions between a prepared proactive practice team and an informed activated patient
b. When feasible, care systems should support team-based care, community involvement, patient registries, and embedded decision support tools to meet patient needs
c. Treatment decisions should be timely and based on evidence-based guidelines that are tailored to individual patient preferences, prognosis, and comorbidities
d. A patient-centered communication style should be employed that incorporates patient preferences, assesses literacy and numeracy, and addresses cultural barriers to care
e. Use the social media to improve the diabetic care

Adapted from references:

Standards Of Medical Care In Diabetes 2013, Diabetes Care, Volume 36, Supplement 1, January 2013, S11-S66

Silvio E. Inzucchi, et al. Management of Hyperglycemia inType 2 Diabetes: A Patient- Centered Approach. Position Statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). Diabetes Care 2012, 35: 1364-79

What are Diabetes guidelines?

Diabetes guidelines aim to help health professionals and patients make the best decisions about treatment or care for a particular condition or situation. The guidelines are typically written in statement form by a reputable organization. The authors of guidelines review the research literature and take advice from experts to gather the current evidence on which to base the recommendations in a guideline. Doctors, nurses and other health care professionals are encouraged to follow Diabetes guidelines where appropriate.

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