Standards of Medical Care in Diabetes - 2017
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Standards of Care

- Funded out Association’s general revenues and does not use industry support.
- Slides correspond with sections within the Standards of Medical Care in Diabetes - 2017.
- Reviewed and approved by the Association’s Board of Directors.
Process

- ADA’s Professional Practice Committee (PPC) conducts annual review & revision.
- Searched Medline for human studies related to each subsection and published since January 1, 2016.
- Recommendations revised per new evidence, for clarity, or to better match text to strength of evidence.

Professional.diabetes.org/SOC
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# Evidence Grading System

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Clear evidence from well-conducted, generalizable RCTs, that are adequately powered, including</td>
</tr>
<tr>
<td></td>
<td>Evidence from a well-conducted multicenter trial or meta-analysis that incorporated quality ratings in the analysis;</td>
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<tr>
<td></td>
<td>Compelling nonexperimental evidence;</td>
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<tr>
<td></td>
<td>Supportive evidence from well-conducted RCTs that are adequately powered</td>
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<tr>
<td>B</td>
<td>Supportive evidence from a well-conducted cohort studies</td>
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<td></td>
<td>Supportive evidence from a well-conducted case-control study</td>
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<tr>
<td>C</td>
<td>Supportive evidence from poorly controlled or uncontrolled studies</td>
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<td></td>
<td>Conflicting evidence with the weight of evidence supporting the recommendation</td>
</tr>
<tr>
<td>E</td>
<td>Expert consensus or clinical experience</td>
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</tbody>
</table>
1. Promoting Health and Reducing Disparities in Populations
Key Recommendations

• Treatment decisions should be timely and based on evidence-based guidelines that are tailored to patient preferences, prognoses, and comorbidities. B

• Providers should consider the burden of treatment and self-efficacy of patients when recommending treatments. E
Key Recommendations (2)

- Treatment plans should align with the Chronic Care Model, emphasizing productive interactions between a prepared proactive practice team and an informed activated patient. A

- When feasible, care systems should support team-based care, community involvement, patient registries, and decision support tools to meet patient needs. B

Care Delivery Systems

- 33-49% of patients still do not meet targets for A1C, blood pressure, or lipids.
- 14% meet targets for all A1C, BP, lipids, and nonsmoking status.
- Progress in CVD risk factor control is slowing.
- Substantial system-level improvements are needed.
- Delivery system is fragmented, lacks clinical information capabilities, duplicates services & is poorly designed.

American Diabetes Association Standards of Medical Care in Diabetes. Promoting Health and Reducing Disparities in Populations. Diabetes Care 2017; 40 (Suppl. 1): S6-S10
Chronic Care Model

Six Core Elements:
1. Delivery system design
2. Self-management support
3. Decision support
4. Clinical information systems
5. Community resources & policies
6. Health systems

Three Key Objectives
1. Optimize Provider and Team Behavior
2. Support Patient Self-Management
3. Change the Care System
Objective 1: Optimize Provider and Team Behavior

- For patients who have not achieved beneficial levels of control in blood pressure, lipids, or glucose, the care team should prioritize timely & appropriate intensification of lifestyle and/or pharmaceutical therapy.

- Strategies include:
  - Explicit goal setting with patients
  - Identifying and addressing language, numeracy, and/or cultural barriers to care
  - Integrating evidence-based guidelines
  - Incorporating care management teams

American Diabetes Association Standards of Medical Care in Diabetes. Promoting Health and Reducing Disparities in Populations. Diabetes Care 2017; 40 (Suppl. 1): S6-S10
Objective 2: Support Patient Self-management

- Implement a systematic approach to support patient behavior change efforts, including:
  - Healthy lifestyle
  - Disease self-management
  - Prevention of diabetes complications
  - Identification of self-management problems and development of strategies to solve those problems

American Diabetes Association Standards of Medical Care in Diabetes. Promoting Health and Reducing Disparities in Populations. *Diabetes Care* 2017; 40 (Suppl. 1): S6-S10
Objective 3: Change the Care System

Successful practices prioritize providing a high quality of care. Changes that have been shown to increase quality of care include:

1. Basing care on evidence-based guidelines
2. Expanding the role of teams to implement more intensive disease management strategies
3. Redesigning the care process
4. Implementing electronic health record tools
5. Activating and educating patients

American Diabetes Association Standards of Medical Care in Diabetes. Promoting Health and Reducing Disparities in Populations. *Diabetes Care* 2017; 40 (Suppl. 1): S6-S10
Successful practices prioritize providing a high quality of care. Changes that have been shown to increase quality of care include:

6. Removing financial barriers and reducing patient out-of-pocket costs

7. Identifying community resources and public policy that supports healthy lifestyles

8. Coordinated primary care, e.g., through Patient-Centered Medical Home

9. Changes to reimbursement structure
Tailoring Treatment to Reduce Disparities

Key Recommendation

• Providers should assess social context, including potential food insecurity, housing stability, and financial barriers, and apply that information to treatment decisions. A

American Diabetes Association Standards of Medical Care in Diabetes. Promoting Health and Reducing Disparities in Populations. *Diabetes Care* 2017; 40 (Suppl. 1): S6-S10
Health Disparities

• Ethnic/Cultural/Sex Differences
• Access to Health Care
  – Lack of Health Insurance
• Food Insecurity
• Language Barriers
• Homelessness

System-Level Interventions

Key Recommendations

• Patients should be referred to local community resources when available. B

• Patients should be provided with self-management support from lay health coaches, navigators, or community health workers when available. A
2. Classification and Diagnosis of Diabetes
Classification & Diagnosis

- Classification
- Diagnostic Tests for Diabetes
- Prediabetes
- Type 1 Diabetes
- Type 2 Diabetes
- Gestational Diabetes
- Monogenic Diabetes Syndromes
- Cystic Fibrosis-Related Diabetes

1. Type 1 diabetes
   – β-cell destruction
2. Type 2 diabetes
   – Progressive insulin secretory defect
3. Gestational Diabetes Mellitus (GDM)
4. Other specific types of diabetes
   – Monogenic diabetes syndromes
   – Diseases of the exocrine pancreas, e.g., cystic fibrosis
   – Drug- or chemical-induced diabetes
# Staging of Type 1 Diabetes

## Table 2.1—Staging of type 1 diabetes (4,5)

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
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<tbody>
<tr>
<td>Stage</td>
<td></td>
<td></td>
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<tr>
<td>• Autoimmunity</td>
<td>• Autoimmunity</td>
<td>• New-onset hyperglycemia</td>
</tr>
<tr>
<td>• Normoglycemia</td>
<td>• Dysglycemia</td>
<td>• Symptomatic</td>
</tr>
<tr>
<td>• Presymptomatic</td>
<td>• Presymptomatic</td>
<td></td>
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<tr>
<td>Diagnostic criteria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Multiple autoantibodies</td>
<td>• Multiple autoantibodies</td>
<td>• Clinical symptoms</td>
</tr>
<tr>
<td>• No IGT or IFG</td>
<td>• Dysglycemia: IFG and/or IGT</td>
<td>• Diabetes by standard criteria</td>
</tr>
<tr>
<td></td>
<td>• FPG 100–125 mg/dL (5.6–6.9 mmol/L)</td>
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<tr>
<td></td>
<td>• 2-h PG 140–199 mg/dL (7.8–11.0 mmol/L)</td>
<td></td>
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<tr>
<td></td>
<td>• A1C 5.7–6.4% (39–47 mmol/mol) or ≥10% increase in A1C</td>
<td></td>
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</tbody>
</table>
Criteria for the Diagnosis of Diabetes

Fasting plasma glucose (FPG) ≥126 mg/dL (7.0 mmol/L)

OR

2-h plasma glucose ≥200 mg/dL (11.1 mmol/L) during an OGTT

OR

A1C ≥6.5%

OR

Classic diabetes symptoms + random plasma glucose ≥200 mg/dL (11.1 mmol/L)

• Blood glucose rather than A1C should be used to dx type 1 diabetes in symptomatic individuals. E

• Screening for type 1 diabetes with an antibody panel is recommended only in the setting of a clinical research study or in a first-degree family members of a proband with type 1 diabetes. B
Screening for prediabetes with an informal assessment of risk factors or validated tools should be considered in asymptomatic adults. B

Testing should begin at age 45 for all people. B

Consider testing for prediabetes in asymptomatic adults of any age with BMI ≥25 kg/m² or ≥23 kg/m² (in Asian Americans) who have 1 or more additional risk factors for diabetes. B

If tests are normal, repeat at a minimum of 3-year intervals. C
## Type 2 Diabetes Risk Test

1. **How old are you?**
   - Less than 40 years (0 points)
   - 40–49 years (1 point)
   - 50–59 years (2 points)
   - 60 years or older (3 points)

2. **Are you a man or a woman?**
   - Man (1 point)
   - Woman (0 points)

3. **If you are a woman, have you ever been diagnosed with gestational diabetes?**
   - Yes (1 point)
   - No (0 points)

4. **Do you have a mother, father, sister, or brother with diabetes?**
   - Yes (1 point)
   - No (0 points)

5. **Have you ever been diagnosed with high blood pressure?**
   - Yes (1 point)
   - No (0 points)

6. **Are you physically active?**
   - Yes (0 points)
   - No (1 point)

7. **What is your weight status? (see chart at right)**

### Height and Weight Table

<table>
<thead>
<tr>
<th>Height</th>
<th>Weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4' 10&quot;</td>
<td>119-142</td>
</tr>
<tr>
<td>4' 11&quot;</td>
<td>124-147</td>
</tr>
<tr>
<td>5' 0&quot;</td>
<td>128-152</td>
</tr>
<tr>
<td>5' 1&quot;</td>
<td>132-157</td>
</tr>
<tr>
<td>5' 2&quot;</td>
<td>136-162</td>
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<tr>
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<td>141-168</td>
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<tr>
<td>5' 4&quot;</td>
<td>145-173</td>
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<tr>
<td>5' 5&quot;</td>
<td>150-179</td>
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<tr>
<td>5' 6&quot;</td>
<td>155-185</td>
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<tr>
<td>5' 7&quot;</td>
<td>159-190</td>
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<td>5' 8&quot;</td>
<td>164-196</td>
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<tr>
<td>5' 9&quot;</td>
<td>169-202</td>
</tr>
<tr>
<td>5' 10&quot;</td>
<td>174-208</td>
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<tr>
<td>5' 11&quot;</td>
<td>179-214</td>
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<td>189-226</td>
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<tr>
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<td>194-232</td>
</tr>
<tr>
<td>6' 3&quot;</td>
<td>200-239</td>
</tr>
<tr>
<td>6' 4&quot;</td>
<td>205-245</td>
</tr>
</tbody>
</table>

8. **Add up your score**
   - (1 Point)
   - (2 Points)
   - (3 Points)

9. **Lower Your Risk**
   - Type 2 Diabetes is more common in African Americans, Hispanics/Latinos, American Indians, and Asian Americans and Pacific Islanders.
   - Higher body weights increase diabetes risk for everyone.
   - Asian Americans are at increased diabetes risk at lower body weights than the rest of the general public (about 15 pounds lower).

For more information, visit our website at diabetes.org or call 1-800-DIABETES (1-800-342-2363)

Visit us on Facebook
Facebook.com/AmericanDiabetesAssociation
• FPG, 2-h PG after 75-g OGTT, and A1C, are equally appropriate for prediabetes testing. B

• In patients with prediabetes, identify and, if appropriate, treat other CVD risk factors. B

• Consider prediabetes testing in overweight/obese children and adolescents with 2 or more add’l diabetes risk factors. E
Prediabetes*

FPG 100–125 mg/dL (5.6–6.9 mmol/L): IFG

OR

2-h plasma glucose 140–199 mg/dL (7.8–11.0 mmol/L): IGT

OR

A1C 5.7–6.4%

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

Screening for type 2 diabetes with an informal assessment of risk factors or validated tools should be considered in asymptomatic adults. B

Consider testing in asymptomatic adults of any age with BMI ≥25 kg/m² or ≥23 kg/m² in Asian Americans who have 1 or more add’l dm risk factors. B

For all patients, testing should begin at age 45 years. B

If tests are normal, repeat testing carried out at a minimum of 3-year intervals is reasonable. C

Recommendations: Screening for Type 2 Diabetes (2)

- FPG, 2-h PG after 75-g OGTT, and the A1C are equally appropriate. B
- In patients with diabetes, identify and, if appropriate, treat other CVD risk factors. B
- Consider testing for T2DM in overweight/obese children and adolescents with 2 or more add’l diabetes risk factors. E

Risk factors for Prediabetes and T2D

- A1C ≥5.7% (39 mmol/mol), IGT, or IFG on previous testing
- first-degree relative with diabetes
- high-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, Pacific Islander)
- women who were diagnosed with GDM
- history of CVD
- hypertension (≥140/90 mmHg or on therapy for hypertension)
- HDL cholesterol level <35 mg/dL (0.90 mmol/L) and/or a triglyceride level >250 mg/dL (2.82 mmol/L)
- women with polycystic ovary syndrome
- physical inactivity
- other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans).

www.diabetes.org/are-you-at-risk
Criteria for Testing for T2DM in Children & Adolescents

• Overweight plus any 2:
  – Family history of type 2 diabetes in 1st or 2nd degree relative
  – Race/ethnicity
  – Signs of insulin resistance or conditions associated with insulin resistance
  – Maternal history of diabetes or GDM

• Age of initiation 10 years or at onset of puberty

• Frequency: every 3 years

• Test with FPG, OGTT, or A1C

Recommendations: Detection and Diagnosis of GDM

- Test for undiagnosed T2DM at the 1st prenatal visit in those with risk factors. B
- Test for GDM at 24–28 weeks of gestation in women not previously known to have diabetes. A
- Screen women with GDM for persistent diabetes at 4–12 weeks postpartum, using the OGTT. E
• Women with GDM history should have lifelong screening for development of diabetes or prediabetes at least every 3 years. B

• Women with GDM history found to have prediabetes should receive lifestyle interventions or metformin to prevent diabetes. A
Screening for & Diagnosis of GDM
One-Step Strategy

• At 24-28 weeks gestation in women not previously dx’d with overt diabetes

• 75-g OGTT; Measure plasma glucose at fasting and at 1 and 2 hours.

• GDM dx’d when plasma glucose exceeds:
  – Fasting: 92 mg/dL (5.1 mmol/L)
  – 1 h: 180 mg/dL (10.0 mmol/L)
  – 2 h: 153 mg/dL (8.5 mmol/L)

Two-Step Strategy

Step 1:

• In women not previously dx’d with overt diabetes, perform 50-g GLT (nonfasting); Measure plasma glucose at 1 hour.

• If 1 hour plasma glucose level is ≥140 mg/dL* (7.8 mmol/L), proceed to step 2.

*ACOG recommends either 135 mg/dL or 140 mg/dL in high-risk ethnic minorities with higher prevalence of GDM.

Two-Step Strategy (2)

Step 2:

100-g OGTT is performed while patient is fasting. The diagnosis of GDM is made if 2 or more of the following plasma glucose levels are met or exceeded:

<table>
<thead>
<tr>
<th></th>
<th>Carpenter/Coustan</th>
<th>or</th>
<th>NDDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>95 mg/dL (5.3 mmol/L)</td>
<td></td>
<td>105 mg/dL (5.8 mmol/L)</td>
</tr>
<tr>
<td>1h</td>
<td>180 mg/dL (10.0 mmol/L)</td>
<td></td>
<td>190 mg/dL (10.6 mmol/L)</td>
</tr>
<tr>
<td>2h</td>
<td>155 mg/dL (8.6 mmol/L)</td>
<td></td>
<td>165 mg/dL (9.2 mmol/L)</td>
</tr>
<tr>
<td>3h</td>
<td>140 mg/dL (7.8 mmol/L)</td>
<td></td>
<td>145 mg/dL (8.0 mmol/L)</td>
</tr>
</tbody>
</table>

Recommendations: Monogenic Diabetes Syndromes

• All children diagnosed with diabetes in the first 6 months of life should have genetic testing for neonatal diabetes. A

• Children and adults, diagnosed in early adulthood, who have diabetes not characteristic of T1D or T2D that occurs in successive generations should have genetic testing for MODY. A

• In both instances, consultation with a center specializing in diabetes genetics is recommended. E

Recommendations: Cystic Fibrosis–Related Diabetes (CFRD)

• Annual screening for CFRD with OGTT should begin by age 10 years in all patients with cystic fibrosis not previously diagnosed with CFRD. B

• A1C is not recommended as a screening test for CFRD. B

Recommendations: Cystic Fibrosis–Related Diabetes (CFRD) (2)

- Patients with CFRD should be treated with insulin to attain individualized glycemic goals. A

- Annual monitoring for complications of diabetes is recommended, starting 5 years after CFRD diagnosis. E

- See also: “Clinical Care Guidelines for Cystic Fibrosis–Related Diabetes” at Care.Diabetes.org.
3. Comprehensive Medical Evaluation and Assessment of Comorbidities
Patient-Centered Collaborative Care

• A patient-centered communication style that uses active listening, elicits patient preferences, and assesses literacy, numeracy, and potential barriers to care should be used to optimize patient health outcomes and health-related quality of life. B
A complete medical evaluation should be performed at the initial visit to:

• Confirm & classify diagnosis \( B \)
• Detect complications & potential comorbid conditions \( E \)
• Review prior treatment & risk factor control \( E \)
• Begin formulation of care management plan \( B \)
• Develop a continuing care plan \( B \)

Components of the Comprehensive Diabetes Evaluation

Medical history:

- Age and characteristics of onset of diabetes
- Eating patterns, nutritional status, weight history, sleep behaviors, physical activity habits, nutrition education
- Presence of common comorbidities and dental disease
- Screen for psychosocial problems and other barriers to self-management
- History of tobacco use, alcohol consumption, and substance use
Components of the Comprehensive Diabetes Evaluation (2)

**Medical History (2):**

- Diabetes education, self-management, and support history & needs
- Previous treatment regimens and response to therapy (A1C records)
- Results of glucose monitoring and patient’s use of data
- DKA frequency, severity, and cause
- Hypoglycemia episodes, awareness, frequency & causes
- Assess medication-taking behaviors/barriers to adherence
Components of the Comprehensive Diabetes Evaluation (3)

Medical History (3):

• History of increased blood pressure, abnormal lipids

• Microvascular: retinopathy, nephropathy, and neuropathy (sensory, including history of foot lesions; autonomic, including sexual dysfunction and gastroparesis)

• Macrovascular: coronary heart disease, cerebrovascular disease, and peripheral arterial disease

• For women with childbearing capacity, review contraception and preconception planning

Components of the Comprehensive Diabetes Evaluation (4)

Physical Examination:

- Height, weight, and BMI; growth and pubertal development in children and adolescents
- Blood pressure determination, including orthostatic measurements when indicated
- Fundoscopic examination
- Thyroid palpation
- Skin examination
- Comprehensive foot examination

Components of the Comprehensive Diabetes Evaluation (5)

Laboratory Evaluation

• A1C, if results not available within past 3 months
• If not performed/available within past year:
  – Fasting lipid profile
  – Liver function tests
  – Spot urinary albumin-to-creatinine ratio
  – Serum creatinine and eGFR
  – Thyroid-stimulating hormone in patients with type 1 diabetes
Recommendations: Immunizations

- Provide routine vaccinations for children and adults with diabetes per age-specific CDC recommendations. C

  CDC.gov/vaccines

- Administer hepatitis B vaccine to unvaccinated adults with diabetes aged 19-59 years. C

- Consider administering hepatitis B vaccine to unvaccinated adults with diabetes ≥ 60 years old. C

Common Comorbidities

- Autoimmune Diseases (T1D)
- Cancer
- Cognitive Impairment Dementia
- Fatty Liver Disease
- Fractures
- Hearing Impairment
- HIV
- Low Testosterone (Men)
- Obstructive Sleep Apnea
- Periodontal Disease
- Psychosocial Disorders

Recommendation: Autoimmune Disease

- Consider screening patients with type 1 diabetes for autoimmune thyroid disease and celiac disease soon after diagnosis. [E]
Recommendation: Cognitive Dysfunction

- In people with cognitive impairment/dementia, intensive glucose control cannot be expected to remediate deficits. Treatment should be tailored to avoid significant hypoglycemia. B
Human Immunodeficiency Virus (HIV)

- Patients with HIV should be screened for diabetes and prediabetes with a fasting glucose level every 6–12 months before starting antiretroviral therapy and 3 months after starting or changing antiretroviral therapy. E
- If initial screening results are normal, checking fasting glucose every year is advised. E
- If prediabetes is detected, continue to measure fasting glucose levels every 3–6 months to monitor for progression to diabetes. E
Anxiety Disorders

• Consider screening for anxiety in people exhibiting anxiety or worries regarding diabetes complications, insulin injections or infusion, taking medications, and/or hypoglycemia that interfere with self-management behaviors. Refer for treatment if anxiety is present. B

• Persons with hypoglycemic unawareness, which can co-occur with fear of hypoglycemia, should be treated using blood glucose awareness training (or other evidence-based similar intervention) to help re-establish awareness of hypoglycemia and reduce fear of hypoglycemia. A
Depression

• Consider annual screening with age-appropriate depression screening measures. B

• Beginning at dx of complications or when there are significant changes in medical status, consider assessment for depression. B

• Referrals for treatment of depression should be made to mental health providers with experience using evidence-based treatment approaches. A
Disordered Eating Behavior

• Consider reevaluating the treatment regimen in people with diabetes who present with symptoms of disordered eating. B

• Consider screening for disordered eating using validated screening measures when hyperglycemia and weight loss are unexplained based on self-reported behaviors. B

Serious Mental Illness

• Annually screen people who are prescribed atypical antipsychotic medications for prediabetes or diabetes. B
• If a second-generation antipsychotic medication is prescribed, changes in weight, glycemic control, and cholesterol levels should be carefully monitored. C
• Incorporate monitoring of diabetes self-care activities into treatment goals in people with diabetes and serious mental illness. B

4. Lifestyle Management
Recommendations: Diabetes Self-Management Education & Support

- All people with diabetes should participate in DSME and DSMS both at diagnosis and as needed thereafter. B

- Effective self-management, improved clinical outcomes, health status, and quality-of-life are key outcomes of DSME and DSMS and should be measured and monitored as part of care. C

- DSME/S should be patient-centered, respectful, and responsive to individual patient preferences, needs, and values that should guide clinical decisions. A

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
Recommendations: Diabetes Self-Management Education & Support (2)

- DSME/S programs have the necessary elements in their curricula to delay or prevent the development of type 2 diabetes; DSME/S programs should be able to tailor their content when prevention of diabetes is the desired goal. B

- Because DSME and DSMS can improve outcomes and reduce costs B, DSME and DSMS should be adequately reimbursed by third-party payers. E

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
DSME / DSMS Delivery

Four critical time points for DSME/S delivery:

1. At diagnosis
2. Annually for assessment of education, nutrition, and emotional needs
3. When new complicating factors arise that influence self-management; and
4. When transitions in care occur

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
Goals of Nutrition Therapy

1. Promote & support healthful eating patterns, emphasizing a variety of nutrient-dense foods in appropriate portion sizes, to improve health and to:
   – Achieve and maintain body weight goals
   – Attain individualized glycemic, blood pressure, and lipid goals
   – Delay or prevent complications of diabetes

2. Address nutrition needs based on personal & cultural preferences, health literacy & numeracy, access to healthful foods, willingness and ability to make behavioral changes & barriers to change.

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
3. To maintain the pleasure of eating by providing non-judgmental messages about food choices.

4. Provide practical tools for developing healthful eating patterns rather than focusing on individual macronutrients, micro-nutrients, or single foods.
Recommendations: Nutrition

Effectiveness of Nutrition Therapy:

● An individualized MNT program is recommended for all people with type 1 and type 2 diabetes. A

● For people with T1D or T2D on a flexible insulin program, education on carb counting and, in some cases, fat and protein gram estimation can improve glycemic control. A

● For people whose daily insulin dosing is fixed, a consistent pattern of carb intake can result in improved glycemic control and a reduced risk of hypoglycemia. B
Effectiveness of Nutrition Therapy (2):

- Emphasizing healthy food choices and portion control may be more helpful for those with type 2 diabetes who are not taking insulin, who have limited health literacy or numeracy, and who are elderly and prone to hypoglycemia. B

- Because diabetes nutrition therapy can result in cost savings and improved outcomes (e.g., A1C reduction) A, MNT should be adequately reimbursed by insurance and other payers. E

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
Energy Balance:

- Modest weight loss achievable by the combination of lifestyle modification and the reduction of calorie intake benefits overweight or obese adults with type 2 diabetes and also those with prediabetes. Intervention programs to facilitate this process are recommended. A
Eating patterns & macronutrient distribution:

• Macronutrient distribution should be individualized while keeping total calorie and metabolic goals in mind. E

• Carbohydrate intake from whole grains, vegetables, fruits, legumes, and dairy products, with an emphasis on foods higher in fiber and lower in glycemic load, should be advised over other sources, especially those containing sugars. B
Eating patterns & macronutrient distribution (2):

- People with diabetes and those at risk should avoid sugar-sweetened beverages to control weight and reduce their risk for CVD and fatty liver \(^B\) and should minimize the consumption of foods with added sugar that have the capacity to displace healthier, more nutrient-dense food choices. \(^A\)

- A variety of eating patterns are acceptable for the management of type 2 diabetes and prediabetes including Mediterranean, DASH, and plant-based diets. \(^B\)
Protein:

- In individuals with type 2 diabetes, ingested protein appears to increase insulin response without increasing plasma glucose concentrations. Therefore, carbohydrate sources high in protein should not be used to treat or prevent hypoglycemia. B

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
Dietary Fat:

- An eating plan emphasizing elements of a Mediterranean-style diet rich in monounsaturated fats may improve glucose metabolism and lower CVD risk and can be an effective alternative to a low-fat, high-carb diet. B

- Eating foods containing long-chain ω-3 fatty acids, such as fatty fish, nuts, and seeds, is recommended to prevent or treat CVD B; however, evidence does not support a beneficial role for ω-3 dietary supplements. A
Micronutrients and herbal supplements:

• There is no clear evidence that dietary supplementation with vitamins, minerals, herbs, or spices can improve diabetes, and there may be safety concerns regarding the long-term use of antioxidant supplements such as vitamins E and C and carotene. C

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
Alcohol:

- Adults with diabetes should drink alcohol only in moderation (no more than one drink per day for adult women and no more than two drinks per day for adult men). C

- Alcohol consumption may place people with diabetes at an increased risk for hypoglycemia, especially if taking insulin or insulin secretagogues. Education and awareness regarding the recognition and management of delayed hypoglycemia are warranted. B

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
Sodium:

- As for the general population, people with diabetes should limit sodium consumption to less than 2,300 mg/day, although further restriction may be indicated for those with both diabetes and hypertension. B
Nonnutritive sweeteners:

• The use of nonnutritive sweeteners has the potential to reduce overall calorie and carbohydrate intake if substituted for caloric sweeteners and without compensation by intake of additional calories from other food sources. Nonnutritive sweeteners are generally safe to use within the defined acceptable daily intake levels. B
Recommendations: Physical Activity (1)

• Children with diabetes/prediabetes: at least 60 min/day physical activity B

• Most adults with type 1 C and type 2 B diabetes: 150+ min/wk of moderate-to-vigorous activity over at least 3 days/week with no more than 2 consecutive days without exercise. Shorter durations (minimum 75 min/week) of vigorous-intensity or interval training may be sufficient for younger and more physically fit individuals.

• Adults with type 1 C and type 2 B diabetes should perform resistance training in 2-3 sessions/week on nonconsecutive days

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
Recommendations: Physical Activity (2)

- All adults, and particularly those with type 2 diabetes, should decrease the amount of time spent in daily sedentary behavior. B Prolonged sitting should be interrupted every 30 min for blood glucose benefits, particularly in adults with type 2 diabetes. C

- Flexibility training and balance training are recommended 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. C
Recommendations: Smoking Cessation

- Advise all patients not to use cigarettes, other tobacco products A or e-cigarettes E.
- Include smoking cessation counseling and other forms of treatment as a routine component of diabetes care. B

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
Recommendations: Immunizations

- Provide routine vaccinations for children and adults with diabetes per age-specific CDC recommendations. \( \text{C} \)

  \[ \text{CDC.gov/vaccines} \]

- Administer hepatitis B vaccine to unvaccinated adults with diabetes aged 19-59 years. \( \text{C} \)

- Consider administering hepatitis B vaccine to unvaccinated adults with diabetes \( \geq 60 \) years old. \( \text{C} \)
Psychosocial care should be provided to all people with diabetes, with the goals of optimizing health outcomes and QOL. A

Psychosocial screening and follow-up include:

- Attitudes
- Expectations for medical mgmt. & outcomes
- Affect/mood
- Quality-of-life (QOL)
- Resources- financial, social & emotional
- Psychiatric history E

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
Recommendations: Psychosocial Care (2)

• Providers should consider assessment for symptoms of diabetes distress, depression, anxiety, disordered eating, and cognitive capacities using patient-appropriate standardized and validated tools at the initial visit, at periodic intervals, and when there is a change in disease, treatment, or life circumstance. B

• Consider screening older adults (aged ≥65 years) with diabetes for cognitive impairment and depression. B

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
Diabetes Distress

• Diabetes distress
  – Very common and distinct from other psychological disorders
  – Negative psychological reactions related to emotional burdens of managing a demanding chronic disease

• Recommendation: Routinely monitor people with diabetes for diabetes distress, particularly when treatment targets are not met and/or at the onset of diabetes complications. B

American Diabetes Association Standards of Medical Care in Diabetes. Lifestyle Management. Diabetes Care 2017; 40 (Suppl. 1): S33-43
## Table 4.2—Situations that warrant referral of a person with diabetes to a mental health provider for evaluation and treatment

- If self-care remains impaired in a person with diabetes distress after tailored diabetes education
- If a person has a positive screen on a validated screening tool for depressive symptoms
- In the presence of symptoms or suspicions of disordered eating behavior, an eating disorder, or disrupted patterns of eating
- If intentional omission of insulin or oral medication to cause weight loss is identified
- If a person has a positive screen for anxiety or fear of hypoglycemia
- If a serious mental illness is suspected
- In youth and families with behavioral self-care difficulties, repeated hospitalizations for diabetic ketoacidosis, or significant distress
- If a person screens positive for cognitive impairment
- Declining or impaired ability to perform diabetes self-care behaviors
- Before undergoing bariatric or metabolic surgery and after surgery if assessment reveals an ongoing need for adjustment support
5. Prevention or Delay of Type 2 Diabetes
Recommendations: Prevention or Delay of T2DM

• Patients with prediabetes should be referred to an intensive diet and physical activity behavioral counseling program adhering to the tenets of the DPP targeting a loss of 7% of body weight, and should increase their moderate physical activity to at least 150 min/week. #American Diabetes Association Standards of Medical Care in Diabetes. Prevention or delay of type 2 diabetes. Diabetes Care 2017; 40 (Suppl. 1): S44-S47
Recommendations: Prevention or Delay of T2DM (2)

- Based on cost-effectiveness of diabetes prevention, such programs should be covered by third-party payers. B

- Metformin therapy for prevention of type 2 diabetes should be considered in those with prediabetes, especially for those with BMI $\geq 35$ kg/m$^2$, aged $< 60$ years, women with prior gestational diabetes (GDM), those with rising A1C despite lifestyle intervention. A
New Recommendation: Prevention or Delay of T2DM (3)

- Long-term use of metformin may be associated with biochemical vitamin B12 deficiency, and periodic measurement of vitamin B12 levels should be considered in metformin-treated patients, especially in those with anemia or peripheral neuropathy. B

American Diabetes Association Standards of Medical Care in Diabetes. Prevention or delay of type 2 diabetes. Diabetes Care 2017; 40 (Suppl. 1): S44-S47
Recommendations: Prevention or Delay of T2DM (4)

- Monitor at least annually for the development of diabetes in those with prediabetes. E

- Screening for and treatment of modifiable risk factors for CVD is suggested. B
Recommendations: Prevention or Delay of T2DM (5)

• DSME and DSMS programs are appropriate for people with prediabetes to receive education and support to develop and maintain behaviors that can prevent or delay the onset of diabetes. B

• Technology assisted tools can be useful elements of effective lifestyle modification to prevent diabetes. B

American Diabetes Association Standards of Medical Care in Diabetes. Prevention or delay of type 2 diabetes. Diabetes Care 2017; 40 (Suppl. 1): S44-S47
6. Glycemic Targets
Assessment of Glycemic Control

- Two primary techniques available for health providers and patients to assess effectiveness of management plan on glycemic control
  1. Patient self-monitoring of blood glucose (SMBG)
  2. A1C
- CGM or interstitial glucose may have an important role assessing the effectiveness and safety of treatment in selected patients.

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
Recommendations: Glucose Monitoring

• When prescribed as part of a broader educational context, SMBG results may be helpful to guide treatment decisions and/or patient self-management for patients using less frequent insulin injections B or noninsulin therapies. E

• When prescribing SMBG, ensure that patients receive ongoing instruction and regular evaluation of SMBG technique and SMBG results, and their ability to use SMBG data to adjust therapy. E

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
Recommendations: Glucose Monitoring (2)

• Most patients on multiple-dose insulin (MDI) or insulin pump therapy should do SMBG
  - Prior to meals and snacks
  - At bedtime
  - Prior to exercise
  - When they suspect low blood glucose
  - After treating low blood glucose until they are normoglycemic
  - Prior to critical tasks such as driving
  - Occasionally postprandially

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
Recommendations: Glucose Monitoring (3)

- When used properly, CGM in conjunction with intensive insulin regimens is a useful tool to lower A1C in selected adults (aged ≥ 25 years) with type 1 diabetes. A

- Although the evidence for A1C lowering is less strong in children, teens, and younger adults, CGM may be helpful in these groups. Success correlates with adherence to ongoing use of the device. B

- CGM may be a supplemental tool to SMBG in those with hypoglycemia unawareness and/or frequent hypoglycemic episodes. C

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
Recommendations: Glucose Monitoring (4)

• Given variable adherence to CGM, assess individual readiness for continuing use of CGM prior to prescribing. E

• When prescribing CGM, robust diabetes education, training, and support are required for optimal CGM implementation and ongoing use. E

• People who have been successfully using CGM should have continued access after they turn 65 years of age. E

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
Recommendations: A1C Testing

• Perform the A1C test at least 2x annually in patients that meet treatment goals (and have stable glycemic control). E

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

• Use of point-of-care (POC) testing for A1C provides the opportunity for more timely treatment changes. E

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
# Mean Glucose Levels for Specified A1C Levels

<table>
<thead>
<tr>
<th>A1C%</th>
<th>Mean Plasma Glucose*</th>
<th>Fasting</th>
<th>Premeal</th>
<th>Postmeal</th>
<th>Bedtime</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mg/dL</td>
<td>mmol/L</td>
<td>mg/dL</td>
<td>mg/dL</td>
<td>mg/dL</td>
</tr>
<tr>
<td>6</td>
<td>126</td>
<td>7.0</td>
<td>122</td>
<td>118</td>
<td>144</td>
</tr>
<tr>
<td>&lt;6.5</td>
<td>122</td>
<td>118</td>
<td>144</td>
<td>136</td>
<td></td>
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<tr>
<td>6.5-6.99</td>
<td>142</td>
<td>139</td>
<td>164</td>
<td>153</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>154</td>
<td>8.6</td>
<td>152</td>
<td>152</td>
<td>176</td>
</tr>
<tr>
<td>7.0-7.49</td>
<td>167</td>
<td>155</td>
<td>189</td>
<td>175</td>
<td></td>
</tr>
<tr>
<td>7.5-7.99</td>
<td>178</td>
<td>179</td>
<td>206</td>
<td>222</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>183</td>
<td>10.2</td>
<td></td>
<td></td>
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<td>8-8.5</td>
<td>212</td>
<td>11.8</td>
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<td>10</td>
<td>269</td>
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<td>12</td>
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<td></td>
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</tbody>
</table>

[professional.diabetes.org/eAG](http://professional.diabetes.org/eAG)

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
Recommendations: Glycemic Goals in Adults

• A reasonable A1C goal for many nonpregnant adults is <7% (53 mmol/mol). A

• Consider more stringent goals (e.g. <6.5%) for select patients if achievable without significant hypos or other adverse effects. C

• Consider less stringent goals (e.g. <8%) for patients with a history of severe hypoglycemia, limited life expectancy, or other conditions that make <7% difficult to attain. B

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
A1C and CVD Outcomes

• DCCT: Trend toward lower risk of CVD events with intensive control (T1D)
• EDIC: 57% reduction in risk of nonfatal MI, stroke, or CVD death (T1D)
• UKPDS: nonsignificant reduction in CVD events (T2D).
• ACCORD, ADVANCE, VADT suggested no significant reduction in CVD outcomes with intensive glycemic control. (T2D)

Care.DiabetesJournals.org

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
Approach to the Management of Hyperglycemia

**Patient/Disease Features**

- Risk of hypoglycemia/drug adverse effects:
  - Low
  - High

- Disease Duration:
  - Newly diagnosed
  - Long-standing

- Life expectancy:
  - Long
  - Short

- Relevant comorbidities:
  - Absent
  - Few/mild
  - Severe

- Established vascular complications:
  - Absent
  - Few/mild
  - Severe

- Patient attitude & expected treatment efforts:
  - Highly motivated, adherent, excellent self-care capabilities
  - Less motivated, nonadherent, poor self-care capabilities

- Resources & support system:
  - Readily available
  - Limited

**Glycemic Targets**

- A1C 7%
- Usually not modifiable
- Potentially modifiable

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
### Glycemic Recommendations for Nonpregnant Adults with Diabetes

<table>
<thead>
<tr>
<th><strong>A1C</strong></th>
<th>&lt;7.0%*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(&lt;53 mmol/mol)</td>
</tr>
<tr>
<td><strong>Preprandial capillary plasma glucose</strong></td>
<td>80–130 mg/dL*</td>
</tr>
<tr>
<td></td>
<td>(4.4–7.2 mmol/L)</td>
</tr>
<tr>
<td><strong>Peak postprandial capillary plasma glucose†</strong></td>
<td>&lt;180 mg/dL*</td>
</tr>
<tr>
<td></td>
<td>(&lt;10.0 mmol/L)</td>
</tr>
</tbody>
</table>

* Goals should be individualized.
† Postprandial glucose measurements should be made 1–2 hours after the beginning of the meal.

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
• More or less stringent glycemic goals may be appropriate for individual patients.

• Postprandial glucose may be targeted if A1C goals are not met despite reaching preprandial glucose goals.
## Classification of Hypoglycemia

### Table 6.3—Classification of hypoglycemia (61)

<table>
<thead>
<tr>
<th>Level</th>
<th>Glycemic criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose alert value (level 1)</td>
<td>( \leq 70 \text{ mg/dL (3.9 mmol/L)} )</td>
<td>Sufficiently low for treatment with fast-acting carbohydrate and dose adjustment of glucose-lowering therapy</td>
</tr>
<tr>
<td>Clinically significant hypoglycemia (level 2)</td>
<td>( &lt; 54 \text{ mg/dL (3.0 mmol/L)} )</td>
<td>Sufficiently low to indicate serious, clinically important hypoglycemia</td>
</tr>
<tr>
<td>Severe hypoglycemia (level 3)</td>
<td>No specific glucose threshold</td>
<td>Hypoglycemia associated with severe cognitive impairment requiring external assistance for recovery</td>
</tr>
</tbody>
</table>
Recommendations: Hypoglycemia

• Individuals at risk for hypoglycemia should be asked about symptomatic and asymptomatic hypoglycemia at each encounter. C

• Glucose (15–20 g) preferred treatment for conscious individual with blood glucose $\leq 70$ mg/dL. E

• Glucagon should be prescribed for those at increased risk of clinically significant hypoglycemia, defined as blood glucose $< 54$ mg/dL, so it is available if needed. E

• Hypoglycemia unawareness or episodes of severe hypoglycemia should trigger treatment re-evaluation. E
Recommendations: Hypoglycemia (2)

- Insulin-treated patients with hypoglycemia unawareness or an episode of severe hypoglycemia should be advised to raise glycemic targets to strictly avoid further hypoglycemia for at least several weeks, to partially reverse hypoglycemia unawareness, and to reduce risk of future episodes. A

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

American Diabetes Association Standards of Medical Care in Diabetes. Glycemic targets. Diabetes Care 2017; 40 (Suppl. 1): S48-S56
7. Obesity Management for the Treatment of Type 2 Diabetes
Benefits of Weight Loss

• Delay progression from prediabetes to type 2 diabetes

• Positive impact on treatment of type 2 diabetes
  – Most likely to occur early in disease development

• Improves mobility, physical and sexual functioning & health-related quality of life

Recommendations: Assessment

- At each patient encounter, BMI should be calculated and documented in the medical record. B
  - Discuss with the patient
  - Asian American cutpoints:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;23 BMI kg/m²</td>
</tr>
<tr>
<td>Overweight</td>
<td>23.0 - 27.4 kg/m²</td>
</tr>
<tr>
<td>Obese</td>
<td>27.5 - 37.4 kg/m²</td>
</tr>
<tr>
<td>Extremely obese</td>
<td>≥37.5 kg/m²</td>
</tr>
</tbody>
</table>
## Overweight/Obesity Treatment

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Body Mass Index Category (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>23.0* or 25.0-26.9</td>
</tr>
<tr>
<td>Diet, physical activity &amp; behavioral therapy</td>
<td>+</td>
</tr>
<tr>
<td>Pharmacotherapy</td>
<td>+</td>
</tr>
<tr>
<td>Metabolic surgery</td>
<td></td>
</tr>
</tbody>
</table>

* Asian-American individuals

† Treatment may be indicated for selected, motivated patients.

Recommendations: Diet, physical activity & behavioral therapy

• Diet, physical activity & behavioral therapy designed to achieve >5% weight loss should be prescribed for overweight & obese patients with T2DM ready to achieve weight loss. A

• Interventions should be high-intensity (≥16 sessions in 6 months) and focus on diet, physical activity & behavioral strategies to achieve a 500 - 750 kcal/day energy deficit. A

Recommendations: Diet, physical activity & behavioral therapy

- Diets should be individualized, as those that provide the same caloric restriction but differ in protein, carbohydrate, and fat content are equally effective in achieving weight loss. A

- Patients who achieve short-term weight loss goals should be prescribed long-term maintenance programs. A

Recommendations: Diet, physical activity & behavioral therapy

- Short-term (3-month) interventions that employ very low calorie diets ($\leq 800$ kcal/day) and total meal replacements may be prescribed for select patients by trained practitioners with close medical monitoring. To maintain weight loss, such programs must incorporate long-term, comprehensive, weight maintenance counseling. B

Recommendations: Pharmacotherapy

- Consider impact on weight when choosing glucose-lowering meds for overweight or obese patients. **E**
- Minimize the medications for comorbid conditions that are associated with weight gain. **E**
- Weight loss meds may be effective adjuncts to diet, physical activity & behavioral counseling for select patients. **A**

Recommendations: Pharmacotherapy

- If patient response to weight loss medications <5% after 3 months or there are safety or tolerability issues at any time, discontinue medication and consider alternative medications or treatment approaches. 

Metabolic Surgery

- Evidence supports gastrointestinal operations as effective treatments for overweight T2DM patients.
- Randomized controlled trials with postoperative follow-up ranging from 1 to 5 years have documented sustained diabetes remission in 30–63% of patients, though erosion of remission occurs in 35-50% or more.
- With or without diabetes relapse, the majority of patients who undergo surgery maintain substantial improvement of glycemic control for at least 5 to 15 years.

Recommendations: Metabolic Surgery

• Metabolic surgery *should be recommended* to treat T2DM for all appropriate surgical candidates with BMIs $\geq 40$ (37.5*) and those with BMIs 35.0-39.9 (32.5-37.4*) when hyperglycemia is inadequately controlled despite lifestyle & optimal medical therapy. A

• Metabolic surgery *should be considered* for the treatment of T2DM in adults with BMIs 30-34.9 (27.5-32.4*) when hyperglycemia is inadequately controlled despite optimal medical control by either oral or injectable medications (including insulin). B

• Metabolic surgery should be performed in high-volume centers with multidisciplinary teams that understand and are experienced in the management of diabetes and gastrointestinal surgery. C

Recommendations: Metabolic Surgery (2)

- Long-term lifestyle support and routine monitoring of micronutrient/nutritional status must be provided after surgery. C
- People presenting for metabolic surgery should receive a comprehensive mental health assessment. B Surgery should be postponed in patients with histories of alcohol or substance abuse, significant depression, suicidal ideation, or other mental health conditions until these conditions have been fully addressed. E
- People who undergo metabolic surgery should be evaluated to assess the need for ongoing mental health services to help them adjust to medical and psychosocial changes after surgery. C

Adverse Effects

• Costly
• Some associated risks
• Outcomes vary
• Patients undergoing metabolic surgery may be at higher risk for depression, substance abuse, and other psychosocial issues
8. Pharmacologic Approaches to Glycemic Treatment
Recommendations: Pharmacologic Therapy For Type 1 Diabetes

- Most people with T1DM should be treated with multiple daily injections of prandial insulin and basal insulin or continuous subcutaneous insulin infusion (CSII). A

- Individuals who have been successfully using CSII should have continued access after they turn 65 years old. E

American Diabetes Association Standards of Medical Care in Diabetes. Approaches to glycemic treatment. Diabetes Care 2017; 40 (Suppl. 1): S64-S74
Recommendations: Pharmacological Therapy For Type 1 Diabetes (2)

- Consider educating individuals with T1DM on matching prandial insulin dose to carbohydrate intake, premeal blood glucose, and anticipated activity. \( E \)

- Most individuals with T1DM should use insulin analogs to reduce hypoglycemia risk. \( A \)
Pramlintide

- FDA approved for T1DM
- Amylin analog
- Delays gastric emptying, blunts pancreatic glucose secretion, enhances satiety
- Induces weight loss, lowers insulin dose
- Requires reduction in prandial insulin to reduce risk of severe hypos

American Diabetes Association Standards of Medical Care in Diabetes. Approaches to glycemic treatment. Diabetes Care 2017; 40 (Suppl. 1): S64-S74
Pancreas and Islet Cell Transplantation

• Can normalize glucose but require lifelong immunosuppression.

• Reserve pancreas transplantation for T1D patients:
  – Undergoing renal transplant
  – Following renal transplant
  – With recurrent ketoacidosis or severe hypos

• Islet cell transplant investigational
  – Consider for patients requiring pancreatectomy who meet eligibility criteria.

American Diabetes Association Standards of Medical Care in Diabetes. Approaches to glycemic treatment. Diabetes Care 2017; 40 (Suppl. 1): S64-S74
Recommendations: Pharmacologic Therapy For T2DM

- Metformin, if not contraindicated and if tolerated, is the preferred initial pharmacologic agent for T2DM. A

- Consider insulin therapy (with or without additional agents) in patients with newly dx’d T2DM who are markedly symptomatic and/or have elevated blood glucose levels ($\geq 300\ mg/dL$) or A1C ($\geq 10\%$). E

American Diabetes Association Standards of Medical Care in Diabetes. Approaches to glycemic treatment. Diabetes Care 2017; 40 (Suppl. 1): S64-S74
New Recommendation: Pharmacologic Therapy For T2DM

• Long-term use of metformin may be associated with biochemical vitamin B12 deficiency, and periodic measurement of vitamin B12 levels should be considered in metformin-treated patients, especially in those with anemia or peripheral neuropathy. B

American Diabetes Association Standards of Medical Care in Diabetes. Approaches to glycemic treatment. Diabetes Care 2017; 40 (Suppl. 1): S64-S74
Recommendations: Pharmacological Therapy For T2DM

• If noninsulin monotherapy at maximal tolerated dose does not achieve or maintain the A1C target over 3 months, add a second oral agent, a GLP-1 receptor agonist, or basal insulin. A

• Use a patient-centered approach to guide choice of pharmacologic agents. E

• Don’t delay insulin initiation in patients not achieving glycemic goals. B

American Diabetes Association Standards of Medical Care in Diabetes. Approaches to glycemic treatment. Diabetes Care 2017; 40 (Suppl. 1): S64-S74
## Antihyperglycemic Therapy in T2DM

**Monotherapy**

<table>
<thead>
<tr>
<th><strong>Efficacy</strong></th>
<th>Metformin</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>

**Lifestyle Management**

- **Weight**: Neutral/loss
- **Costs**: Low

**Dual Therapy**

<table>
<thead>
<tr>
<th><strong>Efficacy</strong></th>
<th>Metformin</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>

**Lifestyle Management**

- **Weight**: Gain
- **Costs**: Low

**Triple Therapy**

<table>
<thead>
<tr>
<th><strong>Combination Injectable Therapy</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(See Figure 8.2)</td>
</tr>
</tbody>
</table>

**American Diabetes Association Standards of Medical Care in Diabetes. Approaches to glycemic treatment. Diabetes Care 2017; 40 (Suppl. 1): S64-S74**
Start with Monotherapy unless:

A1C is greater than or equal to 9%, consider Dual Therapy.

A1C is greater than or equal to 10%, blood glucose is greater than or equal to 300 mg/dL, or patient is markedly symptomatic, consider Combination Injectable Therapy (See Figure 8.2).

### Monotherapy

- **Metformin**
  - **Efficacy**: High
  - **Hypoglycemic Risk**: Low
  - **Weight**: Neutral/loss
  - **Side Effects**: GI/actic acidosis
  - **Costs**: Low

If A1C target not achieved after approximately 3 months of monotherapy, proceed to 2-drug combination (order not meant to denote any specific preference — choice dependent on a variety of patient & disease-specific factors):

### Dual Therapy

- **Metformin +**
  - **Sulfonylurea**
  - **Thiazolidinedione**
  - **DPP-4 inhibitor**
  - **SGLT2 Inhibitor**
  - **GLP-1 receptor agonist**
  - **Insulin (basal)**
  - **Efficacy**: High
  - **Hypoglycemic Risk**: Moderate
  - **Weight**: Gain
  - **Side Effects**: Hypoglycemia, edema, HF, fxS
  - **Costs**: Low

If A1C target not achieved after approximately 3 months of dual therapy, proceed to 3-drug combination (order not meant to denote any specific preference — choice dependent on a variety of patient & disease-specific factors):

### Triple Therapy

- **Metformin +**
  - **Sulfonylurea**
  - **Thiazolidinedione**
  - **DPP-4 inhibitor**
  - **SGLT2 Inhibitor**
  - **GLP-1 receptor agonist**
  - **Insulin (basal)**
  - **Efficacy**: High
  - **Hypoglycemic Risk**: Low
  - **Weight**: High
  - **Side Effects**: GI, dehydration, fxS
  - **Costs**: High

If A1C target not achieved after approximately 3 months of triple therapy and patient (1) on oral combination, move to basal insulin or GLP-1 RA, (2) on GLP-1 RA, add basal insulin, or (3) on optimally titrated basal insulin, add GLP-1 RA or mealtime insulin. Metformin therapy should be maintained, while other oral agents may be discontinued on an individual basis to avoid unnecessarily complex or costly regimens (i.e., adding a fourth antihyperglycemic agent).

### Combination Injectable Therapy

(See Figure 8.2)
Insulin Therapy in T2DM

- The progressive nature of T2DM should be regularly & objectively explained to T2DM patients.

- Avoid using insulin as a threat, describing it as a failure or punishment.

- Give patients a self-titration algorithm.

American Diabetes Association Standards of Medical Care in Diabetes. Approaches to glycemic treatment. Diabetes Care 2017; 40 (Suppl. 1): S64-S74
Combination Injectable Therapy in T2DM

Initiate Basal Insulin
Usually with metformin +/- other noninsulin agent

Start: 10 U/day or 0.1-0.2 U/kg/day
Adjust: 10-15% or 2-4 units once or twice weekly to reach FBG target
For hypo: Determine & address cause; if no clear reason for hypo, dose by 4 units or 10-20%.

If A1C not controlled, consider combination injectable therapy

Add 1 rapid-acting insulin injection before largest meal
Start: 4 units, 0.1 U/kg, or 10% basal dose. If A1C >8%, consider + basal by same amount
Adjust: + dose by 1-2 units or 10-15% once or twice weekly until SMBG target reached
For hypo: Determine and address cause; if no clear reason for hypo, corresponding dose by 2-4 units or 10-20%

If A1C not controlled, advance to basal-bolus

Add GLP-1 RA
If not tolerated or A1C target not reached, change to 2 injection insulin regimen
If goals not met, consider changing to alternative insulin regimen

Change to premixed insulin twice daily (before breakfast and supper)
Start: Divide current basal dose into ⅓ AM, ⅓ PM or ⅓ AM, ⅓ PM
Adjust: + dose by 1-2 units or 10-15% once or twice weekly until SMBG target reached
For hypo: Determine and address cause; if no clear reason for hypo, corresponding dose by 2-4 units or 10-20%

If A1C not controlled, advance to 3rd injection

Add 2 rapid-acting insulin injections before meals (basal-bolus)
Start: 4 units, 0.1 U/kg, or 10% basal dose/meal. If A1C >9%, consider + basal by same amount
Adjust: + dose(s) by 1-2 units or 10-15% once or twice weekly to achieve SMBG target
For hypo: Determine and address cause; if no clear reason for hypo, corresponding dose by 2-4 units or 10-20%

If goals not met, consider changing to alternative insulin regimen

Change to premixed analog insulin 3 times daily (breakfast, lunch, supper)
Start: Add additional injection before lunch
Adjust: + doses by 1-2 units or 10-15% once or twice weekly to achieve SMBG target
For hypo: Determine and address cause; if no clear reason for hypo, corresponding dose by 2-4 units or 10-20%
Initiate Basal Insulin
Usually with metformin +/- other noninsulin agent

- **Start:** 10 U/day or 0.1-0.2 U/kg/day
- **Adjust:** 10-15% or 2-4 units once or twice weekly to reach FBG target
- **For hypo:** Determine & address cause; if no clear reason for hypo, ↓ dose by 4 units or 10-20%

If A1C not controlled, consider combination injectable therapy

**Add 1 rapid-acting insulin injection before largest meal**

- **Start:** 4 units, 0.1 U/kg, or 10% basal dose. If A1C <8%, consider ↓ basal by same amount
- **Adjust:** ↑ dose by 1-2 units or 10-15% once or twice weekly until SMBG target reached
- **For hypo:** Determine and address cause; if no clear reason for hypo, ↓ corresponding dose by 2-4 units or 10-20%

If A1C not controlled, advance to basal-bolus

**Add GLP-1 RA**

- If not tolerated or A1C target not reached, change to 2 injection insulin regimen
- If goals not met, consider changing to alternative insulin regimen

**Change to premixed insulin twice daily (before breakfast and supper)**

- **Start:** Divide current basal dose into ½ AM, ¼ PM or ½ AM, ⅝ PM
- **Adjust:** ↑ dose by 1-2 units or 10-15% once or twice weekly until SMBG target reached
- **For hypo:** Determine and address cause; if no clear reason for hypo, ↓ corresponding dose by 2-4 units or 10-20%

If A1C not controlled, advance to 3rd injection

**Add ≥2 rapid-acting insulin injections before meals (‘basal-bolus’)**

- **Start:** 4 units, 0.1 U/kg, or 10% basal dose/meal. If A1C <8%, consider ↓ basal by same amount
- **Adjust:** ↑ dose(s) by 1-2 units or 10-15% once or twice weekly to achieve SMBG target
- **For hypo:** Determine and address cause; if no clear reason for hypo, ↓ corresponding dose by 2-4 units or 10-20%

If goals not met, consider changing to alternative insulin regimen

**Change to premixed analog insulin 3 times daily (breakfast, lunch, supper)**

- **Start:** Add additional injection before lunch
- **Adjust:** ↑ doses by 1-2 units or 10-15% once or twice weekly to achieve SMBG target
- **For hypo:** Determine and address cause; if no clear reason for hypo, ↓ corresponding dose by 2-4 units or 10-20%
New Recommendation: Pharmacologic Therapy For T2DM

- In patients with long-standing suboptimally controlled type 2 diabetes and established atherosclerotic cardiovascular disease, empagliflozin or liraglutide should be considered as they have been shown to reduce cardiovascular and all-cause mortality when added to standard care. Ongoing studies are investigating the cardiovascular benefits of other agents in these drug classes. B
Average wholesale price (AWP) does not necessarily reflect discounts, rebates, or other price adjustments that may affect the actual cost incurred by the patient but highlights the importance of cost considerations.

---

### Table 8.2—Median monthly cost of maximum approved daily dose of noninsulin glucose-lowering agents in the U.S. (48)

<table>
<thead>
<tr>
<th>Class</th>
<th>Compound(s)</th>
<th>Dosage strength/product (if applicable)</th>
<th>Median AWP (min, max)*</th>
<th>Maximum approved daily dose*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biguanides</td>
<td>Metformin</td>
<td>500 mg (IR)</td>
<td>$84 ($55, $94)</td>
<td>2,000 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>850 mg (IR)</td>
<td>$108 ($55, $108)</td>
<td>2,550 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,000 mg (IR)</td>
<td>$86 ($4, $87)</td>
<td>2,000 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>500 mg (ER)</td>
<td>$90 ($82, $6,672)</td>
<td>2,000 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>750 mg (ER)</td>
<td>$72 ($65, $92)</td>
<td>1,500 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,000 mg (ER)</td>
<td>$1,028 ($1,010, $7,213)</td>
<td>2,000 mg</td>
</tr>
<tr>
<td>Sulfonylureas (2nd Gen)</td>
<td>Glyburide</td>
<td>5 mg</td>
<td>$94 ($64, $103)</td>
<td>20 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 mg (micronized)</td>
<td>$50 ($48, $71)</td>
<td>12 mg (micronized)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 mg (IR)</td>
<td>$74 ($67, $97)</td>
<td>40 mg (IR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 mg (XL)</td>
<td>$97</td>
<td>20 mg (XL)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 mg</td>
<td>$74 ($71, $198)</td>
<td>8 mg</td>
</tr>
<tr>
<td>Meglitinides (glinides)</td>
<td>Repaglinide</td>
<td>2 mg</td>
<td>$799 ($163, $878)</td>
<td>16 mg</td>
</tr>
<tr>
<td></td>
<td>Nateglinide</td>
<td>120 mg</td>
<td>$156</td>
<td>360 mg</td>
</tr>
<tr>
<td>TZDs</td>
<td>Pioglitazone</td>
<td>45 mg</td>
<td>$349 ($348, $349)</td>
<td>45 mg</td>
</tr>
<tr>
<td></td>
<td>Rosiglitazone</td>
<td>4 mg</td>
<td>$355</td>
<td>8 mg</td>
</tr>
<tr>
<td>a-Glucosidase inhibitors</td>
<td>Acarbose</td>
<td>100 mg</td>
<td>$104 ($104, 105)</td>
<td>300 mg</td>
</tr>
<tr>
<td></td>
<td>Miglitol</td>
<td>100 mg</td>
<td>$241</td>
<td>300 mg</td>
</tr>
<tr>
<td>DPP-4 inhibitors</td>
<td>Sitagliptin</td>
<td>100 mg</td>
<td>$436</td>
<td>100 mg</td>
</tr>
<tr>
<td></td>
<td>Saxagliptin</td>
<td>5 mg</td>
<td>$436</td>
<td>5 mg</td>
</tr>
<tr>
<td></td>
<td>Linagliptin</td>
<td>5 mg</td>
<td>$428</td>
<td>5 mg</td>
</tr>
<tr>
<td></td>
<td>Alogliptin</td>
<td>25 mg</td>
<td>$436</td>
<td>25 mg</td>
</tr>
<tr>
<td>Bile acid sequestrant</td>
<td>Colesevelam</td>
<td>625 mg tabs 1.875 g suspension</td>
<td>$679</td>
<td>3.75 g</td>
</tr>
<tr>
<td></td>
<td></td>
<td>625 mg tabs 1.875 g suspension</td>
<td>$1,357</td>
<td>3.75 g</td>
</tr>
<tr>
<td>Dopamine-2 agonists</td>
<td>Bromocriptine</td>
<td>0.8 mg</td>
<td>$719</td>
<td>4.8 mg</td>
</tr>
<tr>
<td>SGLT2 inhibitors</td>
<td>Canagliflozin</td>
<td>300 mg</td>
<td>$470</td>
<td>300 mg</td>
</tr>
<tr>
<td></td>
<td>Dapagliflozin</td>
<td>10 mg</td>
<td>$470</td>
<td>10 mg</td>
</tr>
<tr>
<td></td>
<td>Empagliflozin</td>
<td>25 mg</td>
<td>$470</td>
<td>25 mg</td>
</tr>
<tr>
<td>GLP-1 receptor agonists</td>
<td>Exenatide</td>
<td>10 µg pen</td>
<td>$729</td>
<td>20 µg</td>
</tr>
<tr>
<td></td>
<td>Exenatide</td>
<td>2 mg powder for suspension or pen</td>
<td>$692</td>
<td>2 mg**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(extended-release)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>18 mg/3 mL pen</td>
<td>$831</td>
<td>1.8 mg</td>
</tr>
<tr>
<td></td>
<td>Lisoglutide</td>
<td>50 mg pen</td>
<td>$527</td>
<td>50 mg**</td>
</tr>
<tr>
<td></td>
<td>Dalglibutide</td>
<td>1.5/0.5 mL pen</td>
<td>$690</td>
<td>1.5 mg**</td>
</tr>
<tr>
<td>Amylin mimetics</td>
<td>Premilnide</td>
<td>120 µg pen</td>
<td>$2,124</td>
<td>120 µg/injection**</td>
</tr>
</tbody>
</table>

ER and XL, extended release; IR, immediate release; TZD, thiazolidinedione. *Calculated for 30 day supply (AWP unit price × number of doses required to provide maximum approved daily dose × 30 days); median AWP listed alone when only one product and/or price. **Utilized to calculate median AWP (min, max); generic prices used, if available commercially. **Administered once weekly. ††AWP calculated based on 120 µg three times daily.
There have been substantial increases in the price of insulin in the past decade, and cost-effectiveness is an important consideration.

<table>
<thead>
<tr>
<th>Insulins</th>
<th>Compounds</th>
<th>Dosage form/product</th>
<th>Median AWP package price (min, max)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid-acting analogs</td>
<td>Lispro</td>
<td>U-100 vial</td>
<td>$306</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U-100 3 mL cartridges</td>
<td>$306 ($306, $379)</td>
</tr>
<tr>
<td></td>
<td>Aspart</td>
<td>U-100 vial</td>
<td>$306</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U-100 3 mL cartridges</td>
<td>$380</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U-100 prefilled pen</td>
<td>$395</td>
</tr>
<tr>
<td></td>
<td>Glulisine</td>
<td>U-100 vial</td>
<td>$283</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U-100 prefilled pen</td>
<td>$365</td>
</tr>
<tr>
<td></td>
<td>Inhaled insulin</td>
<td>Inhalation cartridges</td>
<td>$557 ($453, $754)</td>
</tr>
<tr>
<td>Short-acting</td>
<td>Human Regular</td>
<td>U-100 vial</td>
<td>$165</td>
</tr>
<tr>
<td>Intermediate-acting</td>
<td>Human NPH</td>
<td>U-100 vial</td>
<td>$165</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U-100 prefilled pen</td>
<td>$350</td>
</tr>
<tr>
<td>Concentrated Human Regular insulin</td>
<td>U-500 Human Regular insulin</td>
<td>U-500 vial</td>
<td>$165</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U-500 prefilled pen</td>
<td>$213</td>
</tr>
<tr>
<td>Basal analogs</td>
<td>Glargine</td>
<td>U-100 vial; U-100 prefilled pen; U-300 prefilled pen</td>
<td>$298</td>
</tr>
<tr>
<td></td>
<td>Detemir</td>
<td>U-100 vial; U-100 prefilled pen</td>
<td>$323</td>
</tr>
<tr>
<td></td>
<td>Degludec</td>
<td>U-100 prefilled pen; U-200 prefilled pen</td>
<td>$355</td>
</tr>
<tr>
<td>Premixed products</td>
<td>NPH/Regular 70/30</td>
<td>U-100 vial</td>
<td>$165</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U-100 prefilled pen</td>
<td>$350</td>
</tr>
<tr>
<td></td>
<td>Lispro 50/50</td>
<td>U-100 vial</td>
<td>$317</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U-100 prefilled pen</td>
<td>$394</td>
</tr>
<tr>
<td></td>
<td>Lispro 75/25</td>
<td>U-100 vial</td>
<td>$317</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U-100 prefilled pen</td>
<td>$394</td>
</tr>
<tr>
<td></td>
<td>Aspart 70/30</td>
<td>U-100 vial</td>
<td>$318</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U-100 prefilled pen</td>
<td>$395</td>
</tr>
</tbody>
</table>

AWP listed alone when only one product and/or price.
9. Cardiovascular Disease and Risk Management
Cardiovascular Disease

- CVD is the leading cause of morbidity & mortality for those with diabetes.
- Largest contributor to direct/indirect costs
- Common conditions coexisting with type 2 diabetes (e.g., hypertension, dyslipidemia) are clear risk factors for ASCVD.
- Diabetes itself confers independent risk
- Control individual cardiovascular risk factors to prevent/slow CVD in people with diabetes.
- Systematically assess all patients with diabetes for cardiovascular risk factors.

American Diabetes Association Standards of Medical Care in Diabetes.
Cardiovascular disease and risk management. Diabetes Care 2017; 40 (Suppl. 1): S75-S87
Hypertension

• Common DM comorbidity
• Prevalence depends on diabetes type, age, BMI, ethnicity
• Major risk factor for ASCVD & microvascular complications
• In T1DM, HTN often results from underlying kidney disease.
• In T2DM, HTN coexists with other cardiometabolic risk factors.
Blood Pressure Control & T2DM

Action to Control Cardiovascular Risk in Diabetes (ACCORD):

• Does SBP <120 provide better cardiovascular protection than SBP 130-140? No.

ADVANCE-BP:

• Significant risk reduction
Recommendations: Hypertension/ Blood Pressure Control

Screening and Diagnosis:

• Blood pressure should be measured at every routine visit. B

• Patients found to have elevated blood pressure should have blood pressure confirmed on a separate day. B
Systolic Targets:

• People with diabetes and hypertension should be treated to a systolic blood pressure goal of <140 mmHg. A

• Lower systolic targets, such as <130 mmHg, may be appropriate for certain individuals at high risk of CVD, if they can be achieved without undue treatment burden. C

American Diabetes Association Standards of Medical Care in Diabetes. Cardiovascular disease and risk management. Diabetes Care 2017; 40 (Suppl. 1): S75-S87
Diastolic Targets:

- Patients with diabetes should be treated to a diastolic blood pressure <90 mmHg. A

- Lower diastolic targets, such as <80 mmHg, may be appropriate for certain individuals at high risk for CVD if they can be achieved without undue treatment burden. C
Pregnant patients:

- In pregnant patients with diabetes and chronic hypertension, blood pressure targets of 120–160/80–105 mmHg are suggested in the interest of optimizing long-term maternal health and minimizing impaired fetal growth. E
Recommendations: Hypertension/ Blood Pressure Treatment

- Patients with BP >120/80 should be advised on lifestyle changes to reduce BP. B
- Patients with confirmed BP >140/90 should, in addition to lifestyle therapy, have prompt initiation and timely subsequent titration of pharmacological therapy to achieve blood pressure goals. A

American Diabetes Association Standards of Medical Care in Diabetes. Cardiovascular disease and risk management. Diabetes Care 2017; 40 (Suppl. 1): S75-S87
Recommendations: Hypertension/ Blood Pressure Treatment (2)

- Patients with confirmed office-based blood pressure >160/100mmHg 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 patients with diabetes. 

- Lifestyle intervention including:
  - Weight loss if overweight
  - DASH-style diet
  - Moderation of alcohol intake
  - Increased physical activity

American Diabetes Association Standards of Medical Care in Diabetes. Cardiovascular disease and risk management. Diabetes Care 2017; 40 (Suppl. 1): S75-S87
• Treatment for hypertension should include A
  – ACE inhibitor
  – Angiotensin II receptor blocker (ARB)
  – Thiazide-like diuretic
  – Dihydropyridine calcium channel blockers

• Multiple drug therapy (two or more agents at maximal doses) generally required to achieve BP targets.

American Diabetes Association Standards of Medical Care in Diabetes.
Cardiovascular disease and risk management. Diabetes Care 2017; 40 (Suppl. 1): S75-S87
An ACE inhibitor or angiotensin receptor blocker, at the maximum tolerated dose indicated for blood pressure treatment, is the recommended first-line treatment for hypertension in patients with diabetes and urinary albumin–to–creatinine ratio $\geq 300$ mg/g creatinine (A) or 30–299 mg/g creatinine (B). If one class is not tolerated, the other should be substituted.
• If using ACE inhibitors, ARBs, or diuretics, monitor serum creatinine / eGFR & potassium levels. B
Recommendations: Lipid Management

• In adults not taking statins, a screening lipid profile is reasonable (E):
  – At diabetes diagnosis
  – At the initial medical evaluation
  – And every 5 years, or more frequently if indicated

• Obtain a lipid profile at initiation of statin therapy, and periodically thereafter. E
Recommendations: Lipid Management (2)

• To improve lipid profile in patients with diabetes, recommend lifestyle modification A, focusing on:
  – Weight loss (if indicated)
  – Reduction of saturated fat, trans fat, cholesterol intake
  – Increase of ω-3 fatty acids, viscous fiber, plant stanols/sterols
  – Increased physical activity

American Diabetes Association Standards of Medical Care in Diabetes. Cardiovascular disease and risk management. Diabetes Care 2017; 40 (Suppl. 1): S75-S87
Recommendations: Lipid Management (3)

- Intensify lifestyle therapy & optimize glycemic control for patients with:
  - Triglyceride levels ≥ 150 mg/dL (1.7 mmol/L) and/or
  - HDL cholesterol < 40 mg/dL (1.0 mmol/L) in men and < 50 mg/dL (1.3 mmol/L) in women
- For patients with fasting triglyceride levels ≥ 500 mg/dL (5.7 mmol/L), evaluate for secondary causes and consider medical therapy to reduce the risk of pancreatitis.

American Diabetes Association Standards of Medical Care in Diabetes. Cardiovascular disease and risk management. Diabetes Care 2017; 40 (Suppl. 1): S75-S87
### Recommendations for Statin Treatment in People with Diabetes

**American Diabetes Association Standards of Medical Care in Diabetes. Cardiovascular disease and risk management. Diabetes Care 2017; 40 (Suppl. 1): S75-S87**

<table>
<thead>
<tr>
<th>Age</th>
<th>Risk Factors</th>
<th>Statin Intensity*</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40 years</td>
<td>None&lt;br&gt;ASCVD risk factor(s)&lt;br&gt;ASCVD</td>
<td>None&lt;br&gt;Moderate or high&lt;br&gt;High</td>
</tr>
<tr>
<td>40–75 years</td>
<td>None&lt;br&gt;ASCVD risk factors&lt;br&gt;ACS &amp; LDL ≥50 or in patients with history of ASCVD who can’t tolerate high dose statin</td>
<td>Moderate&lt;br&gt;High&lt;br&gt;Moderate + ezetimibe</td>
</tr>
<tr>
<td>&gt;75 years</td>
<td>None&lt;br&gt;ASCVD risk factors&lt;br&gt;ASCVD&lt;br&gt;ACS &amp; LDL ≥50 or in patients with history of ASCVD who can’t tolerate high dose statin</td>
<td>Moderate&lt;br&gt;Moderate or high&lt;br&gt;High&lt;br&gt;Moderate + ezetimibe</td>
</tr>
</tbody>
</table>
Recommendations: Lipid Management (4)

- In clinical practice, providers may need to adjust intensity of statin therapy based on individual patient response to medication (e.g., side effects, tolerability, LDL cholesterol levels). E

- Ezetimibe + moderate intensity statin therapy provides add’l CV benefit over moderate intensity statin therapy alone; consider for patients with a recent acute coronary syndrome w/ LDL ≥ 50mg/dL A or in patients with a history of ASCVD who can’t tolerate high-intensity statin therapy. E
Recommendations: Lipid Management (5)

- Combination therapy (statin/fibrate) doesn’t improve ASCVD outcomes and is generally not recommended A. Consider therapy with statin and fenofibrate for men with both trigs $\geq 204$ mg/dL (2.3 mmol/L) and HDL $\leq 34$ mg/dL (0.9 mmol/L). B

- Combination therapy (statin/niacin) hasn’t demonstrated additional CV benefit over statins alone, may raise risk of stroke & is not generally recommended. A

- Statin therapy is contraindicated in pregnancy. B
# High- and Moderate-Intensity Statin Therapy*

<table>
<thead>
<tr>
<th>High-Intensity Statin Therapy</th>
<th>Lowers LDL by ≥50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin 40-80 mg</td>
<td></td>
</tr>
<tr>
<td>Rosuvastatin 20-40 mg</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moderate-Intensity Statin Therapy</th>
<th>Lowers LDL by 30 - &lt;50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin 10-20 mg</td>
<td></td>
</tr>
<tr>
<td>Rosuvastatin 5-10 mg</td>
<td></td>
</tr>
<tr>
<td>Simvastatin 20-40 mg</td>
<td></td>
</tr>
<tr>
<td>Pravastatin 40-80 mg</td>
<td></td>
</tr>
<tr>
<td>Lovastatin 40 mg</td>
<td></td>
</tr>
<tr>
<td>Fluvastatin XL 80 mg</td>
<td></td>
</tr>
<tr>
<td>Pitavastatin 2-4 mg</td>
<td></td>
</tr>
</tbody>
</table>

* Once-daily dosing. XL, extended release

American Diabetes Association Standards of Medical Care in Diabetes. Cardiovascular disease and risk management. Diabetes Care 2017; 40 (Suppl. 1): S75-S87
Recommendations: Antiplatelet Agents

Consider aspirin therapy (75–162 mg/day) C

• As a primary prevention strategy in those with type 1 or type 2 diabetes at increased cardiovascular risk

• Includes most men or women with diabetes age ≥50 years who have at least one additional major risk factor, including:
  – Family history of premature ASCVD
  – Hypertension
  – Smoking
  – Dyslipidemia
  – Albuminuria

American Diabetes Association Standards of Medical Care in Diabetes. Cardiovascular disease and risk management. Diabetes Care 2017; 40 (Suppl. 1): S75-S87
Recommendations: Antiplatelet Agents (2)

- Aspirin is not recommended for ASCVD prevention for adults with DM at low ASCVD risk, since potential adverse effects from bleeding likely offset potential benefits. **C**
  - Low risk: such as in men or women with diabetes aged <50 years with no major additional ASCVD risk factors)

- In patients with diabetes <50 years of age with multiple other risk factors (e.g., 10-year risk 5–10%), clinical judgment is required. **E**
Recommendations: Antiplatelet Agents (3)

- Use aspirin therapy (75–162 mg/day) as secondary prevention in those with diabetes and history of ASCVD. A

- For patients w/ ASCVD & aspirin allergy, clopidogrel (75 mg/day) should be used. B

- Dual antiplatelet therapy is reasonable for up to a year after an acute coronary syndrome. B

American Diabetes Association Standards of Medical Care in Diabetes. Cardiovascular disease and risk management. Diabetes Care 2017; 40 (Suppl. 1): S75-S87
Recommendations: Coronary Heart Disease

Screening

• In asymptomatic patients, routine screening for CAD isn’t recommended & doesn’t improve outcomes provided ASCVD risk factors are treated. A

• Consider investigations for CAD with:
  – Atypical cardiac symptoms (e.g. unexplained dyspnea, chest discomfort)
  – Signs or symptoms of associated vascular disease incl. carotid bruits, transient ischemic attack, stroke, claudication or PAD
  – EKG abnormalities (e.g. Q waves) E
Recommendations: Coronary Heart Disease (2)

Treatment

• In patients with known ASCVD, use aspirin and statin therapy (if not contraindicated) **A** and consider ACE inhibitor therapy **C** to reduce risk of cardiovascular events.

• In patients with a prior MI, β-blockers should be continued for at least 2 years after the event. **B**
Recommendations: Coronary Heart Disease (3)

Treatment

• In patients with symptomatic heart failure, TZDs should not be used. A

• In type 2 diabetes, patients with stable CHF, metformin may be used if renal function is normal but should be avoided in unstable or hospitalized patients with CHF. B

American Diabetes Association Standards of Medical Care in Diabetes. Cardiovascular disease and risk management. Diabetes Care 2017; 40 (Suppl. 1): S75-S87
10. Microvascular Complications and Foot Care
Recommendations: Diabetic Kidney Disease

Screening

• At least once a year, assess urinary albumin and estimated glomerular filtration rate (eGFR):
  – In patients with type 1 diabetes duration of ≥5 years B
  – In all patients with type 2 diabetes B
  – In all patients with comorbid hypertension B

# Stages of Chronic Kidney Disease

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>eGFR (mL/min/1.73 m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kidney damage* with normal or increased eGFR</td>
<td>≥ 90</td>
</tr>
<tr>
<td>2</td>
<td>Kidney damage* with mildly decreased eGFR</td>
<td>60–89</td>
</tr>
<tr>
<td>3</td>
<td>Moderately decreased eGFR</td>
<td>30–59</td>
</tr>
<tr>
<td>4</td>
<td>Severely decreased eGFR</td>
<td>15–29</td>
</tr>
<tr>
<td>5</td>
<td>Kidney failure</td>
<td>&lt;15 or dialysis</td>
</tr>
</tbody>
</table>

*eGFR = estimated glomerular filtration rate  
* Kidney damage defined as abnormalities on pathologic, urine, blood, or imaging tests.

Recommendations: Diabetic Kidney Disease

Treatment

• Optimize glucose control to reduce risk or slow progression of diabetic kidney disease. A

• Optimize blood pressure control to reduce risk or slow progression of diabetic kidney disease. A

Recommendations: Diabetic Kidney Disease

Treatment (2)

• For people with non-dialysis dependent diabetic kidney disease, dietary protein intake should be ~0.8 g/kg body weight per day. For patients on dialysis, higher levels of dietary protein intake should be considered. B

Recommendations: Diabetic Kidney Disease

Treatment (3)

- In nonpregnant patients with diabetes and hypertension, either an ACE inhibitor or ARB is recommended for those with modestly elevated urinary albumin excretion (30–299 mg/g creatinine) B and is strongly recommended for patients w/ urinary albumin excretion ≥300 mg/g creatinine and/or eGFR <60. A

**Recommendations: Diabetic Kidney Disease**

**Treatment (4)**

- When ACE inhibitors, ARBs, or diuretics are used, consider monitoring serum creatinine & potassium levels for increased creatinine or changes in potassium. E

- Continued monitoring of UACR in patients with albuminuria on an ACE inhibitor or ARB is reasonable to assess treatment response & progression of diabetic kidney disease. E

Recommendations: Diabetic Kidney Disease

Treatment (5)

• An ACE inhibitor or ARB isn’t recommended for primary prevention of diabetic kidney disease in patients with diabetes with normal BP, normal UACR (<30 mg/g creatinine) & normal eGFR. B

• When eGFR is <60, evaluate and manage potential complications of CKD. E
Recommendations: Diabetic Kidney Disease

Treatment (6)

• If patients have eGFR <30, refer for evaluation for renal replacement treatment. A

• Promptly refer to a physician experienced in the care of DKD for: B
  – Uncertainty about the etiology of disease
  – Difficult management issues
  – Rapidly progressing kidney disease

### Management of CKD in Diabetes

<table>
<thead>
<tr>
<th>eGFR</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>Yearly measurement of creatinine, urinary albumin excretion, potassium</td>
</tr>
<tr>
<td>45-60</td>
<td>Referral to a nephrologist if possibility for nondiabetic kidney disease exists</td>
</tr>
<tr>
<td></td>
<td>Consider dose adjustment of medications</td>
</tr>
<tr>
<td></td>
<td>Monitor eGFR every 6 months</td>
</tr>
<tr>
<td></td>
<td>Monitor electrolytes, bicarbonate, hemoglobin, calcium, phosphorus, parathyroid hormone at least yearly</td>
</tr>
<tr>
<td></td>
<td>Assure vitamin D sufficiency</td>
</tr>
<tr>
<td></td>
<td>Consider bone density testing</td>
</tr>
<tr>
<td></td>
<td>Referral for dietary counselling</td>
</tr>
</tbody>
</table>

## Management of CKD in Diabetes (2)

<table>
<thead>
<tr>
<th>eGFR</th>
<th>Recommended</th>
</tr>
</thead>
</table>
| 30-44 | Monitor eGFR every 3 months  
Monitor electrolytes, bicarbonate, calcium, phosphorus, parathyroid hormone, hemoglobin, albumin  
weight every 3–6 months  
Consider need for dose adjustment of medications |
| <30   | Referral to a nephrologist |

American Diabetes Association Standards of Medical Care in Diabetes.  
Recommendations: Diabetic Retinopathy

• To reduce the risk or slow the progression of retinopathy
  – Optimize glycemic control A
  – Optimize blood pressure control A
Recommendations: Diabetic Retinopathy

Screening:

• Initial dilated and comprehensive eye examination by an ophthalmologist or optometrist:
  – Adults with type 1 diabetes, within 5 years of diabetes onset. B
  – Patients with type 2 diabetes at the time of diabetes diagnosis. B

Recommendations: Diabetic Retinopathy

Screening (2):

- If no evidence of retinopathy for one or more eye exam, exams every 2 years may be considered. B

- If diabetic retinopathy is present, subsequent examinations should be repeated at least annually by an ophthalmologist or optometrist. B

- If retinopathy is progressing or sight-threatening, more frequent exams required. B

Recommendations: Diabetic Retinopathy

Screening (3):

• Retinal photography may serve as a screening tool for retinopathy, but is not a substitute for a comprehensive eye exam. E
Recommendations: Diabetic Retinopathy

Screening (4):

• Women with preexisting diabetes who are planning pregnancy or who have become pregnant: **B**
  
  – Counseled on risk of development and/or progression of diabetic retinopathy
  
  – Eye examination should occur before pregnancy or in 1st trimester and then monitored every trimester and for 1 year postpartum as indicated by degree of retinopathy

Recommendations: Diabetic Retinopathy

Treatment:

• Promptly refer patients with macular edema, severe NPDR, or any PDR to an ophthalmologist knowledgeable & experienced in management, treatment of diabetic retinopathy. A

• Laser photocoagulation therapy is indicated to reduce the risk of vision loss in patients with high-risk PDR and, in some cases, severe NPDR. A

Recommendations: Diabetic Retinopathy

Treatment (2):

• Intravitreal injections of VEGF are indicated for center-involved diabetic macular edema, which occurs beneath the foveal center and which may threaten reading vision.

• Retinopathy is not a contraindication to aspirin therapy for cardioprotection, as it does not increase the risk of retinal hemorrhage.

Early recognition & management is important because:

1. DN is a diagnosis of exclusion.
3. Up to 50% of DPN may be asymptomatic.
4. Recognition & treatment may improve symptoms, reduce sequelae, and improve quality-of-life.

Neuropathy

Screening:

• Assess all patients for DPN at dx for T2DM, 5 years after dx for T1DM, and at least annually thereafter. B

• Assessment should include history & 10g monofilament testing, vibration sensation (large-fiber function), and temperature or pinprick (small-fiber function) B

• Symptoms of autonomic neuropathy should be assessed in patients with microvascular & neuropathic complications. E
Recommendations: Neuropathy (2)

Treatment:

• Optimize glucose control to prevent or delay the development of neuropathy in patients with T1DM A & to slow progression in patients with T2DM. B

• Assess & treat patients to reduce pain related to DPN B and symptoms of autonomic neuropathy and to improve quality of life. E

New Recommendation: Neuropathy (3)

Treatment:

• Either pregabalin or duloxetine are recommended as initial pharmacologic treatments for neuropathic pain in diabetes. A
Recommendations: Foot Care

• Perform a comprehensive foot evaluation annually to identify risk factors for ulcers & amputations. B

• All patients with diabetes should have their feet inspected at every visit. C

• History should contain prior hx of ulceration, amputation, Charcot foot, angioplasty or vascular surgery, cigarette smoking, retinopathy & renal disease; and should assess current symptoms of neuropathy and vascular disease. B

Exam should include inspection of the skin, assessment of foot deformities, neurologic assessment & vascular assessment including pulses in the legs and feet. B
Patients with symptoms of claudication, decreased, or absent pedal pulses should be referred for ABI & further vascular assessment.  

A multidisciplinary approach is recommended for individuals with foot ulcers and high-risk feet.  

The use of specialized therapeutic footwear is recommended for patients with high-risk feet.
Recommendations: Foot Care (4)

- Refer patients who smoke or who have hx of lower-extremity complications, loss of protective sensation, structural abnormalities or PAD to foot care specialists for ongoing preventive care and lifelong surveillance. C

- Provide general foot self-care education to all patients with diabetes. B

Recommendations: Foot Care (5)

• To perform the 10-g monofilament test, place the device perpendicular to the skin; Apply pressure until monofilament buckles.

• Hold in place for 1 second & release.

• The monofilament test should be performed at the highlighted sites while the patient’s eyes are closed.

11. Older Adults
Older Adults

- 26% of patients aged >65 have diabetes.
- Older adults have higher rates of premature death, functional disability & coexisting illnesses.
- At greater risk for polypharmacy, cognitive impairment, urinary incontinence, injurious falls & persistent pain.
- Screening for complications should be individualized and periodically revisited.
- At higher risk for depression

• Functional, cognitively intact older adults (≥65 years of age) with significant life expectancy should receive diabetes care using goals developed for younger adults. C

• Determine targets & therapeutic approaches by assessment of medical, functional, mental, and social geriatric domains for diabetes management. C
Recommendations: Older Adults (2)

- Glycemic goals for some older adults might be relaxed but hyperglycemia leading to symptoms or risk of acute hyperglycemic complications should be avoided in all patients. C

- Hypoglycemia should be avoided in older adults with diabetes. It should be screened for and managed by adjusting glycemic targets and pharmacologic interventions. B
Recommendations: Older Adults (3)

- Patients with DM in long-term care facilities need careful assessment to establish a glycemic goal & to make appropriate choices of glucose-lowering agents. E

- Other CV risk factors should be treated in older adults with consideration of the time frame of benefit and the individual patient. E
  - Treatment of HTN is indicated in most older adults C
  - Lipid-lowering and aspirin therapy may benefit those with life expectancy at least equal to the time frame of primary or secondary prevention trials. E
• When palliative care is needed, strict BP control may not be necessary and withdrawal of therapy may be appropriate. Intensity of lipid management can be relaxed and withdrawal of lipid-lowering therapy may be appropriate. E

• Screening for complications should be individualized, but attention should be paid to complications that would lead to functional impairment. C
Screening for geriatric syndromes may be appropriate in older adults with limitations in basic and instrumental activities of daily living. C

Older adults with DM should be considered a high-priority population for depression screening and treatment. B

Annual screening for early detection of mild cognitive impairment or dementia is indicated for adults 65 years of age or older. B
Consider diabetes education for long-term care facility staff. E

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

Recommendations: Older Adults (4)

12. Children & Adolescents
Type 1 Diabetes

- ¾ of all cases of T1DM are dx’d in patients <18 yrs.
- Providers must consider many unique aspects to care & mgmt. of children & adolescents with T1DM.
- Attention to family dynamics, developmental stages, physiological differences is essential.
- Recommendations less likely to be based on clinical trial evidence.

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. *Diabetes Care* 2017; 40 (Suppl. 1): S105-S113
Type 1 Diabetes: DSME & DSMS

• Youth w/ T1DM & parents/caregivers should receive culturally sensitive & developmentally appropriate individualized DSME and DSMS according to national standards at diagnosis and routinely thereafter. B

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. Diabetes Care 2017; 40 (Suppl. 1): S105-S113
Type 1 Diabetes: Psychosocial Issues

- At diagnosis and during routine follow-up care, assess psychosocial issues and family stresses that could impact adherence to diabetes mgmt. Provide referrals to trained mental health professionals, preferably experienced in childhood diabetes. E

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. *Diabetes Care* 2017; 40 (Suppl. 1): S105-S113
Type 1 Diabetes: Psychosocial Issues (2)

- Encourage family involvement in diabetes mgmt. tasks for children & adolescents, as premature transfer of diabetes care can result in nonadherence and deterioration in glycemic control. B

- Mental health professionals should be considered integral members of the pediatric diabetes multidisciplinary team. E
Providers should assess children’s and adolescents’ diabetes distress, social adjustment (peer relationships), and school performance to determine whether further intervention is needed. B

In youth and families with behavioral self-care difficulties, repeated hospitalizations for diabetic ketoacidosis, or significant distress, consider referral to a mental health provider for evaluation and treatment. E

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. Diabetes Care 2017; 40 (Suppl. 1): S105-S113
Type 1 Diabetes: Psychosocial Issues (4)

• Adolescents should have time by themselves with their care provider(s) starting at age 12 years. E

• Starting at puberty, preconception counseling should be incorporated into routine diabetes care for all girls of childbearing potential. A
• An A1C goal of <7.5% is recommended across all pediatric age-groups. E
# Type 1 Diabetes: Glycemic Control

<table>
<thead>
<tr>
<th>Blood glucose goal range</th>
<th>A1C</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before meals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90–130 mg/dL (5.0–7.2 mmol/L)</td>
<td>&lt;7.5%</td>
<td>A lower goal (&lt;7.0%) is reasonable if it can be achieved without excessive hypos</td>
</tr>
<tr>
<td>Bedtime/overnight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90–150 mg/dL (5.0–8.3 mmol/L)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Goals should be individualized; lower goals may be reasonable.
2. Modify BG goals in youth w/ frequent hypos or hypoglycemia unawareness.
Type 1 Diabetes: Autoimmune Disease

• Assess for the presence of autoimmune conditions associated with type 1 diabetes soon after the diagnosis and if symptoms develop. E

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. *Diabetes Care* 2017; 40 (Suppl. 1): S105-S113
Type 1 Diabetes: Thyroid Disease

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

- Measure thyroid stimulating hormone concentrations soon after diagnosis of T1DM & glucose control has been established. If normal, consider rechecking every 1-2 yrs or sooner if patient develops symptoms suggestive of thyroid dysfunction, thyromegaly, an abnormal growth rate, or unexplained glycemic variation. E
Type 1 Diabetes: Celiac Disease

- Consider screening individuals with T1DM for celiac disease soon after the diagnosis of diabetes. E
- Consider screening in individuals who have a first degree relative with celiac disease, growth failure, weight loss, failure to gain weight, diarrhea, flatulence, abdominal pain, or signs of malabsorption, or in children with frequent unexplained hypoglycemia or deterioration in glycemic control. E

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. Diabetes Care 2017; 40 (Suppl. 1): S105-S113
• Individuals with biopsy-confirmed celiac disease should be placed on a gluten-free diet and have a consultation with a dietitian experienced in managing both diabetes and celiac disease. B

Screening:

• Measure BP at each routine visit. Children found to have high-normal blood pressure (SBP or DBP ≥90th percentile for age, sex, and height) or hypertension (SBP or DBP ≥95th percentile for age, sex, and height) should have blood pressure confirmed on three separate days. B
Type 1 Diabetes: Hypertension (2)

Treatment:

- Initial treatment of high-normal BP (SBP or DBP consistently ≥90th percentile for age, sex, and height) includes dietary modification and increased exercise, if appropriate, aimed at weight control. If target blood pressure is not reached with 3–6 months of initiating lifestyle intervention, consider pharmacological treatment. E

- In addition to lifestyle modification, pharmacological treatment of HTN should be considered as soon as HTN is confirmed. E
Treatment (2):

- Consider ACE inhibitors or ARBs for the initial pharmacological treatment of HTN, following reproductive counseling due to the potential teratogenic effects of both drug classes. E

- The goal of treatment is blood pressure consistently <90th percentile for age, sex, and height. E
Type 1 Diabetes: Dyslipidemia

**Testing:**

• Obtain a fasting lipid profile in children ≥10 years of age soon after the diagnosis (after glucose control has been established). E

• If lipids are abnormal, annual monitoring is reasonable. If LDL values are <100 mg/dL, a lipid profile every 3-5 years is reasonable. E

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. *Diabetes Care* 2017; 40 (Suppl. 1): S105-S113
Type 1 Diabetes: Dyslipidemia

Treatment:

• Initial therapy: Optimize glucose control & MNT using a Step 2 American Heart Association diet to decrease the amount of saturated fat in the diet. B

• After age 10, addition of a statin is suggested in patients who, despite MNT & 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 CVD risk factors. E

• Goal of therapy is LDL <100 mg/dL. E
Type 1 Diabetes: Smoking

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

• Annual screening for albuminuria with a random spot urine sample for albumin-to-creatinine ratio (UACR), should be considered once the child has had diabetes for 5 years. B

• Estimate glomerular filtration rate at initial evaluation and then based on age, diabetes duration & treatment. E
Type 1 Diabetes: Nephropathy

Treatment:

• Consider an ACE inhibitor, titrated to normalization of albumin excretion, when elevated UACR (>30 mg/g) is documented with at least 2 of 3 urine samples. Obtain these over a 6-month interval following efforts to improve glycemic control and normalize blood pressure.

C

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. *Diabetes Care* 2017; 40 (Suppl. 1): S105-S113
Type 1 Diabetes: Retinopathy

• An initial dilated & comprehensive eye exam is recommended at age ≥10 years or after puberty has started, whichever is earlier, once the youth has had diabetes for 3–5 years. B

• After the initial exam, annual follow-up is recommended. Less frequent exams, every 2 years, may be acceptable on the advice of an eye care professional. E

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. Diabetes Care 2017; 40 (Suppl. 1): S105-S113
Type 1 Diabetes: Neuropathy

• Consider an annual comprehensive foot exam at the start of puberty or at age ≥10 years, whichever is earlier, once the youth has had type 1 diabetes for 5 years. E

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. Diabetes Care 2017; 40 (Suppl. 1): S105-S113
Type 2 Diabetes

- Distinguishing between type 1 and type 2 can be challenging.
- Diabetes-associated autoantibodies and ketosis may be present in patients with features of type 2 such as obesity and acanthosis nigricans.
- Accurate diagnosis is critical.

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. *Diabetes Care* 2017; 40 (Suppl. 1): S105-S113
Type 2 Diabetes (2)

- Comorbidities may be present at time of diagnosis.
- At diagnosis, perform:
  - BP measurement
  - Fasting lipid panel
  - Assessment for albumin excretion
  - Dilated eye exam
- Other screening & treatment recommendations similar to T1DM.

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. *Diabetes Care* 2017; 40 (Suppl. 1): S105-S113
Additional problems may include:

- PCOS
- Sleep apnea
- Hepatic steatosis
- Orthopedic complications
- Psychosocial concerns

ADA consensus report on Type 2 Diabetes in Children & Adolescents

AAP Clinical Practice Guideline
Recommendations: Transition from Pediatric to Adult Care

• Health care providers and families should begin to prepare youth in early to mid-adolescence and, at the latest, at least 1 year before the transition to adult health care. E

• Both pediatricians and adult health care providers should assist in providing support and links to resources for the teen and emerging adult. B

American Diabetes Association Standards of Medical Care in Diabetes. Children and adolescents. *Diabetes Care* 2017; 40 (Suppl. 1): S105-S113
Recommendations: Transition from Pediatric to Adult Care (2)

• Early & ongoing attention should be given to comprehensive coordinated planning for seamless transition of all youth to adult health care.

• Association position statement, “Diabetes Care for Emerging Adults”

• NDEP: http://ndep.nih.gov/transitions

• Endocrine Society: www.endocrine.org
13. Management of Diabetes in Pregnancy
Preexisting Diabetes

• Starting at puberty, preconception counseling should be incorporated into routine diabetes care for all girls of childbearing potential. A

• Family planning should be discussed and effective contraception should be prescribed and used until a woman is prepared and ready to become pregnant. A
Preexisting Diabetes (2)

• Provide preconception counseling that addresses the importance of glycemic control as close to normal as safely possible, ideally <6.5%, to reduce the risk of congenital anomalies. B
Preexisting Diabetes (3)

- Women w/ preexisting type 1 or type 2 diabetes who are pregnant or planning to become pregnant should be counseled on the risk of development and/or progression of diabetic retinopathy. Eye exams should occur before pregnancy or in the first trimester & then be monitored every trimester and for 1 year postpartum as indicated by degree of retinopathy. B
Gestational Diabetes Mellitus (GDM)

- Lifestyle change is an essential part of GDM management and may suffice for many women. Add medications if needed to achieve glycemic targets. A

- Insulin is the preferred medication for treating hyperglycemia in GDM, as it does not cross the placenta. Metformin and glyburide may be used but both, particularly metformin, cross the placenta. All oral agents lack long-term safety data. A

Gestational Diabetes Mellitus (GDM)

- Metformin, when used to treat polycystic ovary syndrome and induce ovulation, need not be continued once pregnancy has been confirmed.
General Principles for Management of Diabetes in Pregnancy

• Potentially teratogenic medications (ACE inhibitors, statins, etc.) should be avoided in sexually active women of childbearing age who are not using reliable contraception. B

• Fasting and postprandial SMBG are recommended in both GDM and preexisting diabetes in pregnancy to achieve glycemic control. Some women with preexisting diabetes should also test blood glucose preprandially. B

• Due to increased red blood cell turnover, A1C is lower in normal pregnancy than in normal nonpregnant women. A1C target in pregnancy is 6 – 6.5% (42–48 mmol/mol); <6% (42 mmol/mol) may be optimal if achievable without significant hypoglycemia, but the target may be relaxed to <7% (53 mmol/mol) if necessary to prevent hypoglycemia. B

• In pregnant patients with diabetes and hypertension, BP targets 120-160/80-105 are suggested. E
For women with gestational diabetes or preexisting type 1 or type 2 diabetes in pregnancy, the following targets are recommended:

- Fasting $\leq 95$ mg/dL (5.3 mmol/L) 
  and either
- One-hour postprandial $\leq 140$ mg/dL (7.8 mmol/L) or
- Two-hour postprandial $\leq 120$ mg/dL (6.7 mmol/L)
14. Diabetes Care in the Hospital
Recommendations: Diabetes Care in the Hospital

• Perform an A1C for all patients with diabetes or hyperglycemia admitted to the hospital if not performed in the prior 3 months. B

• Insulin therapy should be initiated for treatment of persistent hyperglycemia starting at a threshold ≥180 mg/dL. Then a target glucose of 140–180 mg/dL is recommended for the majority of critically ill A and noncritically ill patients. C

Recommendations: Diabetes Care in the Hospital (2)

- More stringent goals, such as $<140 \text{ mg/dL}$ (mmol/L) may be appropriate for selected critically ill patients, if achievable without significant hypoglycemia. C

- Intravenous insulin infusions should be administered using validated written or computerized protocols that allow for predefined adjustments in the infusion rate based on glycemic fluctuations and insulin dose. E

Recommended: Diabetes Care in the Hospital (3)

• Basal insulin or basal + bolus correction regimen is the preferred treatment for noncritically ill patients with poor oral intake or those who are taking nothing by mouth. An insulin regimen with basal, nutritional & correction components is the preferred treatment for noncritically ill patients with good nutritional intake. A

• The sole use of sliding scale insulin in the inpatient hospital setting is strongly discouraged. A
Recommendations: Diabetes Care in the Hospital (4)

- A hypoglycemia management protocol should be adopted and implemented by each hospital or hospital system. E

- A plan for preventing and treating hypoglycemia should be established for each patient. E

- Episodes of hypoglycemia in the hospital should be documented in the medical record and tracked. E

• 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 each patient. Episodes of hypoglycemia in the hospital should be documented in the medical record and tracked. E
• The treatment regimen should be reviewed and changed if necessary to prevent further hypoglycemia when a blood glucose value is \(<70 \text{ mg/dL (3.9 mmol/L).} \)  

\[ C \]

• There should be a structured discharge plan tailored to the individual patient. \[ B \]

15. Diabetes Advocacy
ADA publishes evidence-based advocacy statements on issues including:

- Diabetes and employment
- Diabetes and driving
- Diabetes management in schools, child care programs, and correctional institutions.

These are important tools in educating:

- Schools
- Employers
- Licensing agencies
- Policy makers
- Professional.diabetes.org/SOC
Helpful Resources
Guidelines

- Full version
- Abridged version for PCPs
- Free app
- Pocket cards with key figures
- Free webcast for continuing education credit

Professional.Diabetes.org/SOC
Professional Education

- Live programs
- Online self-assessment programs
- Online webcasts

Professional.Diabetes.org/CE
Diabetes Self-Management Education

- Find a recognized Diabetes Self-Management program
- Become a recognized DSME program
- Tools and resources for DSME programs
- Online education documentation tools

Professional.Diabetes.org/ERP
Professional Membership

• Journals
• Meeting, book and journal discounts
• Career center
• Quarterly member newsletter

Professional.Diabetes.org/membership
Thank you