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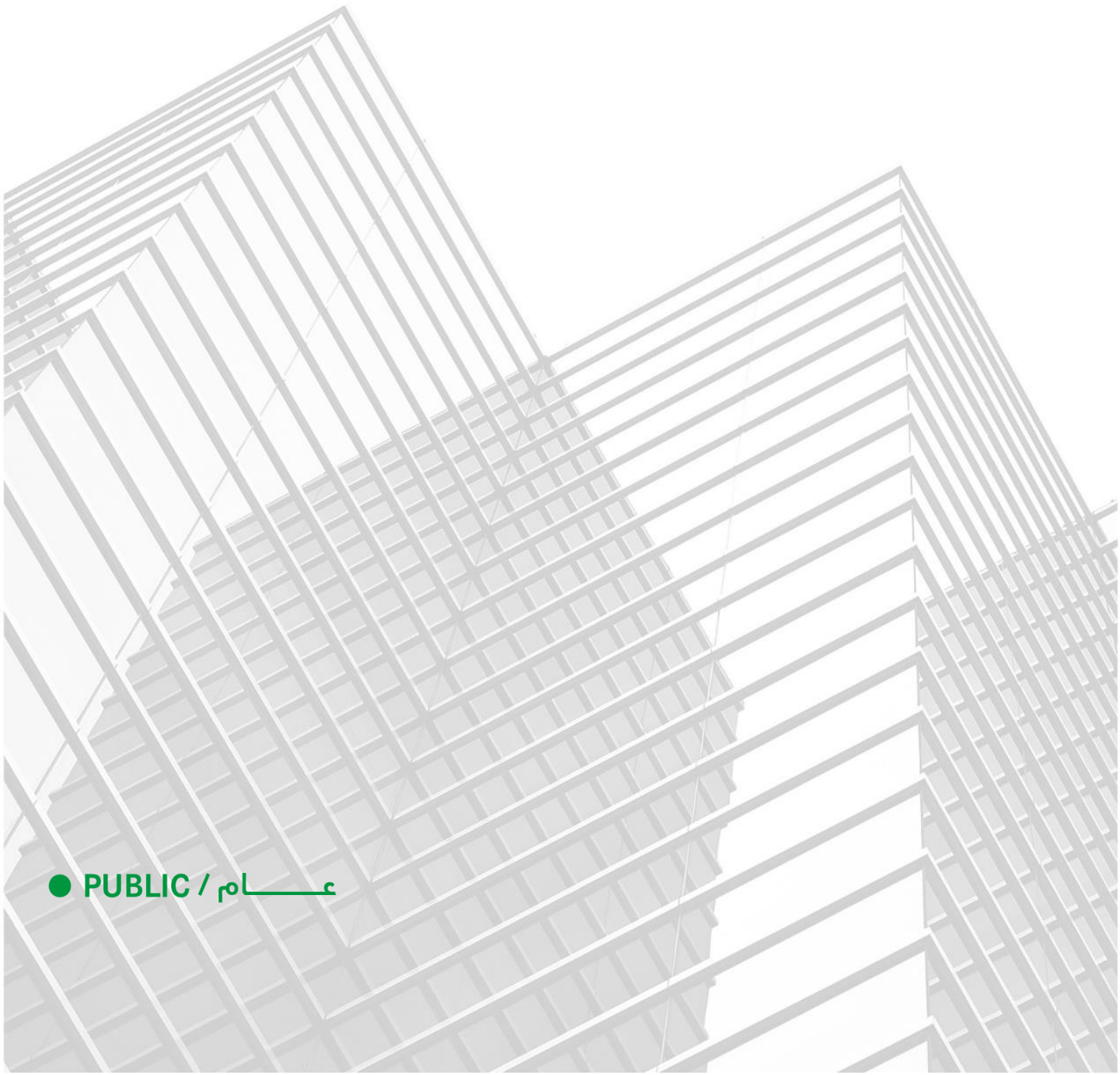
DEPARTMENT OF HEALTH

Standard for Diagnosis and Management of Diabetes Mellitus Type 1 and 2



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1.Standard Scope

The purpose of this standard is to set the requirements for prevention, screening, diagnosis and management of diabetes type 1 and 2. This standard should be read in alignment with the DoH standard for diagnosis, management and data reporting for diabetes.

2. Definitions and Abbreviations

No.	Term / Abbreviation	Definition
2.1	Type 1 DM	A metabolic disorder characterized by hyperglycemia due to absolute insulin deficiency. The condition develops due to destruction of pancreatic beta cells, mostly by immune-mediated mechanisms.
2.2	Type 2 DM	Progressive disorder defined by deficits in insulin secretion and increased insulin resistance that led to abnormal glucose metabolism and related metabolic derangements
2.3	Gestational Diabetes Mellitus GDM	Carbohydrate intolerance of varying severity which is diagnosed and may or may not resolve after pregnancy
2.4	Prediabetes	is the term used for individuals whose glucose levels do not meet the criteria for diabetes yet have abnormal glucose metabolism. People with prediabetes are defined by the presence of IFG and/or IGT and/or HbA1c 5.7–6.4% (39–47 mmol/mol).
2.5	T-Score	A T-score is the difference between bone mineral density and 0, which is the bone mineral density of a healthy young adult. The lower T-score, the higher risk of bone fracture.
2.6	CVD	Cardiovascular disease
2.7	IFG	Impaired fasting glucose
2.8	IGT	Impaired glucose tolerance
2.9	OGTT	Oral glucose tolerance test
2.10	FPG	Fasting plasma glucose
2.11	HbA1c	Hemoglobin A1C
2.12	CGM	Continuous Glucose Monitoring
2.13	NICE	The National Institute for Health and Care Excellence
2.14	CSII	Continuous subcutaneous insulin infusion

2.15	MNT	Medical Nutrition Therapy
2.16	T2DM	Type 2 Diabetes Mellitus
2.17	T1DM	Type 1 Diabetes Mellitus
2.18	TIR	Time In Range
2.19	MDI	Multiple Daily Injection
2.20	DASH	Dietary Approaches to Stop Hypertension
2.21	ASVD	Atherosclerotic Cardiovascular Disease
2.22	PAD	Peripheral Artery Disease
2.23	SGLT2	Sodium–Glucose Cotransporter 2
2.24	GLP-1	Glucagon-Like Peptide 1
2.25	ARBs	Angiotensin Receptor Blockers
2.26	MRAs	Mineralocorticoid Receptor Antagonists
2.27	UACR	Urinary Albumin-to-Creatinine Ratio
2.28	eGFR	Estimated Glomerular Filtration Rate
2.29	anti-VEGF	anti–Vascular Endothelial Growth Factor
2.30	AID	Automated Insulin Delivery
2.31	tTG	Tissue Transglutaminase Antibodies
2.32	ICU	Intensive Care Unit
2.33	POC	Point of Care
2.34	MODY	Maturity-onset Diabetes of the Young
2.35	DSMES	Diabetes Self-Management Education and Support
2.36	SDOH	Social Determinants of Health
2.37	DoH	Department of Health-Abu Dhabi

3.Standard Requirements and Specifications

Diabetes Mellitus is a complex, chronic condition requiring continuous medical care with multifactorial risk-reduction strategies beyond glucose management. Ongoing diabetes self-management education and support are critical to empowering people, preventing acute complications, and reducing risk of long-term complications.

Diabetes Mellitus can be classified into the following general categories:

- Type 1 Diabetes Mellitus T1DM (due to autoimmune beta-cell destruction, usually leading to absolute insulin deficiency, including latent autoimmune diabetes of adulthood)
- Type 2 Diabetes Mellitus T2DM (due to a non-autoimmune progressive loss of adequate B-cell insulin secretion frequently on the background of insulin resistance and metabolic syndrome)
- Specific types of diabetes due to other causes, e.g., monogenic diabetes syndromes (such as neonatal diabetes and maturity-onset diabetes of the young), diseases of the exocrine pancreas (such as cystic fibrosis and pancreatitis), and drug- or chemical-induced diabetes (such as with glucocorticoid use, anti-retro viral medication for the treatment of HIV/AIDS, or immunosuppressive drug used after organ transplantation)
- Gestational diabetes mellitus (diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt prior to gestation)

(please refer to table 1 for more details in Appendix 1)

3.1 Criteria for screening for diabetes or prediabetes in asymptomatic adults:

3.1.1 Screening for prediabetes and T2DM with an informal assessment of risk factors or validated risk calculator should be done in asymptomatic adults. (Please refer to table 2 in Appendix 1)

3.1.1 Testing for prediabetes and/ or T2DM in asymptomatic people should be considered in adults of any age with overweight or obesity (BMI ≥ 25 kg/m2 or ≥ 23 kg/m2) who have one or more risk factors (Please refer to table 2 in Appendix 1) [(1)].

3.1.2 For all people, screening should begin at the age of 18 years.

3.1.3 If tests are normal, repeat screening recommended at a minimum of 3-year intervals is reasonable; repeat screening may be conducted sooner with the onset of symptoms or a change in risk status (i.e., increase in BMI).

3.1.4 To screen for prediabetes and T2DM, fasting plasma glucose, 2-h plasma glucose during 75-g oral glucose tolerance test, and HbA1c are each appropriate and any of these tests would meet the criteria for the screening requirement [(1)]. (Please refer to table 2 and 4 in Appendix 1).

3.1.5 When using oral glucose tolerance testing as a screen for diabetes, adequate carbohydrate intake (at least 150 g/day) should be assured for 3 days prior to testing.

3.1.6 In people with prediabetes and T2DM, identify and treat cardiovascular disease risk factors [(1)].

3.1.7 People with HIV should be screened for diabetes and prediabetes with a fasting glucose test before starting antiretroviral therapy, at the time of switching antiretroviral therapy, and 3–6 months after starting or switching antiretroviral therapy. If initial screening results are normal, fasting glucose should be checked annually.

Pancreatic Diabetes or Diabetes in the Context of Disease of the Exocrine Pancreas:

3.1.8 Screen people for diabetes within 3–6 months following an episode of acute pancreatitis and annually thereafter. Screening for diabetes is recommended annually for people with chronic pancreatitis.

Cystic Fibrosis–Related Diabetes

3.1.9 Annual screening for cystic fibrosis–related diabetes (CFRD) with an OGTT should begin by age 10 years in all people with cystic fibrosis not previously diagnosed with CFRD.

3.1.10 HbA1C is not recommended as a screening test for CFRD due to low sensitivity. However, a value of ≥6.5% (≥48 mmol/mol) is consistent with a diagnosis of CFRD.

3.1.11 Beginning 5 years after the diagnosis of CFRD, annual monitoring for complications of diabetes is recommended.

Post transplantation Diabetes Mellitus

3.1.12 After organ transplantation, screening for hyperglycemia should be done. A formal diagnosis of post transplantation diabetes mellitus (PTDM) is best made once the individual is stable on an immunosuppressive plan and in the absence of an acute infection.

3.1.13 The OGTT is the preferred test to make a diagnosis of PTDM.

3.1.14 Immunosuppressive plans shown to provide the best outcomes for individuals and graft survival should be used, irrespective of PTDM risk.

Monogenic Diabetes Syndromes

3.1.15 Regardless of current age, all people diagnosed with diabetes in the first 6 months of life should have immediate genetic testing for neonatal diabetes.

3.1.16 Children and young adults who do not have typical characteristics of type 1 or T2DM and who often have a family history of diabetes in successive generations (suggestive of an autosomal dominant pattern of inheritance) should have genetic testing for maturity-onset diabetes of the young (MODY).

3.1.17 In both instances, consultation with a center specializing in diabetes genetics is recommended to understand the significance of genetic mutations and how best to approach further evaluation, treatment, and genetic counseling.

Gestational Diabetes Mellitus (GDM)

3.1.18 Before 15 weeks of gestation, test individuals with risk factors (Table 3.1) and consider testing all individuals.

3.1.19 Before 15 weeks of gestation, screen for abnormal glucose metabolism to identify individuals who are at higher risk of adverse pregnancy and neonatal outcomes, are more likely to need insulin, and are at high risk of a later gestational diabetes mellitus (GDM) diagnosis.

3.1.20 Screen for early abnormal glucose metabolism with dysglycemia using FPG of 100–125 mg/dL (5.6–6.9 mmol/L) or HbA1c 5.7–6.4% (41–47 mmol/mol) [(2)].

3.1.21 Screen (75-g OGTT) for GDM at 24–28 weeks of gestation in pregnant individuals not previously found to have diabetes or high-risk abnormal glucose metabolism detected earlier in the current pregnancy [(2)].

3.1.22 Screen individuals with GDM for prediabetes or diabetes at 4–12 weeks postpartum, using the 75-g OGTT and clinically appropriate nonpregnancy diagnostic criteria.

3.1.23 Individuals with a history of GDM should have lifelong screening for the development of prediabetes or diabetes at least every 3 years [(2)].

3.2 Risk-based screening for T2DM or prediabetes in asymptomatic children and adolescents.

Risk-based screening for prediabetes and/or T2DM should be considered after the onset of puberty or after 10 years of age, whichever occurs earlier, in children and adolescents with overweight (BMI ≥ 85th percentile) or obesity (BMI ≥ 95th percentile) and who have one or more risk factors for diabetes. (See Table 3 for evidence grading of risk factors.).

3.2.1 Maternal history of diabetes or GDM during the child's gestation
3.2.2 Family history of T2DM in first- or second-degree relative
3.2.3 Race/ethnicity (Asian, African, Native American, African American, Latino, Asian American, Pacific Islander)
3.2.4 Signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia, polycystic ovary syndrome, or small-for-gestational-age birth weight)

3.3 Diagnostic tests for Diabetes: (for CGM medical criteria please refer to appendix 2)

The American Diabetes Association (ADA) criteria for the diagnosis of diabetes are any of the following.

3.3.1 FPG ≥ 126 mg/dL (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h[3].* OR
3.3.2 2-h PG ≥ 200 mg/dL (11.1 mmol/L) during OGTT. The test should be performed as described by WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water[3]. * OR
3.3.3 HbA1C ≥ 6.5% (48 mmol/mol). The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay. * OR
3.3.4 In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥ 200 mg/dL (11.1 mmol/L)[3].

** In the absence of unequivocal hyperglycemia, diagnosis requires two abnormal test results from the same sample or in two separate test samples.*

3.4 Tests to differentiate T2DM and T1DM:

3.4.1 C-peptide:

Considering measuring C-peptide in the following circumstances:

3.4.1.1 In a child or adult: When there is difficulty distinguishing T1DM from other types.
3.4.1.2 In an adult: you suspect T1DM, but the presentation includes atypical features (e.g., age >50 years, BMI > 25 kg/m², slow evolution of hyperglycemia or long prodrome)[1].
3.4.1.3 In an adult: T1DM has been diagnosed and treatment started but you have a clinical suspicion that the person may have a monogenic form of diabetes, and C-peptide may guide the use of genetic testing.

If C-peptide testing is indicated, it has better discriminative value the longer the test is done after initial presentation (>3-5 years).

In clinical practice, C-peptide testing should only be done with paired glucose. In practical terms, this can be achieved by using C-peptide on a single non-fasting random blood or urine sample after the patient has eaten one of their own meals or after omitting long-acting insulin in the night before (aim for paired glucose >180mg/dl). Otherwise, C-peptide might be suppressed, making a false positive result more likely. This is a particular concern if the patient has been started on therapy that can cause

hypoglycemia (e.g., insulin).

C-peptide is a by-product formed when proinsulin is processed to insulin. Therefore, its levels reflect insulin production. The half-life of C-peptide is 3 to 4 times longer than that of insulin. Low or undetectable C-peptide level during hyperglycemia indicates deficiency of insulin secretion from pancreatic beta cells.

3.4.2 Autoimmune Markers:

These include autoantibodies to glutamic acid decarboxylase, insulin, islet cells, islet antigens (IA2 and IA2-beta), and the zinc transporter ZnT8.

considering measuring diabetes-specific autoantibody titers in an adult in the following circumstances.

3.4.2.1 You suspect T1DM, but the presentation includes atypical features (e.g., age >50 years, BMI > 25 kg/m², slow evolution of hyperglycaemia or long prodrome).

3.4.2.2 T1DM has been diagnosed and treatment started but you have a clinical suspicion that the person may have a monogenic form of diabetes, and C-peptide and/or autoantibody testing may guide the use of genetic testing [(1)].

3.4.2.3 Classification is uncertain and confirming T1DM would have implications for availability of therapy (for example, continuous subcutaneous insulin infusion [CSII or 'insulin pump'] therapy) [(1)].

If diabetes-specific autoantibody titers are indicated, they have their lowest false negative rate at the time of diagnosis; the false negative rate rises thereafter. Carrying out tests for two different diabetes-specific autoantibodies, with at least one being positive, reduces the false negative rate presence indicates autoimmune beta-cell destruction.

3.5 Comprehensive Medical evaluation and assessment of comorbidities:

3.5.1 A complete medical evaluation/examination should be performed at the initial visit to (Table 5):

3.5.1.1 Confirm the diagnosis and classify diabetes.

3.5.1.2 Evaluate diabetes complications, potential comorbid conditions, and overall health status.

3.5.1.3 Review previous treatment and risk factor management in people with established diabetes.

3.5.1.4 Begin engagement with the person with diabetes in the formulation of a care management plan including initial goals of care.

3.5.1.5 Develop a plan for continuing care.

3.5.2 A follow-up visit should include most components of the initial comprehensive medical evaluation.

3.5.3 Ongoing management should be guided by the assessment of overall health status, physical activity, diabetes complications, cardiovascular risk, hypoglycemia risk, and shared decision-making to set therapeutic goals.

Immunization

3.5.4 Provide routinely recommended vaccinations for children and adults with diabetes as indicated by age (see Table 6)

Autoimmune Diseases

3.5.5 People with T1DM should be screened for autoimmune thyroid disease soon after diagnosis and periodically thereafter.

3.5.6 Adults with T1DM should be screened for celiac disease in the presence of gastrointestinal symptoms, signs, laboratory manifestations, or clinical suspicion

suggestive of celiac disease.

Bone Health

3.5.7 Fracture risk should be assessed in older adults with diabetes as a part of routine care in diabetes clinical practice, according to risk factors and comorbidities.

3.5.8 Monitor bone mineral density using dual-energy X-ray absorptiometry of high-risk older adults with diabetes (aged >65 years) and younger individuals with diabetes and multiple risk factors every 2–3 years unless contraindicated [3].

3.5.9 Clinicians should consider the potential adverse impact on bone health when selecting pharmacological options to lower glucose levels in people with diabetes. Prioritizing medications with a proven safety profile for bones is recommended, particularly for those at elevated risk for fractures.

3.5.10 To reduce the risk of falls and fractures, glycemic management goals should be individualized for people with diabetes at a higher risk of fracture. Prioritize use of glucose-lowering medications that are associated with low risk for hypoglycemia to avoid falls.

3.5.11 Advise people with diabetes on their intake of calcium and vitamin D to ensure it meets the recommended daily allowance for those at risk for fracture, either through their diet or supplemental means.

3.5.12 Antiresorptive medications and osteoanabolic agents should be considered for people with diabetes who have low bone mineral density with a T-score ≤–2.0 or have experienced fragility fractures, unless contraindicated.

Cognitive Impairment/Dementia

3.5.13 In the presence of cognitive impairment, diabetes treatment plans should be simplified as much as possible and tailored to minimize the risk of hypoglycemia.

Disability

3.5.14 An assessment of disability should be performed at each visit for people with diabetes. If a disability is impacting functional ability or capacity to manage their diabetes, a referral should be made to an appropriate health care professional specializing in disability (e.g., physical medicine and rehabilitation specialist, physical therapist, occupational therapist, speech-language pathologist).

Low testosterone in men

3.5.15 In men with diabetes who have symptoms or signs of hypogonadism, such as decreased sexual desire (libido) or activity or erectile dysfunction, consider screening with a morning serum testosterone level.

Nonalcoholic Fatty Liver Disease and Nonalcoholic Steatohepatitis

3.5.16 Adults with T2DM or prediabetes, particularly those with obesity or cardiometabolic risk factors or established cardiovascular disease, should be screened/risk stratified for clinically significant liver fibrosis (defined as moderate fibrosis to cirrhosis) using a calculated fibrosis-4 index (FIB-4), even if they have normal liver enzymes.

3.5.17 Adults with diabetes or prediabetes with persistently elevated plasma aminotransferase levels for >6 months and low fibrosis (FIB)-4 should be evaluated for other causes of liver disease.

3.5.18 Adults with T2DM or prediabetes with an indeterminate or high FIB-4 should have additional risk stratification by liver stiffness measurement with transient elastography or the blood biomarker enhanced liver fibrosis (ELF).

3.5.19 Adults with T2DM or prediabetes with indeterminate results or at high risk for significant liver fibrosis (i.e., by FIB-4, liver stiffness measurement, or ELF) should be referred to a gastroenterologist or hepatologist for further workup. Interprofessional care is

recommended for long-term management.

3.5.20 Adults with T2DM and significantly elevated transaminases should have secondary causes excluded and should be referred to a gastroenterologist for further evaluation.

3.6 Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes:

Please refer to appendix 3 for Diabetes self-management education and support.

3.7 Management of Pre-Diabetes and Associated Comorbidities:

The goals of diabetes prevention are:

3.7.1 Delaying the onset of diabetes

3.7.2 Preserving beta cell function

3.7.3 Preventing or delaying microvascular and cardiovascular complications

3.7.4 Treatment of Pre-Diabetes

3.7.4.1 Patients with pre-diabetes should be provided with a comprehensive lifestyle modification programme that includes weight management, medical nutrition therapy (MNT), exercise and advice or therapy to help with smoking cessation.

3.7.4.2 The program should aim to achieve 5–10% weight loss through medical nutrition therapy and moderate-intensity physical activity (~30 min/day, ≥150 min/week) [4]. Allow 6 months on the program before using pharmacotherapy. Repeat testing every 6 months.

3.7.4.3 Drug therapy is helpful in preventing T2DM in high-risk patients for whom lifestyle modification failed or is not sustainable. For selected patients in whom lifestyle interventions failed to improve glycemic indices, the ADA recommends metformin for diabetes prevention or delay.

3.7.4.4 Metformin for the prevention of T2DM should be considered in adults at high risk of T2DM, especially those aged 25–59 years with BMI of 35 kg/m2 or higher, higher fasting plasma glucose (e.g., around 110 mg/dL [around 6 mmol/L] or higher), and higher HbA1c (e.g., around 6.0% [around 42 mmol/mol]), and in individuals with prior gestational diabetes mellitus[4].

Prevention of Vascular Disease and Mortality

3.7.4.5 Prediabetes is associated with heightened cardiovascular risk; therefore, screening for and treatment of modifiable risk factors for cardiovascular disease are recommended.

3.7.4.6 Statin therapy may increase the risk of T2DM in people at high risk of developing T2DM. In such individuals, glucose status should be monitored regularly, and diabetes prevention approaches reinforced. It is not recommended that statins be discontinued for this adverse effect.

3.7.4.7 In people with a history of stroke and evidence of insulin resistance and prediabetes, pioglitazone may be considered to lower the risk of stroke or myocardial infarction. However, this benefit needs to be balanced with the increased risk of weight gain, edema, and fractures. A Lower dose may mitigate the risk of adverse effects but may be less effective.

Person-Centered Care Goals

3.7.4.8 In adults with overweight or obese at high risk of T2DM, care goals should include weight loss and maintenance, minimizing the progression of hyperglycemia, and attention to cardiovascular risk.

3.7.4.9 Pharmacotherapy (e.g., for weight management, minimizing the progression of

hyperglycemia, and cardiovascular risk reduction) may be considered to support person-centered care goals.

3.7.4.10 More intensive preventive approaches should be considered in individuals who are at particularly high risk of progression to diabetes, including individuals with BMI ≥35 kg/m^2, those at higher glucose levels (e.g., fasting plasma glucose 110–125 mg/dL [6.1–6.9 mmol/L], 2–h post challenge glucose 173–199 mg/dL [9.6–11.0 mmol/L], and HbA1c ≥6.0% [≥42 mmol/mol]), and individuals with a history of gestational diabetes mellitus. [4]

3.8 Pharmacologic Therapy for Adults with T1DM

3.8.1 Treat all adults with T1DM with continuous subcutaneous insulin infusion or multiple daily doses of prandial and basal insulin.

3.8.2 For most adults with T1DM, insulin analogs are preferred over injectable human insulins to minimize hypoglycemia risk.

3.8.3 Early use of continuous glucose monitoring is recommended for adults with T1DM to improve glycemic outcomes and quality of life and minimize hypoglycemia.

3.8.4 Automated insulin delivery systems should be considered for all adults with T1DM.

3.8.5 To improve glycemic outcomes and quality of life and minimize hypoglycemia risk, most adults with T1DM should receive education on how to match mealtime insulin doses to carbohydrate intake (insulin carbohydrate ratio) and, additionally, to fat and protein intake. They should also be taught how to modify the insulin dose (correction dose) based on concurrent glycemia, glycemic trends (if available), sick-day management, and anticipated physical activity.

3.8.6 Glucagon should be prescribed for all individuals taking insulin or at high risk for hypoglycemia. Family, caregivers, school personnel, and others providing support to these individuals should know its location and be educated on how to administer it. Glucagon preparations that do not require reconstitution are preferred.

3.8.7 Insulin treatment plan and insulin-taking behavior should be reevaluated at regular intervals (e.g., every 3–6 months) and adjusted to incorporate specific factors that impact choice of treatment and ensure achievement of individualized glycemic goals.

3.9 Pharmacologic Therapy for Adults with T2DM

3.9.1 Healthy lifestyle behaviors, diabetes self-management education and support, avoidance of clinical inertia, and social determinants of health should be considered in the glucose-lowering management of T2DM. Pharmacologic therapy should be guided by person-centered treatment factors, including comorbidities and treatment goals.

3.9.2 In adults with T2DM and established/high risk of atherosclerotic cardiovascular disease, heart failure, and/or chronic kidney disease, the treatment regimen should include agents that reduce cardiorenal risk (Figure 1)

3.9.3 Pharmacologic approaches that provide adequate efficacy to achieve and maintain treatment goals should be considered, such as metformin or other agents, including combination therapy.

3.9.4 Weight management is an impactful component of glucose lowering management in T2DM.

3.9.5 In adults with T2DM, a glucagon-like peptide 1 receptor agonist is preferred to insulin when possible.

3.9.6 If insulin is used, combination therapy with a glucagon-like peptide 1 receptor agonist is recommended for greater efficacy, durability of treatment effect, and weight and hypoglycemia benefit.

3.9.7 Recommendation for treatment intensification for individuals not meeting treatment goals should not be delayed.

3.9.8 Medication regimen and medication-taking behavior should be reevaluated at regular intervals (every 3–6 months) and adjusted as needed to incorporate specific factors that impact choice of treatment [5].

3.10 Structured education program:

3.10.1 Structured education for diabetes self-management should be delivered by certified Diabetes Educators (i.e., nurse, dietician, or pharmacist); and in a manner appropriate to the age and needs of the patient. Diabetes educators must be well trained and competent to deliver the principles and content of such education. Structured education programs can be delivered in a group

format, if suitable. They equip the patient with the knowledge, skills, and ability necessary for diabetes self-management; and provide activities that sustain the lifestyle modifications needed to manage his/her condition on an ongoing basis. Such programs have been shown to improve HbA1c by 0.6%, with no adverse side effects (Appendix 3) [4,5].

3.11 Glycemic Goals and Hypoglycemia

Glycemic Assessment

3.11.1 Assess glycemic status by HbA1c and/or appropriate CGM metrics at least two times a year. Assess more frequently (e.g., every 3 months) for individuals not meeting treatment goals, with frequent or severe hypoglycemia or hyperglycemia, changing health status, or impaired growth and development in youth.

3.11.2 Assess glycemic status at least quarterly and as needed in individuals whose therapy has recently changed and/or who are not meeting glycemic goals.

3.11.3 Standardized, single-page glucose reports from CGM devices with visual cues, such as the ambulatory glucose profile, should be considered as a standard summary for all CGM devices.

3.11.4 Time in range (TIR) is associated with the risk of microvascular complications and can be used for assessment of glycemic status. Additionally, time below range, and time above range are useful parameters for evaluating the treatment plan.

Glycemic Goals

3.11.5 An HbA1c goal for many nonpregnant adults of <7% (<53 mmol/mol) without significant hypoglycemia is appropriate. [6]

3.11.6 If using an ambulatory glucose profile/glucose management indicator to assess glycemia, a parallel goal for many nonpregnant adults is Time in Range TIR >70% with time below range <4% and time <54 mg/dL (<3 mmol/L) <1%. For those with frailty or at high risk of hypoglycemia, a goal of >50% TIR with <1% time below range is recommended. [6]

3.11.7 Based on health care professional judgment and the preference of the person with diabetes, achievement of lower HbA1c levels than the goal of 7% (53 mmol/mol) may be acceptable and even beneficial if it can be achieved safely without significant hypoglycemia or other adverse effects of treatment [6].

3.11.8 Less stringent glycemic goals may be appropriate for individuals with limited life expectancy or where the harms of treatment are greater than the benefits.

3.11.9 Deintensify hypoglycemia-causing medications (insulin, sulfonylureas, or meglitinides), or switch to a medication class with lower hypoglycemia risk, for individuals who are at high risk for hypoglycemia, within individualized glycemic goals.

3.11.10 Deintensify diabetes medications for individuals for whom the harms and/or burdens of treatment may be greater than the benefits, within individualized glycemic goals.

3.11.11 Reassess glycemic goals based on the individualized criteria shown in Appendix 4.

3.11.12 Setting a glycemic goal during consultations is likely to improve patient outcomes.

Hypoglycemia:

3.11.13 The history of hypoglycemia should be reviewed at every clinical encounter for all individuals at risk for hypoglycemia and evaluated as indicated.

3.11.14 Clinicians should screen all individuals at risk for hypoglycemia for impaired hypoglycemia awareness.

3.11.15 Clinicians should consider an individual's risk for hypoglycemia **(Appendix 5)** when selecting diabetes medications and glycemic goals.

3.11.16 Use of CGM is beneficial and recommended for individuals at high risk for hypoglycemia. **(Appendix 2)**

3.11.17 Glucose is the preferred treatment for the conscious individual with glucose <70 mg/dL (<3.9 mmol/L), although any form of carbohydrate that contains glucose may be used. Fifteen minutes after initial treatment, repeat the treatment if hypoglycemia persists [6].

3.11.18 Glucagon should be prescribed for all individuals taking insulin or at high risk for hypoglycemia. Family, caregivers, school personnel, and others providing support to these individuals should

know its location and be educated on how to administer it. Glucagon preparations that do not have to be reconstituted are preferred.

3.11.19 All individuals taking insulin or at risk for hypoglycemia should receive structured education for hypoglycemia prevention and treatment, with ongoing education for those who experience hypoglycemic events.

3.11.20 One or more episodes of level 2 or 3 hypoglycemia should prompt reevaluation of the treatment plan, including deintensifying or switching diabetes medications if appropriate.

3.11.21 Refer individuals with impaired hypoglycemia awareness to a trained health care professional (endocrinologist) to receive evidence-based intervention to help reestablish awareness of symptoms of hypoglycemia.

3.11.22 Ongoing assessment of cognitive function is suggested with increased vigilance for hypoglycemia by the clinician, patient, and caregivers if impaired or declining cognition is found.

3.12 Diabetes Technology:

3.12.1 Diabetes devices should be offered to people with diabetes.

3.12.2 Initiation of CGM should be offered to people with T1DM early in the disease, even at time of diagnosis (Appendix 2).

3.12.3 Consider establishing competencies based on role in practice setting for health care professionals working with diabetes technology.

3.12.4 The type(s) and selection of devices should be individualized based on a person's specific needs, preferences, and skill level. In the setting of an individual whose diabetes is partially or wholly managed by someone else (e.g., a young child or a person with cognitive impairment or dexterity, psychosocial, and/or physical limitations), the caregiver's skills and preferences are integral to the decision-making process.

3.12.5 When prescribing a device, ensure that people with diabetes and caregivers receive initial and ongoing education and training, either in person or remotely, and ongoing evaluation of technique, results, and the ability to utilize data, including uploading/sharing data (if applicable), to monitor and adjust therapy.

Insulin Delivery: Insulin Pumps and Automated Insulin Delivery (AID) Systems

3.12.6 Insulin pump therapy alone with or without a sensor-augmented pump low-glucose suspend feature should be offered for diabetes management to youth and adults on MDI with T1DM who meet all the criteria below.

- 3.12.6.1 Intended for use by children and adults who have difficulty managing their blood glucose levels by self-monitoring and multiple daily insulin injections.
- 3.12.6.2 Patients who cannot easily identify hypoglycemic events, have a history of severe hypoglycemia, are susceptible to night-time hypoglycemia, or who fear daytime or night-time hypoglycemia.
- 3.12.6.3 Providers should receive a training certificate from the manufacturer in order to be eligible to dispense it.
- 3.12.6.4 All patients on insulin pump should be managed by an endocrinologist.

3.12.7 The choice of device should be made based on the individual's circumstances and needs.

3.13 Cardiovascular Disease and Risk Management

Hypertension Screening and Diagnosis:

3.13.1 Blood pressure should be measured at every routine clinical visit. When possible, individuals found to have elevated blood pressure (systolic blood pressure above 120–129 mmHg and diastolic ≥80 mmHg) should have blood pressure confirmed using multiple readings, including measurements on a separate day, to diagnose hypertension. Hypertension is defined as a systolic blood pressure ≥130 mmHg or a diastolic blood pressure ≥80 mmHg based on an average of two or more measurements obtained on two or more occasions. Individuals with blood pressure ≥180/110 mmHg and

cardiovascular disease could be diagnosed with hypertension at a single visit [7].

3.13.2 All people with hypertension and diabetes should be counseled to monitor their blood pressure at home after appropriate education.

Treatment Goals

3.13.3 For people with diabetes and hypertension, blood pressure targets should be individualized through a shared decision-making process that addresses cardiovascular risk, potential adverse effects of antihypertensive medications, and individual preferences.

3.13.4 The on-treatment target blood pressure goal is <130/80 mmHg if it can be safely attained.

3.13.5 In pregnant individuals with diabetes and chronic hypertension, a blood pressure threshold of 140/90 mmHg for initiation or titration of therapy is associated with better pregnancy outcomes than reserving treatment for severe hypertension, with no increase in risk of small-for-gestational-age birth weight. [7]

3.13.6 There are limited data on the optimal lower limit, but therapy should be de-intensified for blood pressure <90/60 mmHg. A blood pressure target of 110–135/85 mmHg is suggested in the interest of reducing the risk for accelerated maternal hypertension. [16]

Treatment Strategies: Lifestyle Intervention

3.13.7 For people with blood pressure >120/80 mmHg, lifestyle intervention consists of weight loss when indicated, a Dietary Approaches to Stop Hypertension (DASH)–style eating pattern including reducing sodium and increasing potassium intake, moderation of alcohol intake, smoking cessation, and increased physical activity. [7]

Pharmacologic Interventions

3.13.8 Individuals with confirmed office-based blood pressure ≥130/80 mmHg qualify for initiation and titration of pharmacologic therapy to achieve the recommended blood pressure goal of <130/80 mmHg. [3]

3.13.9 Individuals with confirmed office-based blood pressure ≥150/90 mmHg should, in addition to lifestyle therapy, have prompt initiation and timely titration of two drugs or a single-pill combination of drugs demonstrated to reduce cardiovascular events in people with diabetes [7] .

3.13.10 Treatment for hypertension should include drug classes demonstrated to reduce cardiovascular events in people with diabetes. ACE inhibitors or angiotensin receptor blockers (ARBs) are recommended first-line therapy for hypertension in people with diabetes and coronary artery disease or nephropathy.

3.13.11 Multiple-drug therapy is generally required to achieve blood pressure targets. However, combinations of ACE inhibitors and ARBs and combinations of ACE inhibitors or ARBs (including ARBs/neprilysin inhibitors) with direct renin inhibitors should not be used.

3.13.12 An ACE inhibitor or ARB, at the maximum tolerated dose indicated for blood pressure treatment, is the recommended first-line treatment for hypertension in people with diabetes and urinary albumin-to-creatinine ratio ≥300 mg/g creatinine or 30–299 mg/g creatinine. If one class is not tolerated, the other should be substituted [7].

3.13.13 For adults treated with an ACE inhibitor, ARB, mineralocorticoid receptor antagonist (MRA), or diuretic, serum creatinine/estimated glomerular filtration rate and serum potassium levels should be monitored within 7–14 days after initiation of therapy and at least annually.

Resistant Hypertension

3.13.14 Individuals with hypertension who are not meeting blood pressure targets on three classes of antihypertensive medications (including a diuretic) should be considered for MRA therapy. These patients should also be investigated for secondary causes of hypertension and referred to an endocrinologist if required.

Lipid management: lifestyle intervention

3.13.15 Lifestyle modification focusing on weight loss (if indicated); application of a Mediterranean or DASH eating pattern; reduction of saturated fat and trans-fat; increase of dietary n-3 fatty acids, viscous fiber, and plant stanol/sterol intake; and increased physical activity should be recommended to improve the lipid profile and reduce the risk of developing ASCVD in people

with diabetes.

3.13.16 Intensify lifestyle therapy and optimize glycemic control for people with diabetes with elevated triglyceride levels (≥150 mg/dL [≥1.7 mmol/L]) and/or low HDL cholesterol (<40 mg/dL [<1.0 mmol/L] for men and <50 mg/dL [<1.3 mmol/L] for women) [7].

Ongoing Therapy and Monitoring with Lipid Panel

3.13.17 In adults with prediabetes or diabetes not taking statins or other lipid-lowering therapy, it is reasonable to obtain a lipid profile at the time of diagnosis, at an initial medical evaluation, annually thereafter, or more frequently if indicated.

3.13.18 Obtain a lipid profile at initiation of statins or other lipid-lowering therapy, 4–12 weeks after initiation or a change in dose, and at least annually thereafter, as it may help to monitor the response to therapy and compliance [7].

3.13.19 In individuals on statin with known poor compliance, lipid level (at least an LDL) may be required every 3-6 months to demonstrate effectiveness of therapy and monitor compliance [7].

Statin Treatment: Primary Prevention

3.13.20 For people with diabetes aged 40–75 years with a low risk of ASCVD, use moderate-intensity statin therapy in addition to lifestyle therapy.

3.13.21 For people with diabetes aged 20–39 years with additional ASCVD risk factors, it may be reasonable to initiate statin therapy in addition to lifestyle therapy.

3.13.22 For people with diabetes aged 40–75 years at higher cardiovascular risk, including those with one or more ASCVD risk factors, it is recommended to use high-intensity statin therapy to reduce LDL cholesterol by ≥50% of baseline and to target an LDL cholesterol goal of <70 mg/dL (<1.8 mmol/L) [7].

3.13.23 For people with diabetes aged 40–75 years at higher cardiovascular risk, especially those with multiple ASCVD risk factors and an LDL cholesterol ≥70 mg/dL (≥1.8 mmol/L), it may be reasonable to add ezetimibe or a PCSK9 inhibitor to maximum tolerated statin therapy [7].

3.13.24 In adults with diabetes aged >75 years already on statin therapy, it is reasonable to continue statin treatment.

3.13.25 In adults with diabetes aged >75 years, it may be reasonable to initiate moderate-intensity statin therapy after a discussion of potential benefits and risks with the patient.

3.13.26 In people with diabetes who are intolerant to statin therapy, treatment with bempedoic acid is recommended to reduce cardiovascular event rates as an alternative cholesterol-lowering plan.

3.13.27 Statin therapy is contraindicated in pregnancy, except in patients with known familial hypercholesterolemia (DoH circular 2022), When a statin is needed in a pregnant patient, a more hydrophilic option (e.g., pravastatin, rosuvastatin) may be preferred.

3.13.28 Lipophilic statins (e.g., atorvastatin, fluvastatin, lovastatin, simvastatin, pitavastatin) may be more likely to cross the placenta and increase the risk of congenital malformations. Atorvastatin can be continued under the supervision of an appropriately trained endocrinologist.

Statin Treatment: Secondary Prevention

3.13.29 For people of all ages with diabetes and ASCVD, high-intensity statin therapy should be added to lifestyle therapy.

3.13.30 For people with diabetes and ASCVD, treatment with high-intensity statin therapy is recommended to target an LDL cholesterol reduction of ≥50% from baseline and an LDL cholesterol goal of <55 mg/dL (<1.4 mmol/L) [7]. Addition of ezetimibe or a PCSK9 inhibitor with proven benefit in this population is recommended if this goal is not achieved on maximum tolerated statin therapy.

3.13.31 For individuals who do not tolerate the intended statin intensity, the maximum tolerated statin dose should be used.

3.13.32 For people with diabetes and ASCVD intolerant to statin therapy, PCSK9 inhibitor therapy with monoclonal antibody treatment, bempedoic acid therapy, or PCSK9 inhibitor therapy with inclisiran siRNA should be considered as an alternative cholesterol-lowering therapy.

Treatment of Other Lipoprotein Fractions or disorder

3.13.33 For individuals with fasting triglyceride levels ≥500 mg/dL (≥5.7 mmol/L), evaluate for secondary causes of hypertriglyceridemia and consider medical therapy to reduce the risk of pancreatitis [7].

3.13.34 In adults with moderate hypertriglyceridemia (fasting or nonfasting triglycerides 175–499 mg/dL [2.0–5.6 mmol/L]), clinicians should address and treat lifestyle factors (obesity and metabolic syndrome), secondary factors (diabetes, chronic liver or kidney disease and/or nephrotic syndrome, and hypothyroidism), and medications that raise triglycerides [7].

3.13.35 In individuals with ASCVD or other cardiovascular risk factors on a statin with controlled LDL cholesterol but elevated triglycerides (135–499 mg/dL [1.5–5.6 mmol/L]), the addition of icosapent ethyl can be considered to reduce cardiovascular risk [7].

Other Combination Therapy

3.13.36 Statin plus fibrate combination therapy has not been shown to improve ASCVD outcomes and is generally not recommended.

3.13.37 Statin plus niacin combination therapy has not been shown to provide additional cardiovascular benefit above statin therapy alone, may increase the risk of stroke with additional side effects, and is generally not recommended.

Antiplatelet Agents

3.13.38 Use aspirin therapy (75–162 mg/day) as a secondary prevention strategy in those with diabetes and a history of ASCVD [7].

3.13.39 For individuals with ASCVD and documented aspirin allergy, clopidogrel (75 mg/day) should be used.

3.13.40 The length of treatment with dual antiplatelet therapy using low-dose aspirin and a P2Y12 inhibitor in individuals with diabetes after an acute coronary syndrome or acute ischemic stroke/transient ischemic attack should be determined by an interprofessional team approach that includes a cardiovascular or neurological specialist, respectively.

3.13.41 Combination therapy with aspirin plus low-dose rivaroxaban should be considered for individuals with stable coronary and/or peripheral artery disease (PAD) and low bleeding risk to prevent major adverse limb and cardiovascular events.

3.13.42 Aspirin therapy (75–162 mg/day) may be considered as a primary prevention strategy in those with diabetes who are at increased cardiovascular risk, after a comprehensive discussion with the individual on the benefits versus the comparable increased risk of bleeding [7].

Smoking Cessation

3.13.43 Routine questioning about smoking, frequency and type, with advice to stop smoking and referral to a smoking cessation service as necessary.

Cardiovascular Disease: Screening

3.13.44 In asymptomatic individuals, routine screening for coronary artery disease is not recommended, as it does not improve outcomes if ASCVD risk factors are treated.

3.13.45 Consider investigations for coronary artery disease in the presence of any of the following: chest pain or any atypical cardiac symptoms; signs or symptoms of associated vascular disease, including carotid bruits, transient ischemic attack, stroke, claudication, or PAD; or electrocardiogram abnormalities (e.g., Q waves).

3.13.46 Adults with diabetes are at increased risk for the development of asymptomatic cardiac structural or functional abnormalities (stage B heart failure) or symptomatic (stage C) heart failure. Consider screening adults with diabetes by measuring a natriuretic peptide (B-type natriuretic peptide [BNP] or N-terminal pro-BNP [NT-proBNP]) to facilitate prevention of stage C heart failure [7].

3.13.47 In asymptomatic individuals with diabetes and abnormal natriuretic peptide levels, echocardiography is recommended to identify stage B heart failure. A referral to cardiology should also be initiated.

3.13.48 In asymptomatic individuals with diabetes and age ≥50 years, microvascular disease in any location, foot complications or any end-organ damage from diabetes, screening for PAD with ankle-brachial index testing is recommended to guide treatment for cardiovascular disease prevention and limb preservation. In individuals with diabetes duration ≥10 years, screening for PAD should be considered.

Cardiovascular Disease: Treatment

3.13.49 Among people with T2DM who have established ASCVD or established kidney disease, or multiple ASCVD risk factors, a sodium–glucose cotransporter 2 (SGLT2) inhibitor or glucagon-like peptide

1 (GLP-1) receptor agonist (or both together) with demonstrated cardiovascular disease benefit is recommended as part of the comprehensive cardiovascular risk reduction and/or glucose-lowering treatment plans [7].

3.13.50 In people with T2DM and established ASCVD or multiple risk factors for ASCVD, combined therapy with an SGLT2 inhibitor with demonstrated cardiovascular benefit and a GLP-1 receptor agonist with demonstrated cardiovascular benefit may be considered for additive reduction of the risk of adverse cardiovascular and kidney events [7].

3.13.51 In people with T2DM and established heart failure with either preserved or reduced ejection fraction, an SGLT2 inhibitor (including SGLT1/2 inhibitor) with proven benefit in this patient population is recommended to reduce the risk of worsening heart failure and cardiovascular death and to improve symptoms, physical limitations, and quality of life.

3.13.52 For individuals with T2DM and chronic kidney disease with albuminuria treated with maximum tolerated doses of ACE inhibitor or ARB, addition of finerenone is recommended to improve cardiovascular outcomes and reduce the risk of chronic kidney disease progression.

3.13.53 In individuals with diabetes with established ASCVD or aged ≥55 years with additional cardiovascular risk factors, ACE inhibitor or ARB therapy is recommended to reduce the risk of cardiovascular events and mortality.

3.13.54 In individuals with diabetes and asymptomatic stage B heart failure, an interprofessional approach to optimize guideline-directed medical therapy, which should include a cardiovascular disease specialist, is recommended to reduce the risk for progression to symptomatic (stage C) heart failure.

3.13.55 In individuals with diabetes and asymptomatic stage B heart failure, ACE inhibitors/ARBs and β-blockers are recommended to reduce the risk for progression to symptomatic (stage C) heart failure.

3.13.56 In individuals with T2DM and asymptomatic stage B heart failure or with high risk of or established cardiovascular disease, treatment with an SGLT inhibitor (including SGLT2 or SGLT1/2 inhibitors) is recommended to reduce the risk of hospitalization for heart failure [5]

3.13.57 In individuals with T2DM and diabetic kidney disease, finerenone is recommended to reduce the risk of hospitalization for heart failure.

3.13.58 In individuals with diabetes, guideline-directed medical therapy for myocardial infarction and symptomatic stage C heart failure is recommended with ACE inhibitors/ARBs, MRAs, angiotensin receptor/neprilysin inhibitor, β-blockers, and SGLT2 inhibitors.

3.13.59 In people with T2DM with stable heart failure, metformin may be continued for glucose lowering if estimated glomerular filtration rate remains >30 mL/min/1.73 m2 but should be avoided in unstable or hospitalized individuals with heart failure [5].

3.13.60 Individuals with T2DM who are ketosis prone and/or those consuming ketogenic diets who are treated with SGLT inhibition should be educated on the risks and signs of ketoacidosis and methods of risk management and provided with appropriate tools for accurate ketone measurement (i.e., serum β-hydroxybutyrate).

Chronic Kidney Disease and Risk Management

Screening

3.13.61 At least annually, urinary albumin (e.g., spot urinary albumin-to-creatinine ratio [UACR]) and estimated glomerular filtration rate [eGFR] should be assessed in people with T1DM with duration of ≥5 years and in all people with T2DM regardless of treatment.

3.13.62 In people with established chronic kidney disease (CKD), urinary albumin (e.g., spot UACR) and eGFR should be monitored 1–4 times per year depending on the stage of the kidney disease (Appendix 5)

Treatment

3.13.63 Optimize glucose management to reduce the risk or slow the progression of CKD.

3.13.64 Optimize blood pressure control and reduce blood pressure variability to reduce the risk or slow the progression of CKD and reduce cardiovascular risk.

3.13.65 In nonpregnant people with diabetes and hypertension, either an ACE inhibitor or an angiotensin receptor blocker (ARB) is recommended for those with moderately increased albuminuria (UACR 30–299 mg/g creatinine) and is strongly recommended for those with severely increased

albuminuria (UACR ≥300 mg/g creatinine) and/or eGFR <60 mL/min/1.73 m2 to prevent the progression of kidney disease and reduce cardiovascular events [8].

3.13.66 Periodically monitor for increased serum creatinine and potassium levels when ACE inhibitors, ARBs, and mineralocorticoid receptor antagonists are used, or for hypokalemia when diuretics are used.

3.13.67 An ACE inhibitor or an ARB is not recommended for the primary prevention of CKD in people with diabetes who have normal blood pressure, normal UACR (<30 mg/g creatinine), and normal eGFR [8].

3.13.68 Do not discontinue renin-angiotensin system blockade for mild to moderate increases in serum creatinine (≤30%) in the absence of signs of extracellular fluid volume depletion.

3.13.69 For people with T2DM and CKD, use of a sodium–glucose cotransporter 2 (SGLT2) inhibitor is recommended to reduce CKD progression and cardiovascular events in individuals with eGFR ≥20 mL/min/1.73 m2 and urinary albumin ≥200 mg/g creatinine [8].

3.13.70 For people with T2DM and CKD, use of an SGLT2 inhibitor is recommended to reduce CKD progression and cardiovascular events in individuals with eGFR ≥20 mL/min/1.73 m2 and urinary albumin ranging from normal to 200 mg/g creatinine [8].

3.13.71 For cardiovascular risk reduction in people with T2DM and CKD, consider use of an SGLT2 inhibitor (if eGFR is ≥20 mL/min/1.73 m2), a glucagon-like peptide 1 agonist, or a nonsteroidal mineralocorticoid receptor antagonist (if eGFR is ≥25 mL/min/1.73 m2) [8].

3.13.72 As people with CKD and albuminuria are at increased risk for cardiovascular events and CKD progression, a nonsteroidal mineralocorticoid receptor antagonist that has been shown to be effective in clinical trials is recommended to reduce cardiovascular events and CKD progression (if eGFR is ≥25 mL/min/1.73 m2). Potassium levels should be monitored [8].

3.13.73 In people with CKD who have ≥300 mg/g urinary albumin, a reduction of 30% or greater in mg/g urinary albumin is recommended to slow CKD progression [8].

3.13.74 For people with non–dialysis-dependent stage G3 or higher CKD, dietary protein intake should be aimed to a target level of 0.8 g/kg body weight per day. (A) For individuals on dialysis, 1.0–1.2 g/kg/day of dietary protein intake should be considered since protein energy wasting is a major problem in some individuals on dialysis [8].

3.13.75 Individuals should be referred for evaluation by a nephrologist if they have continuously increased urinary albumin levels and/or continuously decreasing eGFR and/or if the eGFR is <30 mL/min/1.73 m2[8].

3.13.76 Promptly refer to a nephrologist for uncertainty about the etiology of kidney disease, difficult management issues, and rapidly progressing kidney disease.

Retinopathy, Neuropathy, and Foot Care

Diabetic Retinopathy

3.13.77 Implement strategies to help people with diabetes reach glycemic goals to reduce the risk or slow the progression of diabetic retinopathy.

3.13.78 Implement strategies to help people with diabetes reach blood pressure and lipid goals to reduce the risk or slow the progression of diabetic retinopathy.

Diabetic Retinopathy: Screening

3.13.79 Adults with T1DM should have an initial dilated and comprehensive eye examination by an ophthalmologist or optometrist within 5 years after the onset of diabetes ideally including appropriately graded (Primary and secondary grading) retinal photography.

3.13.80 People with T2DM should have an initial dilated and comprehensive eye examination by an ophthalmologist or optometrist at the time of the diabetes diagnosis ideally including appropriately graded (Primary and secondary grading) retinal photography.

3.13.81 If there is no evidence of retinopathy from one or more annual eye exams and glycemic indicators are within the goal range, then screening every 1–2 years may be considered. If any level of diabetic retinopathy is present, subsequent dilated retinal examinations should be repeated at least annually by an ophthalmologist or optometrist. If retinopathy is significant (R2 or more), or maculopathy is evident or retinopathy is progressing or sight-threatening, then examinations will be required more frequently.

3.13.82 Programs that use retinal photography with remote reading or the use of U.S. Food and Drug

Administration–approved artificial intelligence algorithms to improve access to diabetic retinopathy screening are appropriate screening strategies for diabetic retinopathy. Such programs need to provide pathways for timely referral for a comprehensive eye examination when indicated.

3.13.83 Counsel individuals of childbearing potential with preexisting T1DM or T2DM who are planning pregnancy or who are pregnant on the risk of development and/or progression of diabetic retinopathy.

3.13.84 Individuals with preexisting T1DM or T2DM should receive an eye exam before pregnancy and in the first trimester and should be monitored every trimester and for 1 year postpartum as indicated by the degree of retinopathy.

Diabetic Retinopathy: Treatment

3.13.85 Promptly refer individuals with any level of diabetic macular edema, moderate or worse non-proliferative diabetic retinopathy (a precursor of proliferative diabetic retinopathy [PDR]), or any PDR to an ophthalmologist who is knowledgeable and experienced in the management of diabetic retinopathy.

3.13.86 Pan retinal laser photocoagulation therapy is indicated to reduce the risk of vision loss in individuals with high-risk PDR and, in some cases, severe non-proliferative diabetic retinopathy.

3.13.87 Intravitreous injections of anti–vascular endothelial growth factor (anti-VEGF) is a reasonable alternative to traditional pan retinal laser photocoagulation for some individuals with PDR and also reduce the risk of vision loss in these individuals.

3.13.88 Intravitreous injections of anti–vascular endothelial growth factor is indicated as first-line treatment for most eyes with diabetic macular edema that involves the foveal center and impairs vision acuity.

3.13.89 Macular focal/grid photocoagulation and intravitreal injections of corticosteroid are reasonable treatments in eyes with persistent diabetic macular edema despite previous anti-VEGF therapy or eyes that are not candidates for this first-line approach.

3.13.90 The presence of retinopathy is not a contraindication to aspirin therapy for cardio protection, as aspirin does not increase the risk of retinal hemorrhage.

Visual Rehabilitation

3.13.91 People who experience vision loss from diabetes should be counseled on the availability and scope of vision rehabilitation care and provided, or referred for, a comprehensive evaluation of their visual impairment by a practitioner experienced in vision rehabilitation.

3.13.92 People with vision loss from diabetes should receive educational materials and resources for eye care support in addition to self-management education (e.g., glycemic management and hypoglycemia awareness).

Neuropathy: Screening

3.13.93 All people with diabetes should be assessed for diabetic peripheral neuropathy starting at diagnosis of T2DM and 5 years after the diagnosis of T1DM and at least annually thereafter.

3.13.94 Assessment for distal symmetric polyneuropathy should include a careful history and assessment of either temperature or pinprick sensation (small-fiber function) and vibration sensation using a 128-Hz tuning fork (for large-fiber function). All people with diabetes should have annual 10-g monofilament testing to identify feet at risk for ulceration and amputation.

3.13.95 Symptoms and signs of autonomic neuropathy should be assessed in people with diabetes starting at diagnosis of T2DM and 5 years after the diagnosis of T1DM, and at least annually thereafter, and with evidence of other microvascular complications, particularly kidney disease and diabetic peripheral neuropathy. Screening can include asking about orthostatic dizziness, syncope, or dry cracked skin in the extremities. Signs of autonomic neuropathy include orthostatic hypotension, a resting tachycardia, or evidence of peripheral dryness or cracking of skin.

Neuropathy: Treatment

3.13.96 Optimize glucose management to prevent or delay the development of neuropathy in people with T1DM and to slow the progression of neuropathy in people with T2DM. Optimize blood pressure and serum lipid control to reduce the risk or slow the progression of diabetic

neuropathy.

3.13.97 Assess and treat pain related to diabetic peripheral neuropathy B and symptoms of autonomic neuropathy to improve quality of life.

3.13.98 Gabapentinoids, serotonin-norepinephrine reuptake inhibitors, tricyclic antidepressants, and sodium channel blockers are recommended as initial pharmacologic treatments for neuropathic pain in diabetes. Refer to neurologist or pain specialist when adequate pain management is not achieved within the scope of practice of the treating clinician.

Foot care

3.13.99 Perform a comprehensive foot evaluation at least annually to identify risk factors for ulcers and amputations.

3.13.100 The examination should include inspection of the skin, assessment of foot deformities, neurological assessment (10-g monofilament testing with at least one other assessment: pinprick, temperature, or vibration), and vascular assessment, including pulses in the legs and feet.

3.13.101 Perform evaluation of ill-fitting, inadequate or lack of footwear.

3.13.102 Individuals with evidence of sensory loss or prior ulceration or amputation should have their feet inspected at every visit.

3.13.103 Obtain a prior history of ulceration, amputation, Charcot foot, angioplasty or vascular surgery, cigarette smoking, retinopathy, and renal disease and assess current symptoms of neuropathy (pain, burning, numbness) and vascular disease (leg fatigue, claudication).

3.13.104 Initial screening for peripheral arterial disease (PAD) should include assessment of lower-extremity pulses, capillary refill time, rubor on dependency, pallor on elevation, and venous filling time. Individuals with a history of leg fatigue, claudication, and rest pain relieved with dependency or decreased or absent pedal pulses should be referred for ankle-brachial index with toe pressures and for further vascular assessment as appropriate.

3.13.105 An interprofessional approach facilitated by a podiatrist in conjunction with other appropriate team members is recommended for individuals with foot ulcers and high-risk feet (e.g., those on dialysis, those with Charcot foot, those with a history of prior ulcers or amputation, and those with PAD).

3.13.106 Refer individuals who smoke and have a history of prior lower-extremity complications, loss of protective sensation, structural abnormalities, or PAD to foot care specialists for ongoing preventive care and lifelong surveillance.

3.13.107 Provide general preventive foot self-care education to all people with diabetes, including those with loss of protective sensation, on appropriate ways to examine their feet (palpation or visual inspection with an unbreakable mirror) for daily surveillance of early foot problems.

3.13.108 The use of specialized therapeutic footwear is recommended for people with diabetes at high risk for ulceration, including those with loss of protective sensation, foot deformities, ulcers, callous formation, poor peripheral circulation, or history of amputation.

3.13.109 For chronic diabetic foot ulcers that have failed to heal with optimal standard care alone, adjunctive treatment with randomized controlled trial–proven advanced agents should be considered. Considerations might include negative pressure wound therapy, placental membranes, bioengineered skin substitutes, several acellular matrices, autologous fibrin and leukocyte platelet patches, and topical oxygen therapy.

3.14 Diabetes care for Special Populations:

Older Adults (aged ≥65 years)

3.14.1 Consider the assessment of medical, psychological, functional (self-management abilities), and social domains in older adults with diabetes to provide a framework to determine goals and therapeutic approaches for diabetes management.

3.14.2 Screen for geriatric syndromes (e.g., cognitive impairment, depression, urinary incontinence, falls, persistent pain, and frailty) and polypharmacy in older adults with diabetes, as they may affect diabetes self-management and diminish quality of life.

Neurocognitive Function

3.14.3 Screening for early detection of mild cognitive impairment or dementia should be performed for adults 65 years of age or older at the initial visit, annually, and as appropriate.

Hypoglycemia

3.14.4 Because older adults with diabetes have a greater risk of hypoglycemia, especially when treated with hypoglycemic agents (e.g., sulfonylureas, meglitinides, and insulin), than younger adults, episodes of hypoglycemia should be ascertained and addressed at routine visits.

3.14.5 For older adults with T1DM, CGM is recommended to reduce hypoglycemia.

3.14.6 For older adults with T2DM on insulin therapy, CGM should be considered to improve glycemic outcomes and reduce hypoglycemia.

3.14.7 For older adults with T1DM, consider the use of automated insulin delivery (AID) systems and other advanced insulin delivery devices such as connected pens to reduce risk of hypoglycemia, based on individual ability and support system.

Treatment Goals

3.14.8 Older adults with diabetes who are otherwise healthy with few, and stable coexisting chronic illnesses and intact cognitive function and functional status should have lower glycemic goals (such as HbA1c <7.0–7.5% [<53–58 mmol/mol]) [(9)].

3.14.9 Older adults with diabetes and intermediate or complex health are clinically heterogeneous with variable life expectancy. Selection of glycemic goals should be individualized, with less stringent goals (such as HbA1c <8.0% [<64 mmol/mol]) for those with significant cognitive and/or functional limitations, frailty, severe comorbidities, and a less favorable risk-to-benefit ratio of diabetes medications [(9)].

3.14.10 Older adults with very complex or poor health receive minimal benefit from stringent glycemic control, and clinicians should avoid reliance on glycemic goals and instead focus on avoiding hypoglycemia and symptomatic hyperglycemia.

3.14.11 Screening for diabetes complications should be individualized in older adults with diabetes. Particular attention should be paid to complications that would lead to impairment of functional status or quality of life.

3.14.12 Treatment of hypertension to individualized goal levels is indicated in most older adults with diabetes.

3.14.13 Treatment of other cardiovascular risk factors should be individualized in older adults with diabetes, considering the time frame of benefit. Lipid-lowering therapy and antiplatelet agents may benefit those with life expectancies at least equal to the time frame of primary prevention or secondary intervention trials.

Lifestyle Management

3.14.14 Optimal nutrition and protein intake is recommended for older adults with diabetes; regular exercise, including aerobic activity, weight-bearing exercise, and/or resistance training, should be encouraged in all older adults with diabetes who can safely engage in such activities. (B)

3.14.15 For older adults with T2DM, overweight/obesity, and capacity to safely exercise, an intensive lifestyle intervention focused on dietary changes, physical activity, and modest weight loss (e.g., 5–7%) should be considered for its benefits on quality of life, mobility, and physical functioning, and cardiometabolic risk factor control.

Pharmacologic Therapy

3.14.16 In older adults with T2DM, medications with low risk of hypoglycemia are preferred, especially for those with hypoglycemia risk factors.

3.14.17 Overtreatment of diabetes is common in older adults and should be avoided.

3.14.18 In older adults with diabetes, deintensify hypoglycemia-causing medications (e.g., insulin, sulfonylureas, or meglitinides) or switch to a medication class with low hypoglycemia risk for individuals who are at high risk for hypoglycemia, using individualized glycemic goals.

3.14.19 In older adults with diabetes, deintensify diabetes medications for individuals for whom the harms and/or burdens of treatment may be greater than the benefits, within individualized glycemic goals.

3.14.20 Simplification of complex treatment plans (especially insulin) is recommended to reduce the risk

of hypoglycemia and polypharmacy and decrease the treatment burden if it can be achieved using the individualized glycemic goals.

3.14.21 In older adults with T2DM and established or high risk of atherosclerotic cardiovascular disease, heart failure, and/or chronic kidney disease, the treatment plan should include agents that reduce cardiorenal risk, irrespective of glycemia.

3.14.22 Consider costs of care and coverage when developing treatment plans to reduce risk of cost-related barriers to medication taking and self-management behaviors.

Treatment in Long Term Care Facilities

3.14.23 Consider diabetes education/training (including that for CGM devices, insulin pumps, and advanced insulin delivery systems) for the staff of long-term care and rehabilitation facilities to improve the management of older adults with diabetes.

3.14.24 People with diabetes residing in long-term care facilities need careful assessment to establish individualized glycemic goals and to make appropriate choices of glucose-lowering agents and devices (including CGM devices, insulin pumps, and advanced insulin delivery systems) based on their clinical and functional status.

End-of-Life care

3.14.25 When palliative care is needed in older adults with diabetes, health care professionals should initiate conversations with people with diabetes and their care partners regarding the goals and intensity of care. Strict glucose and blood pressure management are not necessary, and simplification of medication plans can be considered. Similarly, the intensity of lipid management can be relaxed, and withdrawal of lipid-lowering therapy may be appropriate.

3.14.26 Overall comfort, prevention of distressing symptoms, and preservation of quality of life and dignity are primary goals for diabetes management at the end of life.

Children and Adolescents

Diabetes Self-Management Education and Support

3.14.27 Youth with T1DM and their parents/caregivers (for individuals aged <18 years) should receive culturally sensitive and developmentally appropriate individualized diabetes self-management education and support according to national standards at diagnosis and routinely thereafter.

Nutrition Therapy

3.14.28 Individualized medical nutrition therapy is recommended for youth with T1DM as an essential component of the overall treatment plan.

3.14.29 Monitoring carbohydrate intake, whether by carbohydrate counting or experience-based estimation, is a key component to optimizing glycemic management.

3.14.30 Meal composition impacts postprandial glucose excursions. Education on the impact of high-fat and high-protein meals and the adjustment of insulin dosing is necessary.

3.14.31 Comprehensive nutrition education at diagnosis, with at least annual updates and as needed, by an experienced registered dietitian nutritionist is recommended to assess caloric and nutrition intake in relation to weight status and cardiovascular disease risk factors and to inform macronutrient choices.

Physical Activity and Exercise

3.14.32 Physical activity is recommended for all youth with T1DM with the goal of 60 min of moderate- to vigorous-intensity aerobic activity daily, with vigorous muscle-strengthening and bone-strengthening activities at least 3 days per week.

3.14.33 Frequent glucose monitoring before, during, and after exercise, via blood glucose meter or CGM, is important to prevent, detect, and treat hypoglycemia and hyperglycemia associated with exercise.

3.14.34 Youth and their parents/caregivers should receive education on goals and management of glycemia before, during, and after physical activity, individualized according to the type and intensity of the planned physical activity.

3.14.35 Youth and their parents/caregivers should be educated on strategies to prevent hypoglycemia during, after, and overnight following physical activity and exercise, which may include reducing prandial insulin dosing for the meal/snack preceding (and, if needed, following) exercise, reducing basal insulin doses, increasing carbohydrate intake, eating bedtime snacks, and/or using CGM.

Treatment for hypoglycemia should be accessible before, during, and after engaging in activity.

Psychosocial Care

3.14.36 At diagnosis and during routine follow-up care, screen youth with T1DM for psychosocial concerns (e.g., diabetes distress, depressive symptoms, and disordered eating), family factors, and behavioral health concerns that could impact diabetes management with age-appropriate standardized and validated tools. Refer to a qualified behavioral health professional, preferably experienced in childhood diabetes, when indicated.

3.14.37 Behavioral health professionals should be considered integral members of the pediatric diabetes interprofessional team.

3.14.38 Encourage developmentally appropriate family involvement in diabetes management tasks for children and adolescents, recognizing that premature or unsupportive transfer of diabetes care responsibility to the youth can contribute to diabetes distress, lower engagement in diabetes self-management behaviors, and deterioration in glycemia.

3.14.39 Health care professionals should screen for food security, housing stability/homelessness, health literacy, financial barriers, and social/community support and apply that information to treatment decisions.

3.14.40 Health care professionals should consider asking youth and their parents/caregivers about social adjustment (peer relationships) and school performance to determine whether further intervention is needed.

3.14.41 Offer adolescents time by themselves with their health care professional(s) starting at age 12 years or when developmentally appropriate.

3.14.42 Starting at puberty, preconception counseling should be incorporated into routine diabetes care for all individuals of childbearing potential.

Glycemic Monitoring, Insulin Delivery, and Goals

3.14.43 All youth with T1DM should monitor glucose levels multiple times daily (up to 6–10 times/day by blood glucose meter or CGM), including prior to meals and snacks, at bedtime, and as needed for safety in specific situations such as physical activity, driving, or the presence of symptoms of hypoglycemia.

3.14.44 Real-time CGM or intermittently scanned CGM should be offered for diabetes management at diagnosis or as soon as possible in youth with diabetes on multiple daily injections or insulin pump therapy who can use the device safely (either by themselves or with caregivers). (Appendix 2)

3.14.45 Automated insulin delivery (AID) systems should be offered for diabetes management to youth with T1DM who can use the device safely (either by themselves or with caregivers).

3.14.46 Insulin pump therapy alone should be offered for diabetes management to youth on multiple daily injections with T1DM who can use the device safely (either by themselves or with caregivers) if unable to use AID systems.

3.14.47 Students must be supported at school in the use of diabetes technology, including continuous glucose monitors, insulin pumps, connected insulin pens, and AID systems as prescribed by their diabetes care team. School nurses should receive appropriate training especially if children with T1DM attend their school.

3.14.48 HbA1C goals must be individualized and reassessed over time. An HbA1 cof <7% (<53 mmol/mol) is appropriate for many children and adolescents [(10)].

3.14.49 Less stringent HbA1c goals (such as <7.5% [<58 mmol/mol]) may be appropriate for youth who cannot articulate symptoms of hypoglycemia; have hypoglycemia unawareness; lack access to analog insulins, advanced insulin delivery technology, and/or CGM; cannot check blood glucose regularly; or have nonglycemic factors that increase HbA1c (e.g., high glycators).

3.14.50 Even less stringent HbA1c goals (such as <8% [<64 mmol/mol]) may be appropriate for individuals with a history of severe hypoglycemia, limited life expectancy, or where the harms of treatment are greater than the benefits [(10)].

3.14.51 Health care professionals may reasonably suggest more stringent HbA1c goals (such as <6.5% [<48 mmol/mol]) for selected individuals if they can be achieved without significant hypoglycemia, negative impacts on well-being, or undue burden of care or in those who have nonglycemic factors that decrease HbA1c (e.g., lower erythrocyte life span). Lower goals may also be appropriate during the honeymoon phase.

3.14.52 CGM metrics derived from continuous glucose monitor use over the most recent 14 days (or

longer for youth with more glycemic variability), including time in range (70–180 mg/dL [3.9–10.0 mmol/L]), time below range (<70 mg/dL [<3.9 mmol/L] and <54 mg/dL [<3.0 mmol/L]), and time above range (>180 mg/dL [>10.0 mmol/L] and >250 mg/dL [>13.9 mmol/L]), are recommended to be used in conjunction with HbA1c whenever possible[10].

Autoimmune Conditions

3.14.53 Assess for additional autoimmune conditions soon after the diagnosis of T1DM and if symptoms develop.

Thyroid Disease

3.14.54 Consider testing children with T1DM for antithyroid peroxidase and antithyroglobulin antibodies soon after diagnosis.

3.14.55 Measure thyroid-stimulating hormone concentrations at diagnosis when clinically stable or soon after optimizing glycemia. If normal, suggest rechecking every 1–2 years or sooner if the youth has positive thyroid antibodies or develops symptoms or signs suggestive of thyroid dysfunction, thyromegaly, an abnormal growth rate, or unexplained glycemic variability.

Celiac Disease

3.14.56 Screen youth with T1DM for celiac disease by measuring IgA tissue transglutaminase (tTG) antibodies, with documentation of normal total serum IgA levels, soon after the diagnosis of diabetes, or IgG tTG and deamidated gliadin antibodies if IgA is deficient.

3.14.57 Repeat screening for celiac disease within 2 years of diabetes diagnosis and then again after 5 years and consider more frequent screening in youth who have symptoms or a first-degree relative with celiac disease.

3.14.58 Individuals with confirmed celiac disease should be placed on a gluten-free diet for treatment and to avoid complications. Youth and their caregivers should also have a consultation with a registered dietitian nutritionist experienced in managing both diabetes and celiac disease and a referral to a gastroenterologist if appropriate.

Management of Cardiovascular Risk Factors: Hypertension Screening

3.14.59 Blood pressure should be measured at every routine visit. In youth with high blood pressure (blood pressure ≥90th percentile for age, sex, and height or, in adolescents aged ≥13 years, blood pressure ≥120/80 mmHg) on three separate measurements, ambulatory blood pressure monitoring should be strongly considered.

Management of Cardiovascular Risk Factors: Hypertension Treatment

3.14.60 Treatment of elevated blood pressure (defined as 90th to <95th percentile for age, sex, and height or, in adolescents aged ≥13 years, 120–129/<80 mmHg) is lifestyle modification focused on healthy nutrition, physical activity, sleep, and, if appropriate, weight management. [11]

3.14.61 In addition to lifestyle modification, ACE inhibitors or angiotensin receptor blockers should be started for treatment of confirmed hypertension (defined as blood pressure consistently ≥95th percentile for age, sex, and height or, in adolescents aged ≥13 years, ≥130/80 mmHg). Due to the potential teratogenic effects, individuals of childbearing age should receive reproductive counseling, and ACE inhibitors and angiotensin receptor blockers should be avoided in individuals of childbearing age who are not using reliable contraception. [11]

3.14.62 The goal of treatment is blood pressure <90th percentile for age, sex, and height or, in adolescents aged ≥13 years, <130/80 mmHg [10].

Dyslipidemia Screening

3.14.63 Initial lipid profile should be performed soon after diagnosis, preferably after glycemia has improved and age is ≥2 years. If initial LDL cholesterol is ≤100 mg/dL (≤2.6 mmol/L), subsequent testing should be performed at 9–11 years of age. Initial testing may be done with a non-fasting lipid level with confirmatory testing with a fasting lipid panel. [11]

3.14.64 If LDL cholesterol values are within the accepted risk level (<100 mg/dL [<2.6 mmol/L]), a lipid profile repeated every 3 years is reasonable [10].

Dyslipidemia Treatment

3.14.65 If lipids are abnormal, initial therapy should consist of optimizing glycemia and medical nutrition therapy to limit the number of calories from fat to 25–30% and saturated fat to <7%, limit cholesterol to <200 mg/day, avoid trans fats, and aim for ~10% calories from monounsaturated fats.

3.14.66 After the age of 10 years, addition of a statin may be considered in youth with T1DM who, despite medical nutrition therapy and lifestyle changes, continue to have LDL cholesterol >160 mg/dL (>4.1 mmol/L) or LDL cholesterol >130 mg/dL (>3.4 mmol/L) and one or more cardiovascular disease risk factors. Due to the potential teratogenic effects, individuals of childbearing age should receive reproductive counseling, and statins should be avoided in individuals of childbearing age who are not using reliable contraception [(10)].

3.14.67 The goal of therapy is an LDL cholesterol value <100 mg/dL (<2.6 mmol/L).

3.14.68 In children with an LDL >160mg/dl (4.1mmol/l), despite adequate diabetes control and normal thyroid function, a thorough family history and investigations for familial hypercholesterolemia including genetic testing should be considered. Children with proven familial hypercholesterolemia need assessment by a qualified endocrinologist, or lipidologist and therapy with a statin may need to be initiated before the age of 10yrs [(10)].

Microvascular Complications: Nephropathy Screening

3.14.69 Annual screening for albuminuria with a random (morning sample preferred to avoid effects of exercise) spot urine sample for albumin-to-creatinine ratio should be considered at puberty or at age >10 years, whichever is earlier, once the youth has had diabetes for 5 years [(10)].

Microvascular Complications: Nephropathy Treatment

3.14.70 An ACE inhibitor or an angiotensin receptor blocker, titrated to normalization of albumin excretion, may be considered when elevated urinary albumin-to-creatinine ratio (>30 mg/g) is documented (more than two urine samples obtained over a 6-month interval following efforts to improve glycemia and normalize blood pressure). Due to the potential teratogenic effects, individuals of childbearing age should receive reproductive counseling, and ACE inhibitors and angiotensin receptor blockers should be avoided in individuals of childbearing age who are not using reliable contraception [(10)].

Microvascular Complications: Retinopathy

3.14.71 An initial dilated and comprehensive eye examination is recommended once youth have had T1DM for 3–5 years, provided they are aged ≥11 years or puberty has started, whichever is earlier [(10)].

3.14.72 After the initial examination, repeat dilated and comprehensive eye examination every 2 years. Less frequent examinations, every 4 years, may be acceptable on the advice of an eye care professional and based on risk factor assessment, including a history of HbA1c <8%.

3.14.73 Programs that use retinal photography (with remote reading by trained professionals or use of a validated assessment tool) to improve access to diabetic retinopathy screening can be appropriate screening strategies for diabetic retinopathy. Such programs need to provide pathways for timely referral for a comprehensive eye examination when indicated.

Microvascular Complications: Neuropathy

3.14.74 Consider an annual comprehensive foot exam at the start of puberty or at age ≥10 years, whichever is earlier once the youth has had T1DM for 5 years. The examination should include inspection, assessment of foot pulses, pinprick, and 10-g monofilament sensation tests, testing of vibration sensation using a 128-Hz tuning fork, and ankle reflex tests.

T2DM: Screening and Diagnosis

3.14.75 Risk-based screening for prediabetes and/or T2DM should be considered after the onset of puberty or ≥10 years of age, whichever occurs earlier, in youth with overweight (BMI ≥85th percentile) or obesity (BMI ≥95th percentile) and who have one or more additional risk factors for diabetes (see Appendix 1 table 3)

3.14.76 If screening is normal, repeat screening at a minimum of 3-year intervals, or more frequently if BMI is increasing.

3.14.77 Fasting plasma glucose, 2-h plasma glucose during a 75-g oral glucose tolerance test, and HbA1c can be used to test for prediabetes or diabetes in children and adolescents.

3.14.78 Children and adolescents with overweight or obesity in whom the diagnosis of T2DM is being considered should have a panel of pancreatic autoantibodies tested to exclude the possibility of autoimmune T1DM.

T2DM Management: Lifestyle Management

3.14.79 All youth with T2DM and their families should receive comprehensive diabetes self-management education and support that is specific to youth with T2DM and is culturally appropriate.

3.14.80 Youth with overweight/obesity and T2DM and their families should be provided with developmentally and culturally appropriate comprehensive lifestyle programs that are integrated with diabetes management to achieve at least a 7–10% decrease in excess weight.

3.14.81 Given the necessity of long-term weight management for youth with T2DM, lifestyle intervention should be based on a chronic care model and offered in the context of diabetes care.

3.14.82 Youth with prediabetes and T2DM, like all children and adolescents, should be encouraged to participate in at least 60 min of moderate to vigorous physical activity daily (with muscle and bone strength training at least 3 days/week) and to decrease sedentary behavior.

3.14.83 Nutrition for youth with prediabetes and T2DM, like for all children and adolescents, should focus on healthy eating patterns that emphasize consumption of nutrient-dense, high-quality foods and decreased consumption of calorie-dense, nutrient-poor foods, particularly sugar-added beverages and highly processed foods.

T2DM Management: Glycemic Goals

3.14.84 Blood glucose monitoring should be individualized, taking into consideration the pharmacologic treatment of the youth with T2DM.

3.14.85 Real-time CGM or intermittently scanned CGM should be offered for diabetes management in youth with T2DM on multiple daily injections or insulin pumps who can use the device safely (Appendix 2).

3.14.86 Glycemic status should be assessed at least every 3 months.

3.14.87 A reasonable HbA1c goal for most children and adolescents with T2DM is <7% (<53 mmol/mol). More stringent HbA1c goals (such as <6.5% [<48 mmol/mol]) may be appropriate for selected individuals if they can be achieved without significant hypoglycemia or other adverse effects of treatment. Appropriate individuals might include those with a short duration of diabetes and lesser degrees of β-cell dysfunction, and individuals treated with lifestyle or metformin only who achieve significant weight improvement.

3.14.88 Less stringent HbA1c goals (such as 7.5% [58 mmol/mol]) may be appropriate if there is an increased risk of hypoglycemia.

3.14.89 HbA1C goals for individuals on insulin should be individualized, considering the relatively low rates of hypoglycemia in youth-onset T2DM.

T2DM Management: Pharmacologic Management

3.14.90 Initiate pharmacologic therapy, in addition to behavioral counseling for healthful nutrition and physical activity changes, at diagnosis of T2DM.

3.14.91 In individuals with incidentally diagnosed or metabolically stable diabetes (HbA1C <8.5% [<69 mmol/mol] and asymptomatic), metformin is the initial pharmacologic treatment of choice if renal function is normal **(10)**.

3.14.92 Youth with marked hyperglycemia (blood glucose ≥250 mg/dL [≥13.9 mmol/L],HbA1c≥8.5% [≥69 mmol/mol]) without acidosis at diagnosis who are symptomatic with polyuria, polydipsia, nocturia, and/or weight loss should be treated initially with long-acting insulin or GLP1 (if > 12 yrs of age and suffering with obesity > 90th centile for age) while metformin is initiated and titrated**(10)**.

3.14.93 In individuals with ketosis/ketoacidosis (Diabetic ketoacidosis (DKA) is characterized by a biochemical triad of hyperglycemia (or a history of diabetes), ketonemia, and metabolic acidosis, with rapid symptom onset), treatment with subcutaneous or intravenous insulin should be initiated to rapidly correct the hyperglycemia and the metabolic derangement. Once acidosis is resolved, metformin should be initiated while subcutaneous insulin therapy is continued.

3.14.94 In individuals presenting with severe hyperglycemia (blood glucose ≥600 mg/dL [≥33.3 mmol/L]),

consider assessment for hyperglycemic hyperosmolar nonketotic syndrome.

3.14.95 If glycemic goals are no longer met with metformin (with or without long-acting insulin), glucagon-like peptide 1 (GLP-1) receptor agonist therapy and/or empagliflozin and dapagliflozin should be considered in children 10 years of age or older.

3.14.96 When choosing glucose-lowering or other medications for youth with overweight or obesity and T2DM, consider medication-taking behavior and the medications' effect on weight.

3.14.97 For youth not meeting glycemic goals, maximize noninsulin therapies (metformin, a GLP-1 receptor agonist, and empagliflozin) before initiating and/or intensifying insulin therapy plan.

3.14.98 In individuals initially treated with insulin and metformin and/or other glucose lowering medications who are meeting glucose goals based on blood glucose monitoring or CGM, insulin can be tapered over 2–6 weeks by decreasing the insulin dose 10–30% every few days.

T2DM Management: Metabolic Surgery

3.14.99 Metabolic surgery may be considered for the treatment of adolescents with T2DM who have class 2 obesity or higher (BMI >35 kg/m2 or 120% of 95th percentile for age and sex, whichever is lower) and who have elevated HbA1c and/or serious comorbidities despite lifestyle and pharmacologic intervention. (Refer to DoH standard for the weight management program for overweight and obese children) [(10)].

3.14.100 Metabolic surgery should be performed only by an experienced surgeon working as part of a well-organized and engaged interprofessional team, including a surgeon, endocrinologist, registered dietitian nutritionist, behavioral health specialist, and nurse.

Prevention and Management of Diabetes Complications: Hypertension

3.14.101 Blood pressure should be measured at every clinic visit. In youth with high blood pressure (blood pressure ≥90th percentile for age, sex, and height or, in adolescents aged ≥13 years, ≥120/80 mmHg) on three separate measurements, ambulatory blood pressure monitoring should be strongly considered [(10)].

3.14.102 Treatment of elevated blood pressure (defined as 90th to <95th percentile for age, sex, and height or, in adolescents aged ≥13 years, 120–129/<80 mmHg) is lifestyle modification focused on healthy nutrition, physical activity, sleep, and, if appropriate, weight management [(10)].

3.14.103 In addition to lifestyle modification, ACE inhibitors or angiotensin receptor blockers should be started for treatment of confirmed hypertension (defined as blood pressure consistently ≥95th percentile for age, sex, and height or, in adolescents aged ≥13 years, ≥130/80 mmHg). Due to the potential teratogenic effects, individuals of childbearing age should receive reproductive counseling, and ACE inhibitors and angiotensin receptor blockers should be avoided in individuals of childbearing age who are not using reliable contraception.

3.14.104 The goal of treatment is blood pressure <90th percentile for age, sex, and height or, in adolescents aged ≥13 years, <130/80 mmHg [(10)].

Prevention and Management of Diabetes Complications: Nephropathy

3.14.105 Protein intake should be at the recommended daily allowance of 0.85–1.2 g/kg/day (according to age).

3.14.106 Urine albumin-to-creatinine ratio should be obtained at the time of diagnosis and annually thereafter. An elevated urine albumin-to-creatinine ratio (>30 mg/g creatinine) should be confirmed on two of three samples.

3.14.107 Estimated glomerular filtration rate (GFR) should be determined at the time of diagnosis and annually thereafter if normal.

3.14.108 In youth with diabetes and hypertension, either an ACE inhibitor or an angiotensin receptor blocker is recommended for those with modestly elevated urinary albumin-to-creatinine ratio (30–299 mg/g creatinine) and is strongly recommended for those with urinary albumin-to-creatinine ratio >300 mg/g creatinine and/or estimated GFR <60 mL/min/1.73 m2. Due to the potential teratogenic effects, individuals of childbearing age should receive reproductive counseling, and ACE inhibitors and angiotensin receptor blockers should be avoided in individuals of childbearing age who are not using reliable contraception [(10)].

3.14.109 For youth with nephropathy, continue monitoring (yearly and/or as indicated by urinary albumin-to-creatinine ratio and estimated GFR) to detect disease progression.

3.14.110 Referral to nephrology is recommended in case of uncertainty of etiology, worsening urinary

albumin-to-creatinine ratio, or decrease in estimated GFR.

Prevention and Management of Diabetes Complications: Neuropathy

3.14.111 Youth with T2DM should be screened for the presence of neuropathy by foot examination at diagnosis and annually. The examination should include inspection, assessment of foot pulses, pinprick and 10-g monofilament sensation tests, testing of vibration sensation using a 128-Hz tuning fork, and ankle reflex tests.

3.14.112 Prevention of neuropathy should focus on achieving glycemic goals.

Prevention and Management of Diabetes Complications: Retinopathy

3.14.113 Screening for retinopathy should be performed by dilated fundoscopy at or soon after diagnosis and annually thereafter.

3.14.114 Optimizing glycemia is recommended to decrease the risk or slow the progression of retinopathy.

3.14.115 Less frequent examination (every 2 years) may be considered if achieving glycemic goals and a normal eye exam.

3.14.116 Programs that use retinal photography (with remote reading or use of a validated assessment tool) to improve access to diabetic retinopathy screening can be appropriate screening strategies for diabetic retinopathy. Such programs need to provide pathways for timely referral for a comprehensive eye examination when indicated.

Prevention and Management of Diabetes Complications: Nonalcoholic Fatty Liver Disease

3.14.117 Evaluation of youth with T2DM for nonalcoholic fatty liver disease (by measuring AST and ALT) should be done at diagnosis and annually thereafter.

3.14.118 Referral to gastroenterology should be considered for persistently elevated or worsening transaminases.

Prevention and Management of Diabetes Complications: Obstructive Sleep Apnea

3.14.119 Screening for symptoms of sleep apnea should be done at each visit, and referral to a pediatric sleep specialist for evaluation and a polysomnogram, if indicated, is recommended. Obstructive sleep apnea should be treated when documented.

Prevention and Management of Diabetes Complications: Polycystic Ovary Syndrome

3.14.120 Evaluate for polycystic ovary syndrome in female adolescents with T2DM, including laboratory studies, when indicated.

3.14.121 Metformin, in addition to lifestyle modification, is likely to improve the menstrual cyclicity and hyperandrogenism in female individuals with T2DM.

3.14.122 Weight management in adolescents with T2DM, PCOS and obesity is likely to improve menstrual cyclicity and hyperandrogenism. This will include lifestyle interventions with dietary advice and regular physical exercise, as well as medication including GLP1 agonists and metabolic surgery if indicated for other associated metabolic disorders.

Prevention and Management of Diabetes Complications: Cardiovascular Disease

3.14.123 Intensive lifestyle interventions focusing on weight loss, dyslipidemia, hypertension, and dysglycemia are important to prevent overt macrovascular disease in early adulthood.

Prevention and Management of Diabetes Complications: Dyslipidemia

3.14.124 Lipid screening should be performed initially after optimizing glycemia and annually thereafter.

3.14.125 Optimal goals are LDL cholesterol <100 mg/dL (<2.6 mmol/L), HDL cholesterol >35 mg/dL (>0.91 mmol/L), and triglycerides <150 mg/dL (<1.7 mmol/L) **(10)**.

3.14.126 If lipids are abnormal, initial therapy should consist of optimizing glycemia and medical nutritional therapy to limit the number of calories from fat to 25–30% and saturated fat to <7%, limit cholesterol to <200 mg/day, avoid trans fats, and aim for ~10% calories from monounsaturated fats for elevated LDL. For elevated triglycerides, medical nutrition therapy should also focus on decreasing simple sugar intake and increasing dietary n-3 fatty acids in addition to the above changes.

3.14.127 If LDL cholesterol remains >130 mg/dL (>3.4 mmol/L) after 6 months of dietary intervention, initiate therapy with statin, with a goal of LDL <100 mg/dL (<2.6 mmol/L). Due to the potential teratogenic effects, individuals of childbearing age should receive reproductive counseling, and

statins should be avoided in individuals of childbearing age who are not using reliable contraception. [11]

3.14.128 If triglycerides are >400 mg/dL (>4.7 mmol/L) fasting or >1,000 mg/dL (>11.6 mmol/L) nonfasting, optimize glycemia and begin fibrate, with a goal of <400 mg/dL (<4.7 mmol/L) fasting to reduce risk for pancreatitis **(10)**.

Prevention and Management of Diabetes Complications: Cardiac Function Testing

3.14.129 Routine screening for heart disease with electrocardiogram, echocardiogram, or stress testing is not recommended in asymptomatic youth with T2DM.

Prevention and Management of Diabetes Complications: Psychosocial Factors

3.14.130 Health care professionals should screen for food insecurity, housing instability/homelessness, health literacy, financial barriers, and social/community support and apply that information to treatment decisions.

3.14.131 Use age-appropriate standardized and validated tools to screen for diabetes distress, depressive symptoms, and behavioral health in youth with T2DM, with attention to symptoms of depression and disordered eating, and refer to a qualified behavioral health professional when indicated.

3.14.132 Starting at puberty, preconception counseling should be incorporated into routine diabetes clinic visits for all individuals of childbearing potential because of the adverse pregnancy outcomes in this population.

3.14.133 Adolescents and young adults should be screened for tobacco/nicotine, electronic cigarettes, substance use, and alcohol use at diagnosis and regularly thereafter.

Substance Use in Pediatric Diabetes: Tobacco and Electronic Cigarettes

3.14.134 Elicit a smoking history at initial and follow-up diabetes visits; discourage smoking in youth who do not smoke and encourage smoking cessation in those who do smoke.

3.14.135 Electronic cigarette use should be discouraged.

Transition from pediatric to adult care.

3.14.136 Pediatric diabetes care teams should implement transition preparation programs for youth beginning in early adolescence and, at the latest, at least 1 year before the anticipated transfer from pediatric to adult health care.

3.14.137 Interprofessional adult and pediatric health care teams should provide support and resources for adolescents, young adults, and their families prior to and during the transition process from pediatric to adult health care.

3.14.138 Pediatric diabetes specialists should partner with youth with diabetes and their caregivers to decide on the timing of transfer to an adult diabetes specialist.

Management of Diabetes in Pregnancy

Preconception Counseling

3.14.139 Starting at puberty and continuing in all people with diabetes and childbearing potential, preconception counseling should be incorporated into routine diabetes care.

3.14.140 Family planning should be discussed, and effective contraception (with consideration of long-acting, reversible contraception) should be prescribed and used until an individual's treatment plan and HbA1c are optimized for pregnancy. [12, 17]

3.14.141 Preconception counseling should address the importance of achieving glucose levels as close to normal as is safely possible, ideally HbA1c <6.5% (<48 mmol/mol), to reduce the risk of congenital anomalies, preeclampsia, macrosomia, preterm birth, and other complications **(2)**.

Preconception Care

3.14.142 Individuals with preexisting diabetes who are planning a pregnancy should ideally begin receiving interprofessional care for preconception, which includes an endocrinology health care professional, maternal-fetal medicine specialist, registered dietitian nutritionist, and diabetes care and education specialist, when available.

3.14.143 In addition to focused attention on achieving glycemic targets, standard preconception care should be augmented with extra focus on nutrition, physical activity, diabetes self-care education, and screening for diabetes comorbidities and complications.

3.14.144 Individuals with preexisting T1DM or T2DM who are planning a pregnancy or who have become

pregnant should be counseled on the risk of development and/or progression of diabetic retinopathy. Dilated eye examinations should occur ideally before pregnancy or in the first trimester, and then pregnant individuals should be monitored every trimester and for 1 year postpartum as indicated by the degree of retinopathy and as recommended by the eye care health care professional.

Glycemic Goals in Pregnancy

3.14.145 Fasting, pre-prandial, and postprandial blood glucose monitoring are recommended in individuals with diabetes in pregnancy to achieve optimal glucose levels. Glucose goals are fasting plasma glucose <95 mg/dL (<5.3 mmol/L) and either 1-h postprandial glucose <140 mg/dL (<7.8 mmol/L) or 2-h postprandial glucose <120 mg/dL (<6.7 mmol/L) [(2)] .

3.14.146 Due to increased red blood cell turnover, HbA1c is slightly lower during pregnancy in people with and without diabetes. Ideally, the HbA1c goal in pregnancy is <6% (<42 mmol/mol) if this can be achieved without significant hypoglycemia, but the goal may be relaxed to <7% (<53 mmol/mol) if necessary to prevent hypoglycemia.

3.14.147 When used in addition to pre- and postprandial blood glucose monitoring, CGM can help to achieve the HbA1c goal in diabetes and pregnancy (Appendix 2)

3.14.148 CGM is recommended in pregnancies associated with T1DM. When used in addition to blood glucose monitoring, achieving traditional pre- and postprandial goals, real-time CGM can reduce the risk for large-for-gestational age infants and neonatal hypoglycemia in pregnancy complicated by T1DM.

3.14.149 CGM metrics may be used in addition to but should not be used as a substitute for blood glucose monitoring to achieve optimal pre- and postprandial glycemic goals.

3.14.150 Commonly used estimated HbA1c and glucose management indicator calculations should not be used in pregnancy as estimates of HbA1C.

3.14.151 Nutrition counseling should endorse a balance of macronutrients including nutrient-dense fruits, vegetables, legumes, whole grains, and healthy fats with n-3 fatty acids that include nuts and seeds and fish in the eating pattern.

3.14.152 Folic acid supplementation should be initiated 3 months prior to the time of the planned pregnancy.

Management of Gestational Diabetes Mellitus (GDM)

3.14.153 Lifestyle behavior change is an essential component of management of gestational diabetes mellitus (GDM) and may suffice as treatment for many individuals. Insulin should be added if needed to achieve glycemic goals.

3.14.154 If glycemic control (as per above ranges) is not achieved through diet and lifestyle changes, start Metformin. Care can continue with obstetricians and specialized combined diabetic clinic with obstetric Medicine or endocrinologist.

3.14.155 If the blood glucose is uncontrolled despite high dose of Metformin (2000 mg/day for sustained release and 2500 mg/day for immediate release), Insulin should be added if needed to achieve glycemic goals [(2)] .

3.14.156 Telehealth visits used in combination with in-person visits for pregnant people with GDM can improve outcomes compared with standard in-person care alone.

Management of Preexisting T1DM and T2DM in Pregnancy

3.14.157 Insulin should be used to manage T1DM in pregnancy. Insulin is the preferred agent for the management of T2DM in pregnancy.

3.14.158 Either multiple daily injections or insulin pump technology can be used in pregnancy complicated by T1DM.

Preeclampsia and Aspirin

3.14.159 Pregnant individuals with T1DM or T2DM should be prescribed low-dose aspirin 80–160 mg/day starting at 12 to 16 weeks of gestation to lower the risk of preeclampsia. A dosage up to 162 mg/day may be acceptable.

Pregnancy and Drug Considerations

3.14.160 In pregnant individuals with diabetes and chronic hypertension, a blood pressure threshold of 140/90 mmHg for initiation or titration of therapy is associated with better pregnancy outcomes

than reserving treatment for severe hypertension, with no increase in risk of small-for-gestational-age birth weight. There are limited data on the optimal lower limit, but therapy should be de-intensified for blood pressure <90/60 mmHg. A blood pressure target of 110–135/85 mmHg is suggested in the interest of reducing the risk for accelerated maternal hypertension.

3.14.161 Potentially harmful medications in pregnancy (i.e., ACE inhibitors, angiotensin receptor blockers, statins) should be stopped prior to conception and avoided in sexually active individuals of childbearing potential who are not using reliable contraception.

Postpartum Care

3.14.162 Insulin resistance decreases dramatically immediately postpartum, and insulin requirements need to be evaluated and adjusted as they are often roughly half the pre-pregnancy requirements for the initial few days postpartum.

3.14.163 A contraceptive plan should be discussed and implemented with all people with diabetes of childbearing potential.

3.14.164 Screen individuals with a recent history of GDM at 4–12 weeks postpartum, using the 75-g oral glucose tolerance test and clinically appropriate nonpregnancy diagnostic criteria.

3.14.165 Individuals with overweight/obesity and a history of GDM found to have prediabetes should receive intensive lifestyle interventions and/or metformin to prevent diabetes.

3.14.166 Breastfeeding efforts are recommended for all individuals with diabetes. Breastfeeding is recommended for individuals with a history of GDM for multiple benefits including a reduced risk for T2DM later in life.

3.14.167 Individuals with a history of GDM should have lifelong screening for the development of T2DM or prediabetes every 1–3 years.

3.14.168 Individuals with a history of GDM should seek preconception screening for diabetes and preconception care to identify and treat hyperglycemia and prevent congenital malformations.

3.14.169 Postpartum care should include psychosocial assessment and support for self-care.

3.15 Diabetes Care in the Hospital

Hospital Care Delivery Standards

3.15.1 Perform an HbA1c test on all people with diabetes or hyperglycemia (random blood glucose >140 mg/dL [>7.8 mmol/L]) admitted to the hospital if no HbA1c test result is available from the prior 3 months. [13]

3.15.2 Institutions should implement protocols using validated written or computerized provider order entry sets for management of dysglycemia in the hospital (including emergency department, intensive care unit [ICU] and non-ICU wards, gynecology-obstetrics/delivery units, dialysis suites, and behavioral health units) that allow for a personalized approach, including glucose monitoring, insulin and/or noninsulin therapy, hypoglycemia management, diabetes self-management education, nutrition recommendations, and transitions of care.

Diabetes Care Specialists in the Hospital

3.15.3 When caring for hospitalized people with diabetes (with an existing or new diagnosis) or stress hyperglycemia, consult with a specialized diabetes or glucose management team when accessible.

Glycemic Goals in Hospitalized Adults

3.15.4 Insulin and/or other therapies should be initiated or intensified for treatment of persistent hyperglycemia starting at a threshold of ≥180 mg/dL (≥10.0 mmol/L) (confirmed on two occasions within 24 h) for noncritically ill (non-ICU) individuals **(11)**.

3.15.5 Once therapy is initiated, a glycemic goal of 140–180 mg/dL (7.8–10.0 mmol/L) is recommended for most critically ill (ICU) individuals with hyperglycemia **(11)**.

3.15.6 More stringent glycemic goals, such as 110–140 mg/dL (6.1–7.8 mmol/L), may be appropriate for selected critically ill individuals and are acceptable if they can be achieved without significant hypoglycemia **(11)**.

Continuous Glucose Monitoring

3.15.7 In people with diabetes using a personal CGM device, the use of CGM should be continued during hospitalization if clinically appropriate, with confirmatory point-of-care (POC) glucose measurements for insulin dosing decisions and hypoglycemia assessment, if resources and training are available, and according to an institutional protocol.

3.15.8 For people with diabetes using an automated insulin delivery (AID) system along with CGM, the use of AID and CGM should be continued during hospitalization if clinically appropriate, with confirmatory POC blood glucose measurements for insulin dosing decisions and hypoglycemia assessment, if resources and training are available, and according to an institutional protocol.

Continuous Glucose Monitoring Glucose-Lowering Treatment in Hospitalized Patients: Insulin Therapy

3.15.9 Basal insulin or a basal plus bolus correction insulin plan is the preferred treatment for noncritically ill hospitalized individuals with poor oral intake or those who are taking nothing by mouth.

3.15.10 An insulin plan with basal, prandial, and correction components is the preferred treatment for most noncritically ill hospitalized individuals with adequate nutritional intake.

3.15.11 Sole use of a correction or supplemental insulin without basal insulin (formerly referred to as a sliding scale) in the inpatient setting is discouraged.

Continuous Glucose Monitoring Glucose-Lowering Treatment in Hospitalized Patients: Noninsulin Therapies

3.15.12 For people with T2DM hospitalized with heart failure, it is recommended that use of a sodium–glucose cotransporter 2 inhibitor be initiated or continued during hospitalization and upon discharge if there are no contraindications and after recovery from the acute illness. It is also recommended that metformin should be withheld during acute admission until heart failure is stabilized.

Hypoglycemia

3.15.13 A hypoglycemia management protocol should be adopted and implemented by each hospital or hospital system. A plan for preventing and treating hypoglycemia should be established for everyone. Episodes of hypoglycemia in the hospital should be documented in the electronic health record and tracked for quality assessment and quality improvement.

3.15.14 Treatment plans should be reviewed and changed as necessary to prevent hypoglycemia and recurrent hypoglycemia when a blood glucose value of <70 mg/dL (<3.9 mmol/L) is documented [(11)].

Transition from the hospital to the ambulatory setting.

3.15.15 A structured discharge plan should be tailored to the individual with diabetes.

Medication reconciliation

3.15.16 Home and hospital medications must be cross-checked to ensure that no chronic medications are stopped and to ensure the safety of new and old prescriptions.

3.15.17 Prescriptions for new or changed medication should be filled out and reviewed with the individual and care partners at or before discharge.

Structured discharge communication

3.15.18 Information on medication changes, pending tests and studies, and follow-up needs must be accurately and promptly communicated to outpatient health care professionals.

3.15.19 Discharge summaries should be transmitted to the primary care clinician as soon as possible after discharge.

3.15.20 Scheduling follow-up appointments prior to discharge with people with diabetes agreeing to the time and place increases the likelihood that they will attend.

It is recommended that the following areas of knowledge be reviewed and addressed before hospital discharge:

3.15.21 Identification of the health care professionals who will provide diabetes care after discharge.

3.15.22 Level of understanding related to the diabetes diagnosis, glucose monitoring, home glucose goals, and when to call a health care professional.

3.15.23 Definition, recognition, treatment, and prevention of hyperglycemia and hypoglycemia.

3.15.24 Information on making healthy food choices at home and referral to an outpatient registered dietitian nutritionist or diabetes care and education specialist to guide individualization of the meal plan, if needed.

3.15.25 When and how to take blood glucose-lowering medications, including insulin administration and noninsulin injectables.

3.15.26 Sick-day management

3.15.27 Proper use and disposal of diabetes supplies (e.g., insulin pen, pen needles, syringes, and lancets).

Note: People with diabetes must be provided with appropriate durable medical equipment, medications, supplies (e.g., blood glucose test strips or CGM sensors), prescriptions, and appropriate education at the time of discharge to avoid a potentially dangerous hiatus in care.

4.Key stakeholder Roles and Responsibilities

4. General Duties for Healthcare Providers

4.1 All DoH licensed healthcare facilities providing Diabetes Care must:

4.1.1 Provide medical services performed by physicians, nurses, and allied healthcare professionals, in accordance with the specifications of this Standard and consistent with DoH policies and UAE laws.

4.1.2 Ensure that only Healthcare Licensed professionals provide clinical services.

4.1.3 Submit data to DoH via e-claims and in accordance with the DoH Reporting of Health Statistics Chapter, Health Regulator Manual, Version 1.0 and as set out in the DoH Data Management Policy Standards and Procedures (available from www.doh.gov.ae).

4.2 Reimbursement Mechanism [12,13,]

4.2.1 All DoH licensed healthcare facilities providing Diabetes Care must:

4.2.2 Comply with the healthcare insurance pre-authorization requirements, where applicable for payment in accordance with the patients' health insurance product and the requirements of this Standard.

4.2.3 Billing and reimbursement of Diabetes Care shall be in accordance with Standard Provider Contract, DoH Mandatory Tariff and associated Claims and Adjudication Rules, and the Claims and Adjudication Standard.

4.3 Duties for Payers and Payer Third Party Administrators

All payers and TPAs must:

4.3.1 Comply with the health insurance pre-authorization requirement (where applicable) for payment for Diabetes Care in accordance with the patients' health insurance product and the provisions as detailed in this Standard.

5.Monitoring and Evaluation

5.1 The facility should report the data through JAWDA portal for the following measures.

5.1.1 Percentage of diabetics whose most recent HbA1c level was > 9.0 % or who had no test result within 12 months (prior to the end of reporting quarter)

5.1.2 Percentage of diabetics ≥18 to ≤75 years of age whose most recent HbA1c level was ≤7.0% (good control) within 12 months (prior to the end of reporting quarter)

5.1.3 Percentage of diabetics who received a Foot exam: visual inspection with either a sensory exam or a pulse exam within 12 months (prior to the end of reporting quarter)

5.1.4 Percentage of patients ≥18 to ≤75 years of age with diabetes and an active diagnosis of retinopathy in any part of the reporting quarter who had a retinal or dilated eye exam by an eye care professional during the reporting quarter OR diabetics with no diagnosis of retinopathy in any part of the reporting quarter who had a retinal or dilated eye exam

by an eye care professional during the reporting quarter or in the 09 months prior to the reporting quarter

5.1.5 Percentage of patients ≥18 to ≤75 years of age with diabetes who had a nephropathy screening test or evidence of nephropathy during the reporting quarter or in the 09 months prior to the reporting quarter.

6.Enforcement and Sanctions

6.1 Healthcare providers, payers and third-party administrators must comply with the terms and requirements of this Standard, the DoH Standard Contract and the DoH Data Standards and Procedures.

6.2 DoH may impose sanctions in relation to any breach of requirements under this standard in accordance with the healthcare sector disciplinary regulation.

7. Relevant Reference Documents			
No.	Reference Date	Reference Name	Relation Explanation / Coding / Publication Links
1	2024	BMJ best practice	https://bestpractice.bmj.com/topics/en-
2	2024	ADA	https://diabetesjournals.org/care/article/47/S
3	2024	ADA	https://diabetesjournals.org/care/article/47/S
4	2020	Emirates Diabetes	Emirates Diabetes Society Consensus
5	2024	ADA	https://diabetesjournals.org/care/article/47/S
6	2024	ADA	https://diabetesjournals.org/care/article/47/
7	2024	ADA	https://diabetesjournals.org/care/article/47/
8	2024	ADA	https://diabetesjournals.org/care/article/47/S
9	2024	ADA	https://diabetesjournals.org/care/article/47/S
10	2024	ADA	https://diabetesjournals.org/care/article/47/S
11	2024	ADA	https://diabetesjournals.org/care/article/47/S
12	2023	Standard for the	https://www.doh.gov.ae/-
13	2011	HAAD Standard for	HAAD Standard for Medical Billing Services in
14	2024	ADA	https://diabetesjournals.org/care/article/47/
15	2022	NICE	https://www.nice.org.uk/guidance/ng28/res
16	2022	NICE	https://www.nice.org.uk/guidance/ng17/resources/type-1-diabetes-in-adults-diagnosis-and-management-pdf-1837276469701
17	2023	NICE	https://www.nice.org.uk/guidance/ng18/resources/diabetes-type-1-and-type-2-in-children-and-young-people-diagnosis-and-management-pdf-1837278149317

18	2024	ADA	https://diabetesjournals.org/clinical/article/42/2/214/154439/Section-12-Retinopathy-Neuropathy-and-Foot-Care
19	2022	ADA	https://diabetesjournals.org/care/article/45/
20	2024	CESAREAN SECTION STANDARD	https://www.doh.gov.ae/-/media/A3CF7597ABC94300AA0425B63A267051.ashx/media/53DDEF165163450481481DE46FCA653C.ashx

8. Appendices

Appendix 1:

Table 1—Etiologic classification of diabetes mellitus [1,14]

1	T1DM (b-cell destruction, usually leading to absolute insulin deficiency) A. Immune mediated B. Idiopathic
2	T2DM (may range from predominantly insulin resistance with relative insulin deficiency to a predominantly secretory defect with insulin resistance)
3	Other specific types A. Genetic defects of b-cell function 1. MODY 3 (Chromosome 12, HNF-1a) 2. MODY 1 (Chromosome 20, HNF-4a) 3. MODY 2 (Chromosome 7, glucokinase) 4. Other very rare forms of MODY (e.g., MODY 4: Chromosome 13, insulin promoter factor-1; MODY 6: Chromosome 2, NeuroD1; MODY 7: Chromosome 9, carboxyl ester lipase) 5. Transient neonatal diabetes (most commonly ZAC/HYAMI imprinting defect on 6q24) 6. Permanent neonatal diabetes (most commonly KCNJ11 gene encoding Kir6.2 subunit of b-cell KATP channel) 7. Mitochondrial DNA 8. Others B. Genetic defects in insulin action 1. Type A insulin resistance 2. Leprechaunism 3. Rabson-Mendenhall syndrome 4. Lipoatrophic diabetes 5. Others C. Diseases of the exocrine pancreas 1. Pancreatitis 2. Trauma/pancreatectomy 3. Neoplasia 4. Cystic fibrosis 5. Hemochromatosis 6. Fibrocalculous pancreatopathy 7. Others D. Endocrinopathies 1. Acromegaly. 2. Cushing's syndrome 3. Glucagonoma 4. Pheochromocytoma 5. Hyperthyroidism 6. Somatostatinoma 7. Aldosteronoma 8. Others E. Drug or chemical induced 1. Vacor 2. Pentamidine 3. Nicotinic acid 4. Glucocorticoids 5. Thyroid hormone 6. Diazoxide 7. b-Adrenergic agonists 8. Thiazides 9. Dilantin 10. g-Interferon 11. Others F. Infections 1. Congenital rubella

	2. Cytomegalovirus 3. Others G. Uncommon forms of immune-mediated diabetes 1. Stiff-man syndrome 2. Anti-insulin receptor antibodies 3. Others H. Other genetic syndromes sometimes associated with diabetes 1. Down syndrome 2. Klinefelter syndrome 3. Turner syndrome 4. Wolfram syndrome 5. Friedreich ataxia 6. Huntington chorea 7. Laurence-Moon-Biedl syndrome 8. Myotonic dystrophy 9. Porphyria 10. Prader-Willi syndrome 11. Others
4	A. Gestational diabetes mellitus

Patients with any form of diabetes may require insulin treatment at some stage of their disease. Such use of insulin does not, of itself, classify the patient.

Table 2: Criteria for screening for diabetes or prediabetes in asymptomatic adults:

1	Testing should be considered in adults with overweight or obesity (BMI ≥25 kg/m2 or ≥23 kg/m2 in Asian American individuals) who have one or more of the following risk factors: • First-degree relative with diabetes • High-risk race and ethnicity (e.g., African American, Latino, Native American, Asian African, Arab, American, Pacific Islander) • History of cardiovascular disease • Hypertension (≥130/80 mmHg or on therapy for hypertension) • HDL cholesterol level <35 mg/dL (<0.9 mmol/L) and/or a triglyceride level >250 mg/dL (>2.8 mmol/L) • Individuals with polycystic ovary syndrome • Physical inactivity • Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)
2	People with prediabetes (HbA1C ≥5.7% [≥39 mmol/mol], IGT, or IFG) should be tested yearly.
3	People who were diagnosed with GDM should have lifelong testing at least every 3 years.
4	For all other people, testing should begin at age 18 years.
5	If results are normal, testing should be repeated at a minimum of 3-year intervals, with consideration of more frequent testing depending on initial results and risk status.
6	People with HIV, exposure to high-risk medicines, history of pancreatitis
GDM: gestational diabetes mellitus; IFG: impaired fasting glucose; IGT: impaired glucose tolerance	

Table 3 Risk-based screening for T2DM or prediabetes in asymptomatic children and adolescents:

Screening should be considered in youth* who are overweight (≥ 85th percentile) or obese (≥ 95th percentile) and who have one or more additional risk factors based on the strength of their association with diabetes: • Maternal history of diabetes or GDM during the child's gestation • Family history of T2DM in first- or second-degree relative • Race/ethnicity (Native American, African, Arab, American, Latino, Asian American, Pacific Islander) • Signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia, polycystic ovary syndrome, or small-for-gestational-age birth weight.

*GDM, gestational diabetes mellitus. *After the onset of puberty or after 10 years of age, whichever occurs earlier. If tests are normal, repeat testing at a minimum of 3-year intervals (or more frequently if BMI is increasing or risk factor profile deteriorating) is recommended. Reports of T2DM before age 10 years exist, and this can be considered with numerous risk factors.*

Table 4—Criteria defining prediabetes* [14]

FPG 100 mg/dL (5.6 mmol/L) to 125 mg/dL (6.9 mmol/L) (IFG)
OR
2-h PG during 75-g OGTT 140 mg/dL (7.8 mmol/L) to 199 mg/dL (11.0 mmol/L) (IGT)
OR
HbA1C 5.7–6.4% (39–47 mmol/mol)

*FPG, fasting plasma glucose; IFG, impaired fasting glucose; IGT, impaired glucose tolerance; OGTT, oral glucose tolerance test; 2-h PG, 2-h plasma glucose. *For all three tests, risk is continuous, extending below the lower limit of the range and becoming disproportionately greater at the higher end of the range.*

Table 5 components of the comprehensive diabetes medical evaluation at initial, follow-up, and annual visits:

		Initial visit	Every follow-up visit (3 to 6 months)	Annual visit
Neurovascular complications	Fundoscopic examination (refer to eye specialist) or retinal photograph with appropriately trained graders (primary and secondary)	✓		✓
	Screen for PAD (pedal pulses-refer for ABI if diminished	✓		✓
Laboratory Evaluation	• HbA1C, if the results are not available within the past 3 months	✓	✓	✓
	• If not performed/available within the past year	✓		✓
	➢ Lipid profile, including total, LDL, and HDL cholesterol and triglycerides*	✓		✓
	➢ Liver function tests*	✓		✓
	➢ Spot urinary albumin-to-creatinine ratio	✓		✓
	➢ Serum creatinine and estimated glomerular filtration rate**	✓		✓
	➢ Thyroid stimulating hormone in people with T1DM*	✓		✓
	➢ Vitamin B12 if on metformin	✓		✓
	➢ CBC with platelets	✓		✓
	➢ Serum potassium level in people with diabetes on ACE inhibitors, ARBs, or diuretics**	✓		✓

*May also need to be checked after initiation or dose changes of medications that effect these laboratory values

**May be needed more frequently in people with diabetes with known chronic kidney disease or with changes in medications that affect kidney function and serum potassium.

Table 6 Recommended Immunization for Adults with Diabetes

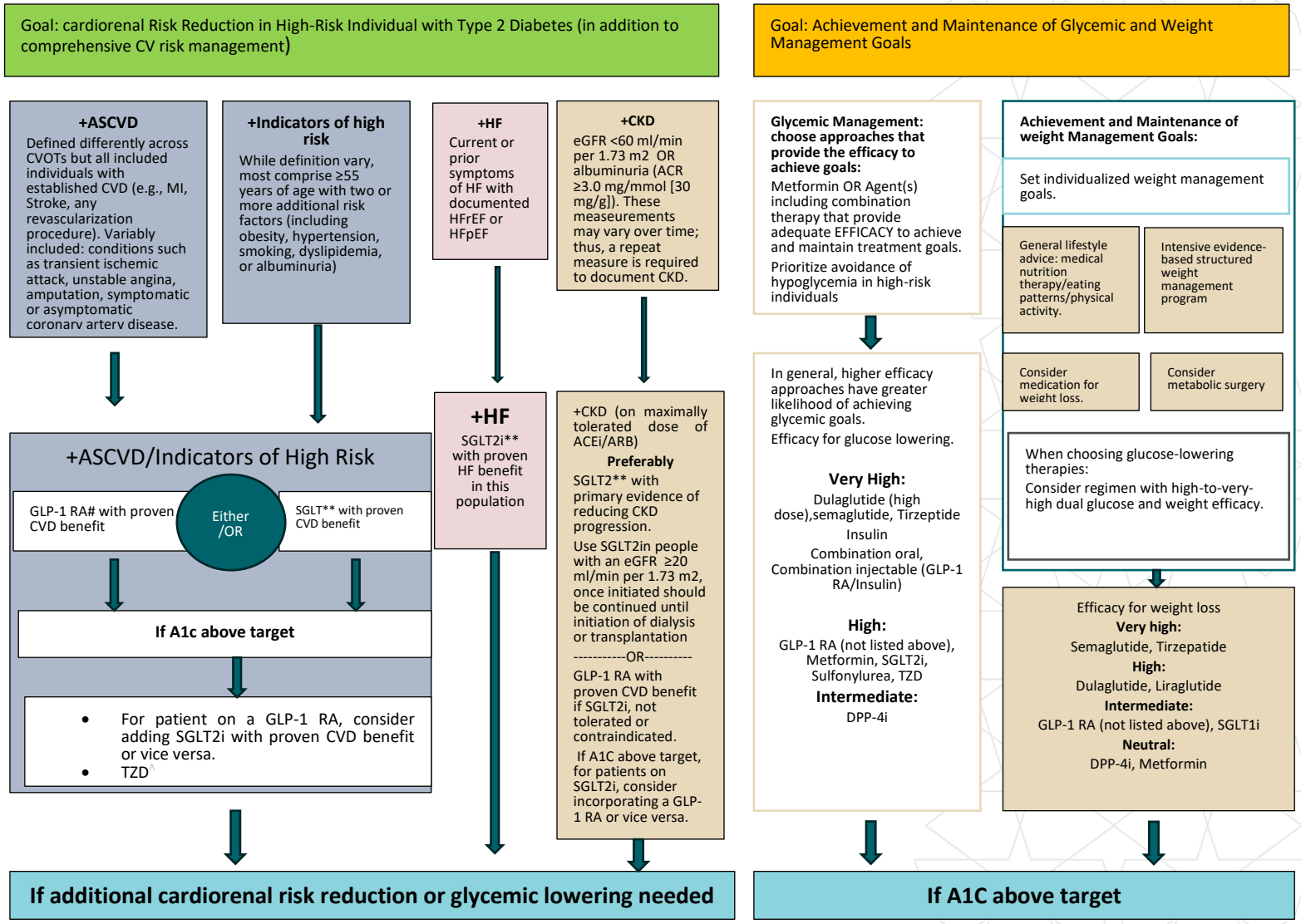
Vaccine	Recommended ages	Schedule	GRADE evidence type*
COVID-19	Recommended for all 6 months of age and older	Current initial vaccination and boosters	
Hepatitis B	Recommended for adults with diabetes aged <60 years; for adults aged ≥60 years, hepatitis B vaccine may be administered at the discretion of the treating clinician based on the person's likelihood of acquiring hepatitis B infection		
Influenza	All people with diabetes advised not to receive live attenuated influenza vaccine	Annual	
Pneumonia (PPSV23 [Pneumovax])	19–64 years of age, vaccinate with Pneumovax	One dose is recommended for those who previously received PCV13; if PCV15 was used, follow with PPSV23 ≥1 year later; PPSV23 is not indicated after PCV20; adults who received only PPSV23 may receive PCV15 or PCV20 ≥1 year after their last dose	2
	≥65 years of age	One dose is recommended for those who previously received PCV13; if PCV15 was used, follow with PPSV23 ≥1 year later; PPSV23 is not indicated after PCV20; adults who received only PPSV23 may receive PCV15 or PCV20 ≥1 year after their last dose	2
PCV20 or PCV15	Adults 19–64 years of age, with an immunocompromising condition (e.g., chronic renal failure), cochlear implant, or cerebrospinal fluid leak	One dose of PCV15 or PCV20 is recommended by the Centers for Disease Control and Prevention	3
	19–64 years of age, immunocompetent	For those who have never received any pneumococcal vaccine, the CDC recommends one dose of PCV15 or PCV20	3
	≥65 years of age, immunocompetent, have shared decision-making discussion with health care professionals	One dose of PCV15 or PCV20; PCSV23 may be given ≥8 weeks after PCV15; PPSV23 is not indicated after PCV20	3
RSV	Older adults ≥60 years of age with diabetes appear to be a risk group	Adults aged ≥60 years may receive a single dose of an RSV vaccine	
Tetanus, diphtheria, pertussis (Tdap)	All adults; pregnant individuals should have an extra dose	Booster every 10 years	2 for effectiveness, 3 for safety
Zoster	≥50 years of age	Two-dose Shingrix, even if previously vaccinated	1

For a comprehensive list of vaccines, refer to the Centers for Disease Control and Prevention web site at www.cdc.gov/vaccines/ Advisory Committee on Immunization Practices recommendations can be found at www.cdc.gov/vaccines/acip/recommendations. **GRADE:** Grading of Recommendations Assessment, Development, and Evaluation; **PCV13:** 13-valent pneumococcal conjugate vaccine; **PCV15:** 15-valent pneumococcal conjugate vaccine; **PCV 20:** 20-valent pneumococcal conjugate vaccine; **PPSV23:** 23-valent pneumococcal polysaccharide vaccine; **RSV:** Respiratory syncytial virus.

* Evidence type: 1, randomized controlled trials (RCTs) or overwhelming evidence from observational studies; 2, RCTs with important limitations or exceptionally strong evidence from observational studies; 3, observational studies or RCTs with notable limitations; 4, clinical experience and observations, observational studies with important limitations, or RCTs with several major limitations.

Figure 1: USE OF GLUCOSE-LOWERING MEDICATIONS IN THE MANAGEMENT OF T2DM:

Healthy Lifestyle Behaviors; Diabetes Self-Management Education and Support (DSMES); Social Determinants of Health (SDOH)



* In people with HF, CKD, established CVD, or multiple risk factors for CVD, the decision to use a GLP-1 RA or SGLT2i with proven benefit should be independent of background use of metformin; † A strong recommendation is warranted for people with CVD and a weaker recommendation for those with indicators of high CV risk. Moreover, a higher absolute risk reduction and thus lower numbers needed to treat are seen at higher levels of baseline risk and should be factored into the shared decision-making process. See text for details; ^ Low-dose TZD may be better tolerated and similarly effective; § For SGLT2i, CV/renal outcomes trials demonstrate their efficacy in reducing the risk of composite MACE, CV death, all-cause mortality, MI, HHF, and renal outcomes in individuals with T2D with established/high risk of CVD; # For GLP-1 RA, CVOTs demonstrate their efficacy in reducing composite MACE, CV death, all-cause mortality, MI, stroke, and renal endpoints in individuals with T2D with established/high risk of CVD.

Appendix 2:

Diabetes and Continuous Glucose Monitoring (CGM)

As per international best practice guidelines, CGM is recommended for diabetes as per below criteria:

T1DM:

CGM is recommended for all adults and children with T1DM.

T2DM:

CGM is recommended for adults with T2DM on multiple daily insulin injections if any of the following apply: **(1,15,16)**

- They have recurrent hypoglycemia or severe hypoglycemia
- They have impaired hypoglycemia awareness.
- They have a condition or disability (including a learning disability or cognitive impairment) that means they cannot self-monitor their blood glucose by capillary blood glucose monitoring.
- They would otherwise be advised to self-measure at least 8 times a day.

Diabetes in Pregnancy:

- CGM is recommended for all women with T1DM.
- CGM is recommended for pregnant women who are on insulin therapy but do not have T1DM.

Appendix 3: Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes

Diabetes Self-Management Education and Support

1. Strongly encourage all people with diabetes to participate in diabetes self-management education and support (DSMES) to facilitate informed decision-making, self-care behaviors, problem-solving, and active collaboration with the health care team.
2. There are five critical times to evaluate the need for DSMES to promote skills acquisition to aid treatment plan implementation, medical nutrition therapy, and well-being: at diagnosis, when not meeting treatment goals, annually, when complicating factors develop (medical, physical, and psychosocial), and when transitions in life and care occur.
3. Clinical outcomes, health status, and well-being are key goals of DSMES that should be assessed as part of routine care.
4. DSMES should be culturally sensitive and responsive to individual preferences, needs, and values and may be offered in group or individual settings. Such education and support should be documented and made available to members of the entire diabetes care team.
5. Consider offering DSMES via telehealth and/or digital interventions to address barriers to access and improve satisfaction.
6. Identify and address barriers to DSMES that exist at the payer, health system, clinic, health care professional, and individual levels.
7. Include social determinants of health of the target population in guiding design and delivery of DSMES with the goal of health equity across all populations.

   See Table 7 for specific nutrition recommendations. Because of the progressive nature of T2DM, behavior modification alone may not be adequate to maintain euglycemia over time.

Physical Activity

8. Counsel youth with T1DM or T2DM to engage in 60 min/day or more of moderate- or vigorous-intensity aerobic activity, with vigorous muscle-strengthening and bone-strengthening activities at least 3 days/week.
9. Counsel most adults with T1DM and T2DM to engage in 150 min or more of moderate- to vigorous-intensity aerobic activity per week, spread over at least 3 days/week, with no more than 2 consecutive days without activity. Shorter durations (minimum 75 min/week) of vigorous-intensity or interval training may be sufficient for younger and more physically fit individuals.
10. Counsel adults with T1DM and T2DM to engage in 2–3 sessions/week of resistance exercise on nonconsecutive days.
11. Recommend flexibility training and balance training 2–3 times/week for older adults with diabetes. Yoga and tai chi may be included based on individual preferences to increase flexibility, muscular strength, and balance.
12. For all people with diabetes, evaluate baseline physical activity and time spent in sedentary behavior (i.e., quiet sitting, lying, and leaning). For people who do not meet activity guidelines, encourage an increase in physical activities (e.g., walking, yoga, housework, gardening, swimming, and dancing) above baseline (T1DM and T2DM). Counsel that prolonged sitting should be interrupted every 30 min for blood glucose benefits.

Smoking Cessation: Tobacco, E-cigarettes.

13. Advise all people with diabetes not to use cigarettes and other tobacco products or e-cigarettes.
14. As a routine component of diabetes care and education, ask people with diabetes about the use of cigarettes or other tobacco products. After identification of use, recommend and refer for combination treatment consisting of both tobacco/smoking cessation counseling and pharmacological therapy.

Supporting Positive Health Behaviors

15. Behavioral strategies should be used to support diabetes self-management and engagement in health behaviors (e.g., taking medications, using diabetes technologies, and engaging in physical activity and healthy eating) to promote optimal diabetes health outcomes.

Psychosocial Care

16. Psychosocial care should be provided to all people with diabetes, with the goal of optimizing health-related quality of life and health outcomes. Such care should be integrated with routine medical care and delivered by trained health care professionals using a collaborative, person-centered, culturally informed approach.
17. Diabetes care teams should implement psychosocial screening protocols for general and diabetes-related mood concerns as well as other topics such as stress, quality of life, available resources (financial, social,

family, and emotional), and/or psychiatric history. Screening should occur at least annually or when there is a change in disease, treatment, or life circumstances.

18. When indicated, refer to behavioral health professionals or other trained health care professionals, ideally those with experience in diabetes, for further assessment and treatment for symptoms of diabetes distress, depression, suicidality, anxiety, treatment-related fear of hypoglycemia, disordered eating, and/or cognitive capacities. Such specialized psychosocial care should use age-appropriate standardized and validated tools and treatment approaches.
19. Consider developmental factors and use age-appropriate validated tools for psychosocial screening in people with diabetes.

Diabetes Distress

20. Screen people with diabetes, caregivers, and family members for diabetes distress at least annually, and consider more frequent monitoring when treatment targets are not met, at transitional times, and/or in the presence of diabetes complications. Health care professionals can address diabetes distress and may consider referral to a qualified behavioral health professional, ideally one with experience in diabetes, for further assessment and treatment if indicated.

Anxiety

21. Consider screening people with diabetes for anxiety symptoms, fear of hypoglycemia, or diabetes-related worries. Health care professionals can discuss diabetes-related worries and should consider referral to a qualified behavioral health professional for further assessment and treatment if anxiety symptoms indicate interference with diabetes self-management behaviors or quality of life.

Depression

22. Conduct at least annual screening of depressive symptoms in all people with diabetes and more frequently among those with a self-reported history of depression. Use age-appropriate, validated depression screening measures, recognizing that further evaluation will be necessary for individuals who have a positive screen.
23. Beginning at diagnosis of complications or when there are significant changes in medical status, consider assessment for depression.
24. Refer to qualified behavioral health professionals or other trained health care professionals with experience using evidence-based treatment approaches for depression in conjunction with collaborative care with the diabetes treatment team.

Disordered Eating Behavior

25. Consider screening for disordered or disrupted eating using validated screening measures when hyperglycemia and weight loss are unexplained based on self-reported behaviors related to medication dosing, meal plan, and physical activity. In addition, a review of the medical treatment plan is recommended to identify potential treatment-related effects on hunger/caloric intake.
26. Consider reevaluating the treatment plan of people with diabetes who present with symptoms of disordered eating behavior, an eating disorder, or disrupted patterns of eating, in consultation with a qualified professional. Key qualifications include familiarity with diabetes disease physiology, treatments for diabetes and disordered eating behaviors, and weight-related and psychological risk factors for disordered eating behaviors.

Serious Mental Illness

27. Provide an increased level of support for people with diabetes and serious mental illness through enhanced monitoring of and assistance with diabetes self-management behaviors.
28. Monitor changes in body weight, glycemia, and lipids in adolescents and adults with diabetes who are prescribed second-generation antipsychotic medications; adjust the treatment plan accordingly, if needed.

Cognitive Capacity/Impairment

29. Cognitive capacity should be monitored throughout the life span for all individuals with diabetes, particularly in those who have documented cognitive disabilities, those who experience severe hypoglycemia, very young children, and older adults.
30. If cognitive capacity changes or appears to be suboptimal for decision-making and/or behavioral self-management, referral for a formal assessment should be considered.

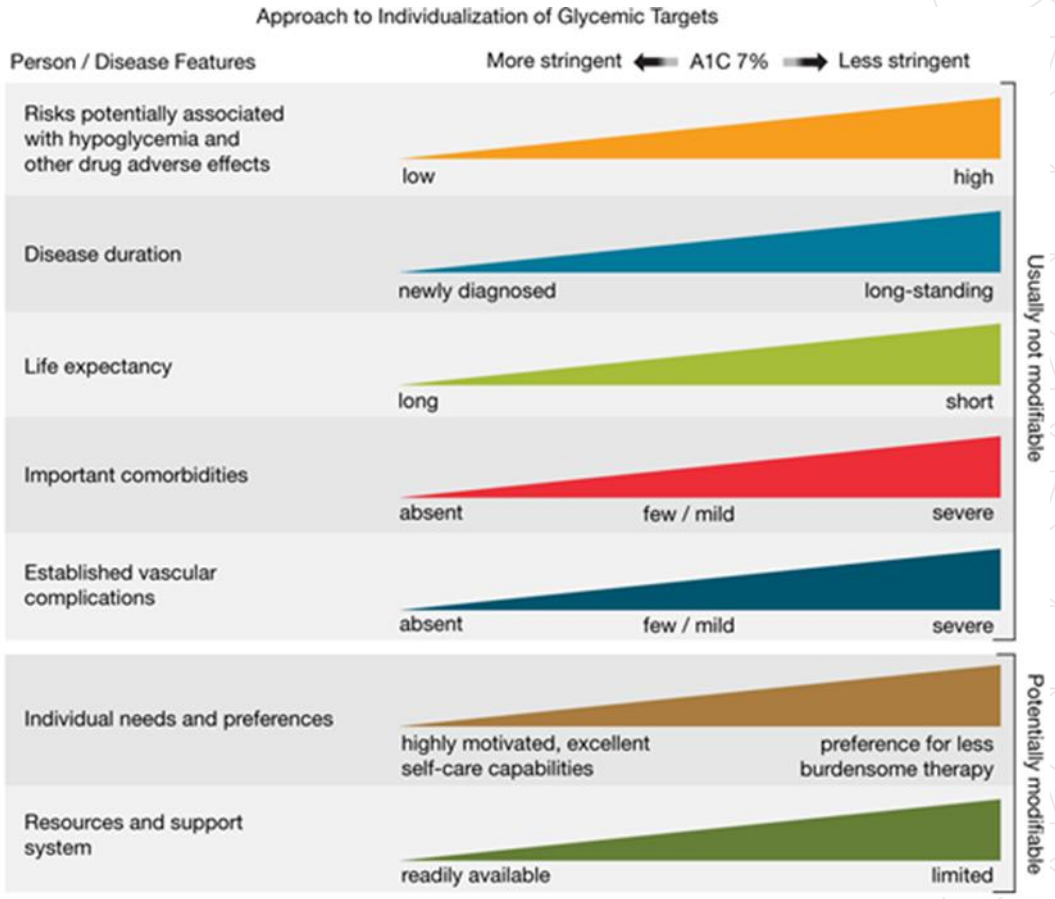
Sleep Health

31. Consider screening for sleep health in people with diabetes, including symptoms of sleep disorders, disruptions to sleep due to diabetes symptoms or management needs, and worries about sleep. Refer to sleep medicine specialists and/or qualified behavioral health professionals as indicated.
32. Counsel people with diabetes to practice sleep-promoting routines and habits (e.g., maintaining a consistent sleep schedule and limiting caffeine in the afternoon).

Table 7:

	Recommendations
Effectiveness of nutrition therapy	• An individualized medical nutrition therapy program as needed to achieve treatment goals, provided by a registered dietitian nutritionist, preferably one who has comprehensive knowledge and experience in diabetes care, is recommended for all people with T1DM or T2DM, prediabetes, and gestational diabetes mellitus. • Because diabetes medical nutrition therapy can result in cost savings **B** and improved cardiometabolic outcomes, medical nutrition therapy should be adequately reimbursed by insurance and other payers.
Energy balance	• For all people with overweight or obesity, behavioral modification to achieve and maintain a minimum weight loss of 5% is recommended.
Eating patterns and macronutrient distribution	• For diabetes prevention and management of people with prediabetes or diabetes, recommend individualized meal plans that keep nutrient quality, total calories, and metabolic goals in mind, as data do not support a specific macronutrient pattern. • Food-based dietary patterns should emphasize key nutrition principles (inclusion of non-starchy vegetables, whole fruits, legumes, whole grains, nuts/seeds, and low-fat dairy products and minimizing consumption of meat, sugar-sweetened beverages, sweets, refined grains, and ultra processed foods) in people with prediabetes and diabetes. • Consider reducing overall carbohydrate intake for adults with diabetes to improve glycemia, as this approach may be applied to a variety of eating patterns that meet individual needs and preferences.
Carbohydrates	• Emphasize minimally processed, nutrient-dense, high-fiber sources of carbohydrate (at least 14 g fiber per 1,000 kcal). • People with diabetes and those at risk are advised to replace sugar-sweetened beverages (including fruit juices) with water or low-calorie or no-calorie beverages as much as possible to manage glycemia and reduce risk for cardiometabolic disease **B** and minimize consumption of foods with added sugar that have the capacity to displace healthier, more nutrient-dense food choices. • Provide education on the glycemic impact of carbohydrate, fat, and protein tailored to an individual's needs, insulin plan, and preferences to optimize mealtime insulin dosing. • When using fixed insulin doses, individuals should be provided with education about consistent patterns of carbohydrate intake with respect to time and amount while considering the insulin action time, as it can result in improved glycemia and reduce the risk for hypoglycemia.
Protein	• For people with T2DM, consider avoiding carbohydrate sources high in protein when treating or preventing hypoglycemia, as ingested protein appears to increase insulin response without increasing plasma glucose concentrations.
Dietary fat	• Counsel people with diabetes to consider an eating plan emphasizing elements of a Mediterranean eating pattern, which is rich in monounsaturated and polyunsaturated fats and long-chain fatty acids such as fatty fish, nuts, and seeds, to reduce cardiovascular disease risk and improve glucose metabolism.
Micronutrients and herbal supplements	• Dietary supplementation with vitamins, minerals (such as chromium and vitamin D), herbs, or spices (such as cinnamon or aloe vera) are not recommended for glycemic benefits. Health care professionals should inquire about intake of supplements and counsel as needed. • Counsel against β-carotene supplementation, as there is evidence of harm for certain individuals, and it confers no benefit.
Alcohol	• Advise adults with diabetes who consume alcohol to not exceed the recommended daily limits (one drink per day for adult women and two drinks per day for adult men). Advise abstainers to not start to drink, even in moderation, solely for the purpose of improving health outcomes. • Educating people with diabetes about the signs, symptoms, and self-management of delayed hypoglycemia after drinking alcohol, especially when using insulin or insulin secretagogues, is recommended. The importance of monitoring glucose after drinking alcoholic beverages to reduce hypoglycemia risk should be emphasized.
Sodium	• Counsel people with diabetes to limit sodium consumption to <2,300 mg/day.
Nonnutritive sweeteners	• Counsel people with prediabetes and diabetes that water is recommended over nutritive and nonnutritive sweetened beverages. However, the use of nonnutritive sweeteners as a replacement for sugar-sweetened products in moderation is acceptable if it reduces overall calorie and carbohydrate intake.

Appendix 4:

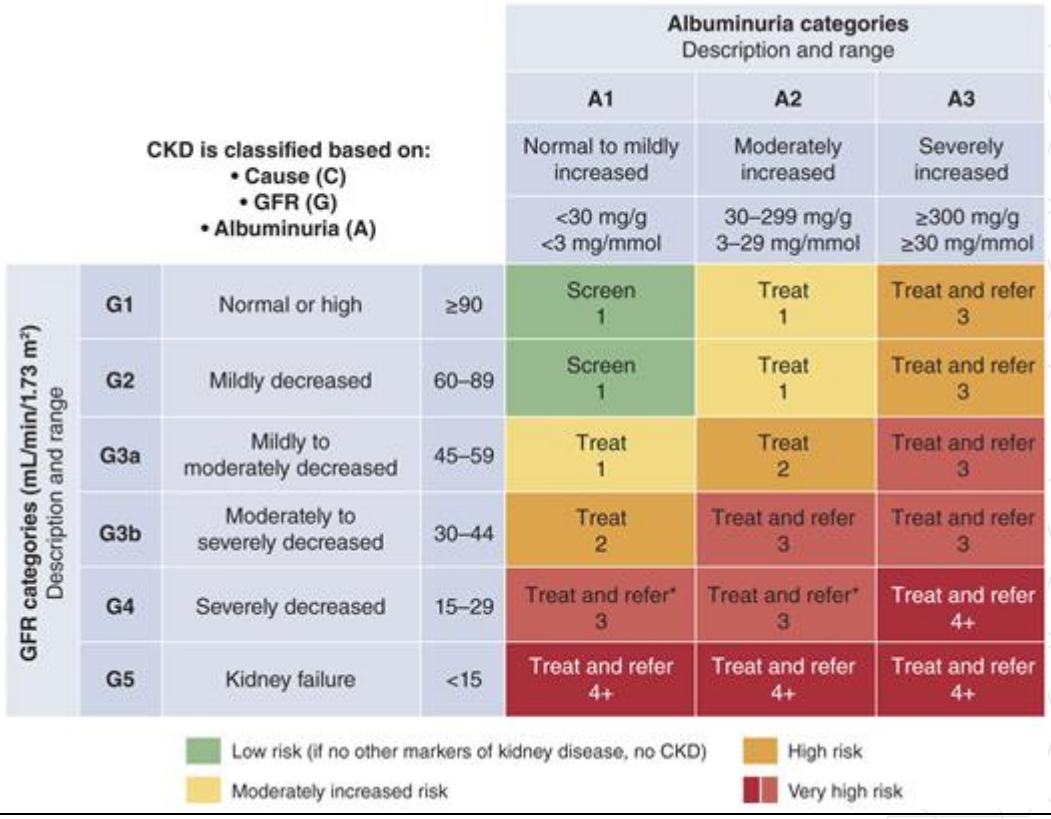

Approach to Individualization of Glycemic Targets
Person / Disease Features
More stringent
A1C 7%
Less stringent
Risks potentially associated with hypoglycemia and other drug adverse effects
low
high
Disease duration
newly diagnosed
long-standing
Life expectancy
long
short
Important comorbidities
absent
few / mild
severe
Established vascular complications
absent
few / mild
severe
Usually not modifiable
Individual needs and preferences
highly motivated, excellent self-care capabilities
preference for less burdensome therapy
Resources and support system
readily available
limited
Potentially modifiable

Appendix 5:

Assessment of hypoglycemia risk among individuals treated with insulin, sulfonylureas, or meglitinides.

Clinical/biological risk factors	Social, cultural, and economic risk factors
Major risk factors • Recent (within the past 3–6 months) level 2 or 3 hypoglycemia • Intensive insulin therapy* • Impaired hypoglycemia awareness • End-stage kidney disease • • Cognitive impairment or dementia	Major risk factors • Food insecurity • Low-income status§ • Homelessness • Fasting for religious or cultural reasons
Other risk factors • Multiple recent episodes of level 1 hypoglycemia Basal insulin therapy* • Age ≥75 years† • Female sex • High glycemic variability‡ • Polypharmacy • Cardiovascular disease • Chronic kidney disease (eGFR <60 mL/min/1.73 m^2 or albuminuria) • Neuropathy • Retinopathy • Major depressive disorder	Other risk factors • Low health literacy • Alcohol or substance use disorder
Major risk factors are those that have a consistent, independent association with a high risk for level 2 or 3 hypoglycemia. Other risk factors are those with less consistent evidence or a weaker association. These risk factors are identified through observational analyses and are intended to be used for hypoglycemia risk stratification. Individuals considered at high risk for hypoglycemia are those with ≥1 major risk factor or who have multiple other risk factors (determined by the health care professional incorporating clinical judgment). Proximal causes of hypoglycemic events (e.g., exercise and sleep) are not included. eGFR, estimated glomerular filtration rate.	
* Rates of hypoglycemia are highest for individuals treated with intensive insulin therapy (including multiple daily injections of insulin, continuous subcutaneous insulin infusion, or automated insulin delivery systems), followed by basal insulin, followed by sulfonylureas or meglitinides. Combining treatment with insulin and sulfonylureas also increases hypoglycemia risk. † Accounting for treatment plan and diabetes subtype, the oldest individuals (aged ≥75 years) have the highest risk for hypoglycemia in T2DM; younger individuals with T1DM are also at very high risk. ‡ Tight glycemic control in randomized trials increases hypoglycemia rates. In observational studies, both low and highHbA1care associated with hypoglycemia in a J-shaped relationship. § Includes factors associated with low income, such as being underinsured or living in a socioeconomically deprived area.	

Appendix 6: Chronic Kidney Disease Classification [8]



CKD: chronic kidney disease; GFR: glomerular filtration rate.

The numbers in the boxes are a guide to the frequency of screening or monitoring (number of times per year). Green reflects no evidence of CKD by estimated GFR or albuminuria, with screening indicated once per year. For monitoring of prevalent CKD, suggested monitoring varies from once per year (yellow) to four times or more per year (i.e., every 1–3 months, [deep red]) according to risks of CKD progression and CKD complications (e.g., cardiovascular disease, anemia, hyperparathyroidism). These are general parameters based only on expert opinion and underlying comorbid conditions, and disease state must be taken into account, as well as the likelihood of impacting a change in management for any individual.