<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Description</th>
</tr>
</thead>
</table>
| A                 | Clear or supportive evidence from adequately powered well-conducted, generalizable, randomized controlled trials  
Compelling nonexperimental evidence |
| B                 | Supportive evidence from well-conducted cohort studies or case-control study |
| C                 | Supportive evidence from poorly controlled or uncontrolled studies  
Conflicting evidence with the weight of evidence supporting the recommendation |
| E                 | Expert consensus or clinical experience |
Trends in the Number and Proportion of Higher and Lower Level Recommendations

- Higher level recommendations defined as A or B evidence grades
- Lower level recommendations defined as C or E evidence grades

Grant R W. and Kirkman M S Dia Care 2015;38:6-8
Trends in the Proportion of Higher Level Recommendations by Category

Proportion of Recommendations Each Year
1. STRATEGIES FOR IMPROVING DIABETES CARE
Recommendations: Strategies for Improving Diabetes Care (1)

- Care should be aligned with components of the Chronic Care Model to ensure 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 embedded decision support tools to meet patient needs **B**
Recommendations: Strategies for Improving Diabetes Care (2)

- Treatment decisions should be timely, based on evidence-based guidelines tailored to individual patient preferences, prognoses, and comorbidities B

- A patient-centered communication style should be employed that incorporates patient preferences, assesses literacy and numeracy, and addresses cultural barriers to care B
The American Diabetes Association highlights three themes that are woven throughout the *Standards of Care in Diabetes* that clinicians, policymakers, and advocates should keep in mind:

a) **Patient-Centeredness:** The science and art of medicine come together when the clinician is faced with making treatment recommendations for a patient who would not have met eligibility criteria for the studies on which guidelines were based.

b) **Diabetes Across the Lifespan:** There is a need to improve coordination between clinical teams as patients pass through different stages of the life span or the stages of pregnancy (preconception, pregnancy, and postpartum.)

c) **Advocacy for Patients With Diabetes:** Given the tremendous toll that lifestyle factors such as obesity, physical inactivity, and smoking have on the health of patients with diabetes, ongoing and energetic efforts are needed to address and change the societal determinants at the root of these problems.
Objective 1: Optimize Provider and Team Behavior

- Care team should prioritize timely, appropriate intensification of lifestyle and/or pharmaceutical therapy
  - Patients who have not achieved beneficial levels of blood pressure, lipid, or glucose control
- Strategies include
  - Explicit goal setting with patients
  - Identifying and addressing barriers to care
  - Integrating evidence-based guidelines
  - Incorporating care management teams
Objective 2: Support Patient Behavior Change

- Implement a systematic approach to support patient behavior change efforts
  a) Healthy lifestyle: physical activity, healthy eating, nonuse of tobacco, weight management, effective coping
  b) Disease self-management: medication taking and management, self-monitoring of glucose and blood pressure when clinically appropriate
  c) Prevention of diabetes complications: self-monitoring of foot health, active participation in screening for eye, foot, and renal complications, and immunizations
Objective 3: Change the System of Care

• The most successful practices have an institutional priority for providing high quality of care
  – Basing care on evidence-based guidelines
  – Expanding the role of teams and staff
  – Redesigning the processes of care
  – Implementing electronic health record tools
  – Activating and educating patients
  – Identifying and/or developing community resources and public policy that supports healthy lifestyles
  – Alterations in reimbursement
2. CLASSIFICATION AND DIAGNOSIS OF DIABETES
Classification of Diabetes

- Type 1 diabetes
  - β-cell destruction
- Type 2 diabetes
  - Progressive insulin secretory defect
- Other specific types of diabetes
  - Genetic defects in β-cell function, insulin action
  - Diseases of the exocrine pancreas
  - Drug- or chemical-induced
- Gestational diabetes mellitus (GDM)
Criteria for the Diagnosis of Diabetes

A1C ≥6.5%

OR

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

A random plasma glucose ≥200 mg/dL (11.1 mmol/L)
Criteria for the Diagnosis of Diabetes

A1C ≥ 6.5%

The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay*

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

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

Fasting is defined as no caloric intake for at least 8 h*

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

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

The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water*

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

In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L)
Recommendation: Screening for Type 1 Diabetes

- Inform type 1 diabetes patients of the opportunity to have their relatives screened for type 1 diabetes risk in the setting of a clinical research study E
Categories of Increased Risk for Diabetes (Prediabetes)*

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

OR

2-h plasma glucose in the 75-g OGTT
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.
Recommendations: Testing for Diabetes in Asymptomatic Patients

- Consider testing overweight/obese adults (BMI ≥25 kg/m² or ≥ 23 kg/m² in Asian Americans) with one or more additional risk factors for type 2 diabetes; for all patients, particularly those who are overweight, testing should begin at age 45 years B

- If tests are normal, repeat testing at least at 3-year intervals is reasonable C

- To test for diabetes/prediabetes, the A1C, FPG, or 2-h 75-g OGTT are appropriate B

- In those with prediabetes, identify and, if appropriate, treat other CVD risk factors B
1. Testing should be considered in all adults who are overweight (BMI ≥25 kg/m² or ≥23 kg/m² in Asian Americans) and have additional risk factors:

- Physical inactivity
- First-degree relative with diabetes
- High-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, Pacific Islander)
- Women who delivered a baby weighing >9 lb or were diagnosed with GDM
- Hypertension (≥140/90 mmHg or on therapy for hypertension)

- HDL cholesterol level <35 mg/dL (0.90 mmol/L) and/or a triglyceride level >250 mg/dL (2.82 mmol/L)
- Women with polycystic ovarian syndrome (PCOS)
- A1C ≥5.7%, IGT, or IFG on previous testing
- Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)
- History of CVD
2. In the absence of criteria (risk factors on previous slide), and particularly in those who are overweight or obese, testing for diabetes should begin at age 45 years.

3. If results are normal, testing should be repeated at least at 3-year intervals, with consideration of more frequent testing depending on initial results (e.g., those with prediabetes should be tested yearly), and risk status.
Testing to detect type 2 diabetes and prediabetes should be considered in children and adolescents who are overweight and who have two or more additional risk factors for diabetes.
Recommendations: Detection and Diagnosis of GDM (1)

- Screen for undiagnosed type 2 diabetes at the first prenatal visit in those with risk factors, using standard diagnostic criteria B
- Screen for GDM at 24–28 weeks of gestation in pregnant women not previously known to have diabetes A
- Screen women with GDM for persistent diabetes at 6–12 weeks postpartum, using OGTT, nonpregnancy diagnostic criteria E
Recommendations: Detection and Diagnosis of GDM (2)

- Women with a history of GDM should have lifelong screening for the development of diabetes or prediabetes at least every 3 years **B**
- Women with a history of GDM found to have prediabetes should receive lifestyle interventions or metformin to prevent diabetes **A**
Screening for and Diagnosis of GDM
One-step Strategy

• Perform a 75-g OGT T, with plasma glucose measurement fasting and at 1 and 2 h, at 24–28 weeks of gestation in women not previously diagnosed with overt diabetes

• Perform OGTT in the morning after an overnight fast of at least 8 h

• GDM diagnosis: when any of the following plasma glucose values are exceeded
  - Fasting: 92 mg/dL (5.1 mmol/L)
  - 1 h: 180 mg/dL (10.0 mmol/L)
  - 2 h: 153 mg/dL (8.5 mmol/L)
Screening for and Diagnosis of GDM
Two-step Strategy (1)

**Step 1:** Perform 50-g GLT (nonfasting) with plasma glucose measurement at 1 h at 24–28 weeks of gestation in women not previously diagnosed with overt diabetes

*If plasma glucose level measured at 1 h after load is ≥140 mg/dL* (7.8 mmol/L), proceed to step 2, 100-g OGTT

*ACOG recommends 135 mg/dL in high-risk ethnic minorities with higher prevalence of GDM.*
Screening for and Diagnosis 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>Time</th>
<th>Carpenter/Coustan</th>
<th>NDDG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>95 mg/dL (5.3 mmol/L)</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>190 mg/dL (10.6 mmol/L)</td>
</tr>
<tr>
<td>2h</td>
<td>155 mg/dL (8.6 mmol/L)</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>145 mg/dL (8.0 mmol/L)</td>
</tr>
</tbody>
</table>
Recommendations: Cystic Fibrosis–Related Diabetes (CFRD) (1)

- Annual screening for CFRD with OGTT should begin by age 10 years in all patients with cystic fibrosis who do not have CFRD B A1C as a screening test for CFRD is not recommended B
- In patients with cystic fibrosis and IGT without confirmed diabetes, prandial insulin therapy should be considered to maintain weight. 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, beginning 5 years after the diagnosis of CFRD E
3. INITIAL EVALUATION AND DIABETES MANAGEMENT PLANNING
Diabetes Care: Initial Evaluation

• A complete medical evaluation should be performed to
  – Classify the diabetes
    • Detect presence of diabetes complications
    • Review previous treatment, risk factor control in patients with established diabetes
    • Assist in formulating a management plan
    • Provide a basis for continuing care
• Perform laboratory tests necessary to evaluate each patient’s medical condition

Screening Recommendation

• Consider screening those with type 1 diabetes for other autoimmune diseases (thyroid, vitamin B12 deficiency, celiac) as appropriate
Components of the Comprehensive Diabetes Evaluation (1)

Medical history (1)

- Age and characteristics of onset of diabetes (e.g., DKA, asymptomatic laboratory finding)
- Eating patterns, physical activity habits, nutritional status, and weight history; growth and development in children and adolescents
- Diabetes education history
- Review of previous treatment regimens and response to therapy (A1C records)
Components of the Comprehensive Diabetes Evaluation (2)

Medical history (2)

- Current treatment of diabetes, including medications, adherence and barriers thereto, meal plan, physical activity patterns, readiness for behavior change
- Results of glucose monitoring, patient’s use of data
- DKA frequency, severity, cause
- Hypoglycemic episodes
  - Hypoglycemic awareness
  - Any severe hypoglycemia: frequency, cause
Medical history (3)

- History of diabetes-related complications
  - Microvascular: retinopathy, nephropathy, neuropathy
    - Sensory neuropathy, including history of foot lesions
    - Autonomic neuropathy, including sexual dysfunction and gastroparesis
  - Macrovascular: CHD, cerebrovascular disease, PAD
  - Other: psychosocial problems,* dental disease*

*See appropriate referrals for these categories.*
Components of the Comprehensive Diabetes Evaluation (4)

Physical examination (1)

- Height, weight, BMI
- Blood pressure determination, including orthostatic measurements when indicated
- Fundoscopic examination
- Thyroid palpation
- Skin examination (for acanthosis nigricans and insulin injection sites)
Components of the Comprehensive Diabetes Evaluation (5)

Physical examination (2)
• Comprehensive foot examination
  – Inspection
  – Palpation of dorsalis pedis and posterior tibial pulses
  – Presence/absence of patellar and Achilles reflexes
  – Determination of proprioception, vibration, and monofilament sensation
Components of the Comprehensive Diabetes Evaluation (6)

Laboratory evaluation
- A1C, if results not available within past 3 months
- If not performed/available within past year
  - Fasting lipid profile, including total, LDL, and HDL cholesterol and triglycerides
  - Liver function tests
  - Test for urine albumin excretion with spot urine albumin-to-creatinine ratio
  - Serum creatinine and calculated GFR
  - TSH in type 1 diabetes, dyslipidemia, or women over age 50 years
Components of the Comprehensive Diabetes Evaluation (7)

Referrals
- Eye care professional for annual dilated eye exam
- Family planning for women of reproductive age
- Registered dietitian for MNT
- Diabetes self-management education/support
- Dentist for comprehensive periodontal examination
- Mental health professional, if needed
Diabetes Care: Management

- People with diabetes should receive medical care from a team that may include
  - Physicians, nurse practitioners, physician’s assistants, nurses, dietitians, pharmacists, mental health professionals
  - In this collaborative and integrated team approach, essential that individuals with diabetes assume an active role in their care
- Management plan should recognize diabetes self-management education (DSME) and on-going diabetes support
Recommendation: Assessment of Common Comorbid Conditions

- Consider assessing for and addressing common comorbid conditions that may complicate the management of diabetes B
- Common comorbidities
  - Depression
  - Obstructive sleep apnea
  - Fatty liver disease
  - Cancer
  - Fractures
  - Cognitive impairment
  - Low testosterone in men
  - Periodontal disease
  - Hearing impairment
4. FOUNDATIONS OF CARE: EDUCATION, NUTRITION, PHYSICAL ACTIVITY, SMOKING CESSTATION, PSYCHOSOCIAL CARE, AND IMMUNIZATION
Recommendations: Diabetes Self-Management Education, Support

- People with diabetes should receive DSME/DSMS according to National Standards for Diabetes Self-Management Education and Support at diagnosis and as needed thereafter B
- Effective self-management, quality of life are key outcomes of DSME/DSMS; should be measured, monitored as part of care C
- DSME/DSMS should address psychosocial issues, since emotional well-being is associated with positive outcomes C
Recommendations: Diabetes Self-Management Education, Support

- DSME/DSMS programs are appropriate venues for people with prediabetes to receive education and support to develop and maintain behaviors that can prevent or delay the onset of diabetes C
- Because DSME/DSMS can result in cost-savings and improved outcomes B, DSME/DSMS should be adequately reimbursed by third-party payers E
Recommendations: Medical Nutrition Therapy (MNT) (1)

- Nutrition therapy is recommended for all people with type 1 and type 2 diabetes as an effective component of the overall treatment plan A

- Individuals who have prediabetes or diabetes should receive individualized MNT as needed to achieve treatment goals, preferably provided by a registered dietitian familiar with the components of diabetes MNT A
Recommendations: Medical Nutrition Therapy (MNT) (2)

- Because diabetes nutrition therapy can result in cost savings B and improved outcomes such as reduction in A1C A, nutrition therapy should be adequately reimbursed by insurance and other payers E
Evidence suggests there is no ideal percentage of calories from carbohydrate, protein, and fat for all people with diabetes

Therefore, macronutrient distribution should be based on individualized assessment of current eating patterns, preferences, and metabolic goals

Recommendation: Macronutrient Distribution
Recommendations: Physical Activity

- Children with diabetes/prediabetes: engage in at least 60 min/day physical activity **B**
- Adults with diabetes: at least 150 min/wk of moderate-intensity aerobic activity (50–70% of maximum heart rate), over at least 3 days/wk with no more than 2 consecutive days without exercise **A**
- Evidence supports that all individuals, including those with diabetes, should be encouraged to reduce sedentary time, particularly by breaking up extended amounts of time (>90 min) spent sitting **B**
- If not contraindicated, adults with type 2 diabetes should perform resistance training at least twice weekly **A**
Recommendations: Smoking Cessation

• Advise all patients not to smoke or use tobacco products A
• Include smoking cessation counseling and other forms of treatment as a routine component of diabetes care B
Recommendations: Psychosocial Assessment and Care

- Ongoing part of medical management of diabetes \( B \)
- Psychosocial screening/follow-up: attitudes, medical management/outcomes expectations, affect/mood, quality of life, resources, psychiatric history \( E \)
- Routinely screen for psychosocial problems: depression, diabetes-related distress, anxiety, eating disorders, cognitive impairment \( B \)
Recommendations: Immunization (1)

- Provide routine vaccinations for children and adults with diabetes as for the general population C
- Provide influenza vaccine annually to all patients with diabetes ≥6 months of age C
- Administer pneumococcal polysaccharide vaccine 23 (PPSV23) to all patients with diabetes ≥2 years C
- Adults ≥65 years of age, if not previously vaccinated, should receive pneumococcal conjugate vaccine (PCV13), followed by PPSV23 6-12 months after initial vaccination C
- Adults ≥65 years of age, if previously vaccinated with PPSV23, should receive a follow-up ≥12 months with PCV13 C
Recommendations: Immunization (2)

- Administer hepatitis B vaccination to unvaccinated adults with diabetes who are aged 19–59 years C
- Consider administering hepatitis B vaccination to unvaccinated adults with diabetes who are aged ≥60 years C
5. PREVENTION/DELAY OF TYPE 2 DIABETES
Recommendations: Prevention/Delay of Type 2 Diabetes

- Refer patients with IGT A, IFG E, or A1C 5.7–6.4% E to ongoing support program
  - Targeting weight loss of 7% of body weight
  - Increasing physical activity to at least 150 min/week of moderate activity (eg, walking)
- Follow-up counseling appears to be important for success B
- Based on cost-effectiveness of diabetes prevention, such programs should be covered by third-party payers B
Recommendations: Prevention/Delay of Type 2 Diabetes

• Consider metformin for prevention of type 2 diabetes if IGT A, IFG E, or A1C 5.7–6.4% E
  – Especially for those with BMI >35 kg/m², age <60 years, and women with prior GDM A
• In those with prediabetes, monitor for development of diabetes annually E
• Screen for and treat modifiable risk factors for CVD B
• DSME/DSMS programs are appropriate venues for people with prediabetes to develop and maintain behaviors that can prevent or delay the onset of diabetes C
6. GLYCEMIC TARGETS
Two primary techniques available for health providers and patients to assess effectiveness of management plan on glycemic control:

- Patient self-monitoring of blood glucose (SMBG), or interstitial glucose
- A1C
Recommendations: Glucose Monitoring (1)

- Patients on multiple-dose insulin (MDI) or insulin pump therapy should do SMBG:
  - Prior to meals and snacks
  - Occasionally postprandially
  - At bedtime
  - Prior to exercise
  - When they suspect low blood glucose
  - After treating low blood glucose until they are normoglycemic
  - Prior to critical tasks such as driving
Recommendations: Glucose Monitoring (2)

- 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, as well as their ability to use SMBG data to adjust therapy E
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

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
Recommendations: A1C

• Perform the A1C test at least two times a year in patients meeting 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
### Mean Glucose Levels for Specified A1C Levels

<table>
<thead>
<tr>
<th>A1C%</th>
<th>Mean Plasma Glucose*</th>
<th>Mean Fasting Glucose</th>
<th>Mean Premeal Glucose</th>
<th>Mean Postmeal Glucose</th>
<th>Mean Bedtime Glucose</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>
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<tr>
<td>6</td>
<td>126</td>
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<tr>
<td>7</td>
<td>154</td>
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<td>12</td>
<td>298</td>
<td>16.5</td>
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</tbody>
</table>

*These estimates are based on ADAG data of ~2,700 glucose measurements over 3 months per A1C measurement in 507 adults with type 1, type 2, and no diabetes. The correlation between A1C and average glucose was 0.92. A calculator for converting A1C results into estimated average glucose (eAG), in either mg/dL or mmol/L, is available at http://professional.diabetes.org/eAG.*
Lowering A1C to below or around 7% has been shown to reduce microvascular complications and, if implemented soon after the diagnosis of diabetes, is associated with long-term reduction in macrovascular disease. Therefore, a reasonable A1C goal for many nonpregnant adults is <7%.
Providers might reasonably suggest more stringent A1C goals (such as <6.5%) for selected individual patients, if this can be achieved without significant hypoglycemia or other adverse effects of treatment. Appropriate patients might include those with short duration of diabetes, long life expectancy, and no significant CVD.
Recommendations: Glycemic Goals in Adults (3)

- Less stringent A1C goals (such as <8%) may be appropriate for patients with B
  - History of severe hypoglycemia, limited life expectancy, advanced microvascular or macrovascular complications, extensive comorbid conditions
  - Those with longstanding diabetes in whom the general goal is difficult to attain despite DSME, appropriate glucose monitoring, and effective doses of multiple glucose lowering agents including insulin
Approach to the Management of Hyperglycemia

PATIENT / DISEASE FEATURES

- Risks potentially associated with hypoglycemia and other drug adverse effects
- Disease duration
- Life expectancy
- Important comorbidities
- Established vascular complications
- Patient attitude and expected treatment efforts
- Resources and support system

A1C 7% [usually not modifiable]

Potential stringency levels:
- more stringent
- less stringent

ADA. 6. Glycemic Targets. Diabetes Care 2015;38(suppl 1):S37. Figure 6.1; adapted with permission from Inzucchi SE, et al. Diabetes Care, 2015;38:140-149
Glycemic Recommendations for Nonpregnant Adults with Diabetes (1)

A1C < 7.0%*

Preprandial capillary plasma glucose 80–130 mg/dL* (4.4–7.2 mmol/L)

Peak postprandial capillary plasma glucose† < 180 mg/dL* (<10.0 mmol/L)

*Goals should be individualized.
†Postprandial glucose measurements should be made 1–2 h after the beginning of the meal, generally peak levels in patients with diabetes.
Glycemic Recommendations for Nonpregnant Adults with Diabetes (2)

- Goals should be individualized based on
  - Duration of diabetes
  - Age/life expectancy
  - Comorbid conditions
  - Known CVD or advanced microvascular complications
  - Hypoglycemia unawareness
  - Individual patient considerations
Glycemic Recommendations for Nonpregnant Adults with Diabetes (3)

- 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
Recommendations: Hypoglycemia (1)

- 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 hypoglycemia E
- Glucagon should be prescribed for all individuals at significant risk of severe hypoglycemia and caregivers/family members instructed in administration E
• Hypoglycemia unawareness or one or more episodes of severe hypoglycemia should trigger re-evaluation of the treatment regimen E
• 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
7. APPROACHES TO GLYCEMIC TREATMENT
Most people with type 1 diabetes should:

- Be treated with MDI injections (3–4 injections per day of basal and prandial insulin) or continuous subcutaneous insulin infusion (CSII) \( \text{A} \)
- Be educated in how to match prandial insulin dose to carbohydrate intake, premeal blood glucose, and anticipated activity \( \text{E} \)
- Use insulin analogs to reduce hypoglycemia risk \( \text{A} \)
Recommendations: Pharmacological Therapy For Type 2 Diabetes (1)

• Metformin, if not contraindicated and if tolerated, is the preferred initial pharmacological agent for type 2 diabetes A

• In patients with newly diagnosed type 2 diabetes and markedly symptomatic and/or elevated blood glucose levels or A1C, consider insulin therapy (with or without additional agents) E
Recommendations: Therapy for Type 2 Diabetes (2)

- 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 insulin A
Recommendations: Therapy for Type 2 Diabetes (3)

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

- Due to the progressive nature of type 2 diabetes, insulin therapy is eventually indicated for many patients with type 2 diabetes
# Antihyperglycemic Therapy in Type 2 Diabetes

## Approaches to Glycemic Treatment

### 1. Healthy eating, weight control, increased physical activity, and diabetes education

### 2. Monotherapy
- **Efficacy**
- **Hypo risk**
- **Weight**
- **Side effects**
- **Costs**

### 3. Dual therapy
- **Efficacy**
- **Hypo risk**
- **Weight**
- **Side effects**
- **Costs**

### 4. Triple therapy
- **Efficacy**
- **Hypo risk**
- **Weight**
- **Side effects**
- **Costs**

### 5. Combination injectable therapy

### Metformin
- **Efficacy**
- **Hypo risk**
- **Weight**
- **Side effects**
- **Costs**

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

### If A1C target not achieved after ~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- and disease-specific factors):

### If A1C target not achieved after ~3 months of triple therapy and patient (1) on oral combination, move to Injectables; (2) on GLP-1-RA, add basal insulin; or (3) on optimally titrated basal insulin, add GLP-1-RA or mealtime insulin. In refractory patients consider adding TZD or SGLT2-i:

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**American Diabetes Association** 7. Approaches to Glycemic Treatment. Diabetes Care 2015;38(suppl 1):S43. Figure 7.1; adapted with permission from Inzucchi SE, et al. Diabetes Care, 2015;38:140-149.
Approach To Starting and Adjusting Insulin in Type 2 Diabetes

ADA. 7. Approaches to Glycemic Treatment. Diabetes Care 2015;38(suppl 1):S46. Figure 7.2; adapted with permission from Inzucchi SE, et al. Diabetes Care, 2015;38:140-149
Bariatric surgery may be considered for adults with BMI > 35 kg/m² and type 2 diabetes, especially if diabetes or associated comorbidities are difficult to control with lifestyle and pharmacological therapy B

After surgery, life-long lifestyle support and medical monitoring is necessary B

Insufficient evidence to recommend surgery in patients with BMI <35 kg/m² outside of a research protocol E

ADA. 7. Approaches to Glycemic Treatment. Diabetes Care 2015;38(suppl 1):S46
8. CARDIOVASCULAR DISEASE AND RISK MANAGEMENT
Cardiovascular Disease

• CVD is the major 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 CVD
• Diabetes itself confers independent risk
• Benefits observed when individual cardiovascular risk factors are controlled to prevent/slow CVD in people with diabetes

ADA. 8. Cardiovascular Disease and Risk Management. Diabetes Care 2015;38(suppl 1):S49
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
Goals

• 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, such as younger patients, if it can be achieved without undue treatment burden C
• 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, such as younger patients, if it can be achieved without undue treatment burden B
Recommendations: Hypertension/Blood Pressure Control

Treatment (1)

- Patients with blood pressure >120/80 mmHg should be advised on lifestyle changes to reduce blood pressure B
- Patients with confirmed blood pressure higher than 140/90 mmHg should, in addition to lifestyle therapy, have prompt initiation and timely subsequent titration of pharmacological therapy to achieve blood pressure goals A
Recommendations: Hypertension/Blood Pressure Control

Treatment (2)

- Lifestyle therapy for elevated blood pressure
  - Weight loss if overweight
  - DASH-style dietary pattern including reducing sodium, increasing potassium intake
  - Moderation of alcohol intake
  - Increased physical activity
Treatment (3)

- Pharmacological therapy for patients with diabetes and hypertension comprise a regimen that includes
  - either an ACE inhibitor or angiotensin II receptor blocker B;
  - if one class is not tolerated, substitute the other C

- Multiple drug therapy (two or more agents at maximal doses) generally required to achieve blood pressure targets B
Treatment (4)

- If ACE inhibitors, ARBs, or diuretics are used, serum creatinine/eGFR and potassium levels should be monitored.

- In pregnant patients with diabetes and chronic hypertension, blood pressure target goals of 110–129/65–79 mmHg are suggested in interest of long-term maternal health and minimizing impaired fetal growth; ACE inhibitors, ARBs, contraindicated during pregnancy.
Recommendations: Dyslipidemia/Lipid Management (1)

Screening

- In adults, a screening lipid profile is reasonable E
  - At first diagnosis
  - At the initial medical evaluation
  - And/or at age 40 years and periodically (e.g., every 1-2 years) thereafter
Treatment recommendations and goals

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

Recommendations: Dyslipidemia/Lipid Management (2)

ADA. 8. Cardiovascular Disease and Risk Management. Diabetes Care 2015;38(suppl 1):S51
Treatment recommendations and goals

• Intensify lifestyle therapy and optimize glycemic control for patients with C
  – 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 C
## Recommendations for Statin Treatment in People with Diabetes

<table>
<thead>
<tr>
<th>Age</th>
<th>Risk factors</th>
<th>Recommended statin dose*</th>
<th>Monitoring with lipid panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40 years</td>
<td>None</td>
<td>None</td>
<td>Annually or as needed to monitor for adherence</td>
</tr>
<tr>
<td></td>
<td>CVD risk factor(s)**</td>
<td>Moderate or high</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overt CVD***</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>40–75 years</td>
<td>None</td>
<td>Moderate</td>
<td>As needed to monitor adherence</td>
</tr>
<tr>
<td></td>
<td>CVD risk factors</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overt CVD</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>&gt;75 years</td>
<td>None</td>
<td>Moderate</td>
<td>As needed to monitor adherence</td>
</tr>
<tr>
<td></td>
<td>CVD risk factors</td>
<td>Moderate or high</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overt CVD</td>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>

* In addition to lifestyle therapy.

** CVD risk factors include LDL cholesterol ≥100 mg/dL (2.6 mmol/L), high blood pressure, smoking, and overweight and obesity.

*** Overt CVD includes those with previous cardiovascular events or acute coronary syndromes.
Treatment recommendations and goals

• 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.)

• Cholesterol laboratory testing may be helpful in monitoring adherence to therapy but may not be needed once the patient is stable on therapy.
Recommendations: Dyslipidemia/Lipid Management (6)

Treatment recommendations and goals

• Combination therapy has been shown not to provide additional cardiovascular benefit above statin therapy alone and is not generally recommended A

• Statin therapy is contraindicated in pregnancy B
**Recommendations: Antiplatelet Agents (1)**

- 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 (10-year risk >10%)
  - Includes most men >50 years of age or women >60 years of age who have at least one additional major risk factor
    - Family history of CVD
    - Hypertension
    - Smoking
    - Dyslipidemia
    - Albuminuria
Recommendations: Antiplatelet Agents (2)

- Aspirin should not be recommended for CVD prevention for adults with diabetes at low CVD risk, since potential adverse effects from bleeding likely offset potential benefits.  
  - Low risk: 10-year CVD risk <5%, such as in men <50 years, women <60 years with no major additional CVD risk factors.
  - In patients in these age groups with multiple other risk factors (10-year risk 5–10%), clinical judgment is required.
Recommendations: Antiplatelet Agents (3)

- Use aspirin therapy (75–162 mg/day)
  - Secondary prevention strategy in those with diabetes with a history of CVD A
- For patients with CVD and documented 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
Screening

- In asymptomatic patients, routine screening for CAD is not recommended because it does not improve outcomes as long as CVD risk factors are treated
Recommendations: Cardiovascular Disease (2)

Treatment (1)
- To reduce risk of cardiovascular events in patients with known CVD, consider
  - ACE inhibitor **C**
  - Aspirin* **A**
  - Statin therapy* **A**
- In patients with a prior MI
  - β-blockers should be continued for at least 2 years after the event **B**

*If not contraindicated.

Treatment (2)

- In patients with symptomatic heart failure, thiazolidinedione treatment should not be used A
- In patients with stable CHF, metformin B
  - May be used if renal function is normal
  - Should be avoided in unstable or hospitalized patients with CHF
9. MICROVASCULAR COMPLICATIONS AND FOOT CARE
Recommendations: Nephropathy

• To reduce the risk or slow the progression of nephropathy
  – Optimize glucose control A
  – Optimize blood pressure control A
Recommendations: Nephropathy (1)

Screening

• At least once a year, quantitatively assess urine albumin excretion and estimated glomerular filtration rate B
  – In patients with type 1 diabetes duration of \( \geq 5 \) years
  – In all patients with type 2 diabetes
Treatment (1)

- An ACE inhibitor or ARB is not recommended for the primary prevention of diabetic kidney disease in patients who have normal blood pressure and a normal urine-albumin-to-creatinine ratio (UACR) (<30 mg/g) \textbf{B}

- Nonpregnant patient with modestly elevated urinary albumin excretion (30–299 mg/day) \textbf{C} or higher levels (>300 mg/day) \textbf{A}
  - Use either ACE inhibitors or ARBs (not both)
Recommendations: Nephropathy (3)

Treatment (2)

• When ACE inhibitors, ARBs, or diuretics are used, monitor serum creatinine, potassium levels for increased creatinine or changes in potassium E
• Reasonable to continue monitoring urine albumin excretion to assess both response to therapy and disease progression E
• When eGFR is <60 mL/min/1.73 m², evaluate and manage potential complications of CKD E
Treatment (3)  
- Consider referral to a physician experienced in care of kidney disease  
  - Uncertainty about etiology; difficult management issues; advanced kidney disease  

Nutrition  
- For people with diabetes and diabetic kidney disease (albuminuria >30 mg/24 h), reducing dietary protein below usual intake not recommended
### Definitions of Abnormalities in Albumin Excretion

<table>
<thead>
<tr>
<th>Category</th>
<th>Spot collection (mg/g creatinine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;30</td>
</tr>
<tr>
<td>Increased urinary albumin excretion*</td>
<td>≥30</td>
</tr>
</tbody>
</table>

*Historically, ratios between 30 and 299 have been called microalbuminuria and those 300 or greater have been called macroalbuminuria (or clinical albuminuria).*
## Stages of Chronic Kidney Disease

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

GFR = glomerular filtration rate

*Kidney damage defined as abnormalities on pathologic, urine, blood, or imaging tests.
## Management of CKD in Diabetes (1)

<table>
<thead>
<tr>
<th>GFR</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>

Adapted from http://www.kidney.org/professionals/KDOQI/guideline_diabetes/
## Management of CKD in Diabetes (2)

<table>
<thead>
<tr>
<th>GFR</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 |
Recommendations: Retinopathy

- To reduce the risk or slow the progression of retinopathy
  - Optimize glycemic control A
  - Optimize blood pressure control A
Screening (1)

- Initial dilated and comprehensive eye examination by an ophthalmologist or optometrist
  - Adults with type 1 diabetes
    - Within 5 years after diabetes onset
  - Patients with type 2 diabetes
    - Shortly after diagnosis of diabetes
Screening (2)

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

- If diabetic retinopathy if present
  - Subsequent examinations for type 1 and type 2 diabetic patients should be repeated annually by an ophthalmologist or optometrist B

- If retinopathy is progressing, more frequent exams required B
Screening (3)

- High-quality fundus photographs
  - Can detect most clinically significant diabetic retinopathy

- Interpretation of images
  - Performed by a trained eye care provider

- While retinal photography may serve as a screening tool for retinopathy, it is not a substitute for a comprehensive eye exam
  - Perform comprehensive eye exam at least initially and at recommended intervals
Screening (4)

- Women with preexisting diabetes who are planning pregnancy or who have become pregnant B
  - Comprehensive eye examination
  - Counseled on risk of development and/or progression of diabetic retinopathy
- Eye examination should occur in the first trimester B
  - Close follow-up throughout pregnancy
  - For 1 year postpartum
Recommendations: Retinopathy

Treatment

• Promptly refer patients with any level of macular edema, severe NPDR, or any PDR
  – To an ophthalmologist knowledgeable and experienced in management, treatment of diabetic retinopathy A

• Laser photocoagulation therapy is indicated A
  – To reduce risk of vision loss in patients with
    • High-risk PDR
    • Clinically significant macular edema
    • Some cases of severe NPDR
Treatment

• Anti-vascular endothelial growth factor (VEGF) therapy is indicated for diabetic macular edema A

• Presence of retinopathy
  – Not a contraindication to aspirin therapy for cardioprotection, as this therapy does not increase the risk of retinal hemorrhage A
Recommendations: Neuropathy Screening, Treatment (1)

- All patients should be screened for distal symmetric polyneuropathy (DPN) **B**
  - At diagnosis of type 2 diabetes and 5 years after diagnosis of type 1 diabetes
  - At least annually thereafter using simple clinical tests, such as a 10-g monofilament

- Screening for signs and symptoms of cardiovascular autonomic neuropathy
  - Should be considered with more advanced disease **E**
Recommendations: Neuropathy Screening, Treatment (2)

- Tight glycemic control is the only strategy convincingly shown
  - To prevent or delay the development of DPN or CAN in patients with type 1 diabetes A
  - To slow the progression of neuropathy in some patients with type 2 diabetes B

- Assess and treat patients
  - To reduce pain related to DPN B
  - To reduce symptoms of automatic neuropathy E
  - To improve the quality of life E
• For all patients with diabetes, perform an annual comprehensive foot examination to identify risk factors predictive of ulcers and amputations **B**
  – Inspection
  – Assessment of foot pulses
**Upper panel**

- To perform the 10-g monofilament test, place the device perpendicular to the skin, with pressure applied until the monofilament buckles.
- Hold in place for 1 second and then release.

**Lower panel**

- The monofilament test should be performed at the highlighted sites while the patient’s eyes are closed.
Recommendations: Foot Care (3)

- Provide general foot self-care education **B**
- Use multidisciplinary approach
  - Individuals with foot ulcers, high-risk feet (e.g., dialysis patients and those with Charcot foot, prior ulcers, or amputation) **B**
- Refer patients to foot care specialists for ongoing preventive care, life-long surveillance **C**
  - Smokers
  - Loss of protective sensation or structural abnormalities
  - History of prior lower-extremity complications
Recommendations: Foot Care (4)

- Initial screening for peripheral arterial disease (PAD) **C**
  - Include a history for claudication, assessment of pedal pulses

- Refer patients with significant claudication or a positive ABI for further vascular assessment **C**
  - Consider exercise, medications, surgical options

10. OLDER ADULTS
**Recommendations: Older Adults (1)**

- Functional, cognitively intact older adults with significant life expectancies should receive diabetes care using goals developed for younger adults E

- Glycemic goals for some older adults might reasonably be related, using individual criteria, but hyperglycemia leading to symptoms or risk of acute hyperglycemic complications should be avoided in all patients E
Recommendations: Older Adults (2)

- Treat other cardiovascular risk factors with consideration of time frame of benefit and the individual patient
  - Treatment of hypertension is indicated in virtually all older adults; lipid, aspirin therapy may benefit those with life expectancy equal to time frame of primary/secondary prevention trials **E**
- Individualize screening for diabetes complications with attention to those leading to functional impairment **E**
- Older adults with diabetes should be considered a high-priority population for depression screening and treatment **B**
11. CHILDREN AND ADOLESCENTS
Recommendations: Pediatric Glycemic Control (Type 1 Diabetes)

• An A1C goal of < 7.5% is recommended across all pediatric age groups E
## Recommendations: Pediatric Glycemic Control (Type 1 Diabetes)

### Plasma blood glucose goal range

<table>
<thead>
<tr>
<th>Before meals</th>
<th>Bedtime/overnight</th>
</tr>
</thead>
<tbody>
<tr>
<td>90–130 mg/dL (5.0–7.2 mmol/L)</td>
<td>90–150 mg/dL (5.0–8.3 mmol/L)</td>
</tr>
</tbody>
</table>

### A1C

<table>
<thead>
<tr>
<th>A1C</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;7.5%</td>
<td>A lower goal (&lt;7.0%) is reasonable if it can be achieved without excessive hypoglycemia</td>
</tr>
</tbody>
</table>

- Goals should be *individualized*, and lower goals may be reasonable based on benefit-risk assessment.
- Blood glucose goals should be modified in children with frequent hypoglycemia or hypoglycemia unawareness.
- Postprandial blood glucose values should be measured when there is a discrepancy between preprandial blood glucose values and A1C levels and to help assess glycemia in those on basal–bolus regimens.
Screening

• Assess for the presence of additional autoimmune conditions at diagnosis and if symptoms develop
Recommendations: Pediatric Celiac Disease (Type 1 Diabetes) (1)

- Screen for by measuring IgA antitissue transglutaminase or antiendomysial antibodies; document normal total serum IgA levels soon after diabetes diagnosis E
- Consider testing in children with
  - Positive family history of celiac disease
  - Growth failure
  - Failure to gain weight, weight loss
  - Diarrhea, flatulence, abdominal pain, signs of malabsorption
  - Frequent unexplained hypoglycemia or deterioration in glycemic control E
Recommendations: Pediatric Celiac Disease (Type 1 Diabetes) (2)

- Asymptomatic children with positive antibodies
  - Consider referral to a gastroenterologist for evaluation with possible endoscopy and biopsy for confirmation of celiac disease E

- Children with biopsy-confirmed celiac disease
  - Place on a gluten-free diet
  - Consult with a dietitian experienced in managing both diabetes and celiac disease B
Recommendations: Pediatric Hypothyroidism (Type 1 Diabetes)

- Children with type 1 diabetes
  - Screen for antithyroid peroxidase, antithyroglobulin antibodies soon after diagnosis

- Thyroid-stimulating hormone (TSH) concentrations
  - Measure after metabolic control established
    - If normal, consider rechecking every 1–2 years, especially if patient develops symptoms of thyroid dysfunction, thyromegaly, an abnormal growth rate, or unusual glycemic variation
Screening

- Measure blood pressure at each routine visit; confirm high-normal blood pressure or hypertension on three separate days
Treatment (1)

- Initial treatment of high-normal blood pressure (SBP or DBP consistently above 90th percentile for age, sex, and height)
  - Dietary intervention and exercise, aimed at weight control; increased physical activity, if appropriate

- If target blood pressure is not reached with 3–6 months of lifestyle intervention, consider pharmacologic treatment E
Treatment (2)

- Pharmacologic treatment of hypertension
  - SBP or DBP consistently above the 95th percentile for age, sex, and height
- Consider treatment as soon as diagnosis is confirmed E
Treatment (3)

• ACE inhibitors
  – Consider for initial treatment of hypertension, following appropriate reproductive counseling due to potential teratogenic effects E

• Goal of treatment
  – Blood pressure consistently below the 90th percentile for age, sex, and height E
Screening

- Obtain a fasting lipid profile in children $\geq 2$ years of age soon after diagnosis (after glucose control has been established) E
Screening

- If lipids are abnormal
  - Annual monitoring is reasonable E
- If LDL cholesterol values are within accepted risk levels (<100 mg/dL [2.6 mmol/L])
  - Repeat lipid profile every 5 years E
Recommendations: Pediatric Dyslipidemia (Type 1 Diabetes)

Treatment

• Initial therapy: optimize glucose control, MNT using Step 2 AHA diet aimed at decreasing dietary saturated fat
  
• After the age of 10 years, statin treatment is reasonable in those (after MNT and lifestyle changes) with
  
  – 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

• Goal: LDL cholesterol <100 mg/dL (2.6 mmol/L)
**Recommendations: Pediatric Nephropathy (Type 1 Diabetes)**

**Screening**
- At least annual screening for albumin levels; random spot urine sample for albumin-to-creatinine (UACR) ratio at start of puberty or age ≥10 years, whichever is earlier, once youth has had diabetes for 5 years B
- Measure creatinine clearance/estimated glomerular filtration rate at initial evaluation and then based on age, diabetes duration and treatment E

**Treatment**
- ACE inhibitor when elevated UACR (>30 mg/g) confirmed on two of three additional urine samples from different days over 6-month interval B
Recommendations: Pediatric Retinopathy (Type 1 Diabetes)

• Initial dilated and comprehensive eye examination should be considered
  – Start of puberty or age ≥10 years, whichever is earlier, once the youth has had diabetes for 3–5 years B

• After initial examination
  – Annual routine follow-up generally recommended
  – Less frequent examinations may be acceptable on advice of an eye care professional E
• Consider an annual comprehensive foot exam for the child at the start of puberty or at age $\geq$ 10 years, whichever is earlier, once the youth has had type 1 diabetes for 5 years E
Youth with type 1 diabetes and parents/caregivers (for patients aged <18 years) should receive diabetes self-management education and support at diagnosis and routinely thereafter that is B

- Culturally sensitive
- Developmentally appropriate
- Individualized
Recommendations: Transition from Pediatric to Adult Care

• As teens transition into emerging adulthood, health care providers and families must recognize their many vulnerabilities B and prepare the developing teen, beginning in early to mid adolescence and at least 1 year prior to the transition E

• Both pediatricians and adult health care providers should assist in providing support and links to resources for the teen and emerging adult B
At diagnosis and during routine follow-up care, assess psychosocial issues and family stresses that could impact adherence with diabetes management. Provide appropriate referrals to trained mental health professions, preferably experienced in childhood diabetes.

Encourage family involvement in diabetes management tasks.

- Recognize that premature transfer of diabetes care to the child can result in nonadherence and deterioration of glycemic control.
Pediatric Type 2 Diabetes

• Given the obesity epidemic, distinguishing between type 1 and type 2 diabetes in children is difficult, but critical for determining the optimal treatment regimen.

• Due to the significant comorbidities associated with type 2 diabetes, these tests are recommended at diagnosis:
  – Blood pressure measurement
  – Fasting lipid panel
  – Albumin excretion assessment
  – Dilated eye examination

• Thereafter, screening and treatment guidelines for in youth with type 2 diabetes are similar to those with type 1 diabetes.
12. MANAGEMENT OF DIABETES IN PREGNANCY
Recommendations: Diabetes in Pregnancy (1)

- Provide preconception counseling that addresses the importance of tight control in reducing the risk of congenital anomalies with an emphasis on achieving A1C < 7%, if this can be achieved without hypoglycemia. **B**

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

- GDM should be managed first with diet and exercise, and medications should be added if needed. **A**
Women with pregestational diabetes should have a baseline ophthalmology exam in the first trimester and then be monitored every trimester as indicated by degree of retinopathy. B

Due to alterations in red blood cell turnover that lower the normal A1C level in pregnancy, the A1C target in pregnancy is < 6% if this can be achieved without significant hypoglycemia. B

Medications widely used in pregnancy include insulin, metformin, and glyburide; most oral agents cross the placenta or lack long-term safety data. B
The goals for glycemic control for GDM are based on recommendations from the Fifth International Workshop-Conference on Gestational Diabetes Mellitus (GDM) and have the following targets for maternal capillary glucose concentrations:

- Preprandial $\leq 95$ mg/dL (5.3 mmol/L) and either
- One-hour postmeal $\leq 140$ mg/dL (7.8 mmol/L) or
- Two-hour postmeal $\leq 120$ mg/dL (6.7 mmol/L)
For women with preexisting type 1 diabetes or type 2 diabetes who become pregnant, the following are recommended as optimal glycemic goals if they can be achieved without excessive hypoglycemia:

- Premeal, bedtime, and overnight glucose 60–99 mg/dL (3.3–5.4 mmol/L)
- Peak postprandial glucose 100–129 mg/dL (5.4–7.1 mmol/L)
- A1C < 6.0%

The ADA recommends setting targets based on clinical experience, individualizing care as needed.
13. DIABETES CARE IN THE HOSPITAL, NURSING HOME, AND SKILLED NURSING FACILITY
Recommendations: Diabetes Care in the Hospital

- Diabetes discharge planning should start at hospital admission, and clear diabetes management instructions should be provided at discharge E

- The sole use of sliding scale insulin in the inpatient hospital setting is discouraged A
Recommendations: Diabetes Care in the Hospital

• All patients with diabetes admitted to the hospital should have their diabetes clearly identified in the medical record.
Recommends: Diabetes Care in the Hospital

Goals for blood glucose levels

Critically ill patients

- Initiate insulin therapy for persistent hyperglycemia starting no greater than 180 mg/dL (10 mmol/L); once started, glucose range of 140–180 mg/dL (7.8–10 mmol/L) is recommended A
- More stringent goals, 110–140 mg/dL (6.1–7.8 mmol/L) may be appropriate for selected patients if achievable without significant hypoglycemia C
- Critically ill patients require an IV insulin protocol with demonstrated efficacy, safety in achieving desired glucose range without increasing risk for severe hypoglycemia E
Recommendations: Diabetes Care in the Hospital

Goals for blood glucose levels

Non-Critically ill patients

- If treated with insulin, generally premeal blood glucose targets of <140 mg/dL (7.8 mmol/L) with random blood glucose <180 mg/dL (10.0 mmol/L) are reasonable, provided these targets can be safely achieved. **C**
  - More stringent targets may be appropriate in stable patients with previous tight glycemic control.
  - Less stringent targets may be appropriate in those with severe

- A basal plus correction insulin regimen is the preferred treatment for patients with poor oral intake or who are taking nothing by mouth (NPO). An insulin regimen with basal, nutritional, and correction components is the preferred treatment for patients with good nutritional intake. **A**
A hypoglycemia management protocol should be adopted and implemented by each hospital or hospital system.

Consider obtaining an A1C in patients:
- With diabetes admitted to the hospital if testing result in previous 2–3 mo unavailable.
- With risk factors for undiagnosed diabetes who exhibit hyperglycemia in the hospital.

Patients with hyperglycemia without a prior diagnosis: document plans for follow-up testing and care at discharge.
• Largest randomized controlled trial to date
• Tested effect of tight glycemic control (target 81–108 mg/dL) on outcomes among 6,104 critically ill participants
• Majority (>95%) required mechanical ventilation
Diabetes Care in the Hospital: NICE-SUGAR Study (2)

- In both surgical/medical patients, 90-day mortality significantly higher in intensively treated vs conventional group (target 144–180 mg/dL)
  - Severe hypoglycemia more common (6.8% vs. 0.5%; \( P < 0.001 \))
  - Findings strongly suggest may not be necessary to target blood glucose levels <140 mg/dL; highly stringent target of <110 mg/dL may actually be dangerous
Advocacy Position Statements

• The ADA publishes evidence-based, peer-reviewed statements on topics such as
  – Diabetes and employment
  – Diabetes and driving
  – Diabetes management in certain settings such as schools, child care programs, and correctional institutions.

• In addition to ADA’s clinical position statements, these advocacy position statements can help describe the intersection of diabetes medicine and the law to
  – Schools
  – Employers
  – Licensing agencies
  – Policy makers
  – Others