Standards of Medical Care in Diabetes — 2016
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—2016.
- Reviewed and approved by the Executive Committee of 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, 2015.
- Recommendations revised per new evidence, for clarity, or to better match text to strength of evidence.

Professional.diabetes.org/SOC
Clinical Practice Recommendations
Evidence Grading System

A
- Clear evidence from adequately-powered, well-conducted, generalizable RCTs, including evidence from a multicenter trial or meta-analysis that incorporated quality ratings in the analysis;
- Compelling nonexperimental evidence;
- Supportive evidence from adequately-powered, well-conducted RCTs.

B
- Supportive evidence from a well-conducted cohort studies
- Supportive evidence from a well-conducted case-control study

C
- Supportive evidence from poorly controlled or uncontrolled studies or evidence from observational studies with high potential for bias
- Evidence from case series or case reports
- Conflicting evidence with the weight of evidence supporting the recommendation

E
- Expert consensus or clinical experience

American Diabetes Association Standards of Medical Care in Diabetes.
Introduction. Diabetes Care 2016; 39 (Suppl. 1): S1-S2
Terminology

- No longer using the term “diabetic.”
- Diabetes does not define people.
- People with diabetes are individuals with diabetes, not “diabetics.”
- “Diabetic” will continue to be used related to complications, e.g., “diabetic retinopathy.”
1. Strategies for Improving Diabetes Care
Strategies for Improving Care

- Key Recommendations
- Diabetes Care Concepts
- Care Delivery Systems
  1. Optimize Provider and Team Behavior
  2. Support Patient Behavior Change
  3. Change the System of Care
- What to Do When Treatment Goals are Not Met
- Tailoring Treatment to Vulnerable Populations
Key Recommendations

- Use a patient-centered communication style that incorporates patient preferences, assesses literacy and numeracy, and addresses cultural barriers to care. B

- Treatment decisions should be timely and based on evidence-based guidelines that are tailored to patient preferences, prognoses, and comorbidities. B
Key Recommendations (2)

- 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 decision support tools to meet patient needs. B
3 key themes are woven throughout the Standards of Care in Diabetes:

1. **Patient-Centeredness**: One size does not fit all. These Standards provide guidance for when and how to adapt recommendations.

2. **Diabetes Across the Lifespan**: There is a need to improve coordination between clinical teams as patients pass through different stages of the life span.

3. **Advocacy for Patients with Diabetes**: Given the tremendous toll that obesity, physical inactivity, and smoking have on the health of patients with diabetes, efforts are needed to address and change the societal determinants at the root of these problems.
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 control is slowing.
- Substantial system-level improvements are needed.
- Delivery system is fragmented, lacks clinical information capabilities, duplicates services & is poorly designed.
Chronic Care Model

Six Components:

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

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
Objective 2: Support Patient Behavior Change

- Implement a systematic approach to support patient behavior change efforts, including:
  - Healthy lifestyle: physical activity, healthy eating, tobacco cessation, weight management, effective coping
  - Disease self-management: taking and managing medication, self-monitoring of glucose and blood pressure when clinically appropriate
  - Prevention of diabetes complications: self-monitoring of foot health, active participation in screening for eye, foot, and renal complications, and immunizations
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
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
When Treatment Goals Aren’t Met

- Seek evidence-based approaches that improve clinical outcomes and quality of life.
- Recent reviews of quality improvement strategies have not identified one approach that’s more effective than others.
- Translating Research Into Actions for Diabetes (TRIAD) study provided objective data.
Including:

- Periodic testing of A1C, lipids & urine albumin
- Examining retina and feet
- Advising on aspirin use
- Smoking cessation
- Performance feedback, reminders & structured care may influence providers to improve processes of care.

TRIAD: Processes of Care
Better address barriers to treatment intensification and adherence than processes of care.

In 35% of cases, uncontrolled A1C, BP, or lipids was associated with lack of treatment intensification.

*Treatment intensification* is associated with improved A1C, BP, and lipid control.
Poor adherence was associated with uncontrolled A1C, blood pressure, or lipids in 23% of TRIAD cases.

“Adequate” adherence: 80%
TRIAD: Barriers to Adherence

- **Patient factors:**
  - Remembering to get or take medicines
  - Fear
  - Depression
  - Health beliefs

- **Medication factors:**
  - Complexity
  - Multiple daily dosing
  - Cost
  - Side effects

- **System factors: Inadequate follow up or support**
1. Assess adherence:
   - ≥ 80% consider treatment intensification
   - ≤ 80% consider initiating or changing to a different medication class.

2. Explore barriers to adherence

3. Establish a follow-up plan
Vulnerable Populations

- Ethnic, cultural, religious & gender differences and socioeconomic status affect health care access, diabetes prevalence, and outcomes.

- Type 2 diabetes is more common in:
  - Women with hx of GDM
  - Individuals with HTN or dyslipidemia
  - African Americans, Native Americans, Hispanic/Latinos & Asian Americans
Diabetes treatment must be individualized, patient-centered, and culturally appropriate.

In Asian Americans, consider DM testing in adults of any age with 1 risk factor and a BMI ≥23.

Leverage NQF’s National Voluntary Consensus Standards for Ambulatory Care – Measuring Healthcare Disparities.
Health Disparities

- Lack of health insurance
- Food insecurity (FI)
  - Carefully evaluate hyperglycemia and hypoglycemia and propose solutions.
  - Recognize that homelessness, poor literacy, and poor numeracy often occur with food insecurity; appropriate resources should be made available for patients with diabetes.
Cognitive Dysfunction

1. Intensive glucose control is not advised for the improvement of poor cognitive function in hyperglycemic individuals with T2DM. B

2. In individuals with poor cognitive function or severe hypoglycemia, glycemic therapy should be tailored to avoid significant hypoglycemia. C
3. In individuals with diabetes at high CVD risk, the cardiovascular benefits of statin therapy outweigh the risk of cognitive dysfunction. 

4. If a second-generation antipsychotic medication is prescribed, changes in weight, glycemic control, and cholesterol levels, should be carefully monitored and the treatment regimen reassessed.
Screen patients with HIV for diabetes and prediabetes before starting antiretroviral (ARV) therapy, and 3 months after starting or changing it. E

If initial screening results are normal, check fasting glucose annually. E

If prediabetes is detected, continue to measure levels every 3-6 months to monitor for progression to diabetes. E
2. Classification and Diagnosis of Diabetes
Classification & Diagnosis

- Classification
- Diagnostic Tests for Diabetes
- Categories of Increased Risk
- Type 1 Diabetes
- Type 2 Diabetes
- Gestational Diabetes
- Monogenic Diabetes Syndromes
- Cystic Fibrosis-Related Diabetes
Classification of 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
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

Random plasma glucose ≥200 mg/dL (11.1 mmol/L)
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

* In the absence of unequivocal hyperglycemia, result should be confirmed by repeat testing.
A1C ≥6.5% *

- Performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay – www.ngsp.org
- POC testing not recommended
- Greater convenience, preanalytical stability, and less day-to-day perturbations than FPG and OGTT
- Consider cost, age, race/ethnicity, anemia, etc.
Random plasma glucose $\geq 200$ mg/dL

- In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis
Recommendations: Prediabetes

- Testing should begin at age 45 for all patients, particularly those who are overweight or obese. **B**

- Consider testing for prediabetes in asymptomatic adults of any age w/ BMI $\geq 25$ kg/m$^2$ or $\geq 23$ kg/m$^2$ (in Asian Americans) who have 1 or more add’l risk factors for diabetes. **B**

- If tests are normal, repeat at a minimum of 3-year intervals. **C**
Recommendations: Prediabetes (2)

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

Inform relatives of patients with T1D of the opportunity to be tested for type 1 diabetes risk, but only in the setting of a clinical research study. E

www.DiabetesTrialNet.org
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
Criteria for Testing for T2DM in Children & Adolescents

- **Overweight plus any 2:**
  - Family history of type 2 diabetes in 1\textsuperscript{st} or 2\textsuperscript{nd} 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

- **Screen with 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 6–12 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 135 mg/dL in high-risk ethnic minorities with higher prevalence of GDM.
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 (mg/dL)</th>
<th>Carpenter/Coustan (mmol/L)</th>
<th>NDDG (mg/dL)</th>
<th>NDDG (mmol/L)</th>
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<tr>
<td>Fasting</td>
<td>95 mg/dL</td>
<td>5.3 mmol/L</td>
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<tr>
<td>1h</td>
<td>180 mg/dL</td>
<td>10.0 mmol/L</td>
<td>190 mg/dL</td>
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<tr>
<td>2h</td>
<td>155 mg/dL</td>
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<tr>
<td>3h</td>
<td>140 mg/dL</td>
<td>7.8 mmol/L</td>
<td>145 mg/dL</td>
<td>8.0 mmol/L</td>
</tr>
</tbody>
</table>
All children diagnosed with diabetes in the first 6 months of life should have genetic testing. B

- Consider Maturity-Onset Diabetes of the Young (MODY) in patients who have mild stable fasting hyperglycemia and multiple family members with diabetes not characteristic of type 1 or type 2. E

- Consider referring individuals with diabetes that is not typical of type 1 or type 2 diabetes and occurs in successive generations to a specialist for further evaluation. 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 who do not have CFRD. B

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

- For patients with cystic fibrosis and IGT without confirmed diabetes, consider prandial insulin therapy to maintain weight. B
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. Foundations of Care and Comprehensive Medical Evaluation
Foundations of Care

1. Self Management Education
2. Nutrition
3. Counseling
4. Physical Activity
5. Smoking Cessation
6. Immunizations
7. Psychosocial Care
8. Medications
Foundations of Care

- Health care providers must take a holistic approach.
- Team approach facilitates comprehensive assessment and development of a diabetes management plan that fits the patient.
- Comprehensive clinical evaluation
- Patient engagement – Chronic Care Model
Basis for Initial Care

- Diabetes Self-Management Education (DSME)
- Diabetes Self-Management Support (DSMS)
- Medical Nutrition Therapy (MNT)
- Physical activity education
- Smoking cessation counseling
- Guidance on routine immunizations
- Psychosocial care
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
Recommendations: Diabetes Self-Management Education & Support (2)

- DSME/S programs may have the necessary elements in their curricula that are needed to prevent the onset of diabetes; content should be tailored specifically when prevention of diabetes is the desired goal. **B**

- Because DSME and DSMS can result in cost-savings and improved outcomes **B**, DSME and DSMS should be adequately reimbursed by third-party payers. **E**
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
Goals of Medical Nutrition Therapy (MNT)

1. Promote healthful eating patterns, eating a variety of nutrient-dense foods in appropriate portion sizes, to improve overall 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.
Goals of Medical Nutrition Therapy (2)

- To maintain the pleasure of eating by providing non-judgmental messages about food choices.
- Provide practical tools for developing healthful eating patterns rather than focusing on individual macronutrients, micro-nutrients, or single foods.
Effectiveness of Nutrition Therapy:

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

- For people with T1DM or those with T2D who are on a flexible insulin program, education on carb counting or estimation. A

- For patients on a fixed insulin program, having a consistent pattern of carbohydrate intake with respect to time and amount 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. C

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

- Modest weight loss achievable by the combination of lifestyle modification and the reduction of energy intake benefits overweight or obese adults with type 2 diabetes and also those at risk for diabetes. Interventional 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 sucrose-containing foods that have the capacity to displace healthier, more nutrient-dense food choices. A
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
Recommendations: Nutrition (7)

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 omega-3 fatty acids and omega-3 linolenic acid (ALA) is recommended to prevent or treat CVD B; however, evidence does not support a beneficial role for omega-3 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
**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).  
  
- Alcohol consumption may place people with diabetes at an increased risk for delayed hypoglycemia, especially if taking insulin or insulin secretagogues. Education and awareness regarding the recognition and management of delayed hypoglycemia are warranted.
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
Recommendations: Physical Activity

- Children with diabetes/prediabetes: at least 60 min/day physical activity B
- Adults with diabetes: at least 150 min/wk of moderate-intensity aerobic activity over at least 3 days/week with no more than 2 consecutive days without exercise A
- All individuals, including those with diabetes, should reduce sedentary time, particularly by breaking up extended amounts of time (>90 min) spent sitting. B
- Adults with type 2 diabetes should perform resistance training at least twice weekly A
Recommendations: Smoking Cessation

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

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
Address the patient’s psychological and social situation in medical management of diabetes. B

Psychosocial screening and follow-up include, but are not limited to:

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

Recommendations: Psychosocial Care (2)

- Routinely screen for depression, diabetes-related distress, anxiety, eating disorders & cognitive impairment. B

- Adults aged ≥65 years with DM should be considered for evaluation of cognitive function, depression screening and treatment. B

- Patients with diabetes and depression should receive a collaborative care approach for depression mgmt. A
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, physical activity habits, nutrition education and behavioral support history and needs
- Presence of common comorbidities, psychosocial problems, and dental disease
- Screen for depression, diabetes distress
- History of smoking, 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
Components of the Comprehensive Diabetes Evaluation (3)

**Medical History (3):**

- History of increased blood pressure, increased lipids, and tobacco use
- 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
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 urine albumin-to-creatinine ratio
  - Serum creatinine and eGFR
  - Thyroid-stimulating hormone in patients with type 1 diabetes or dyslipidemia or women aged >50 years
4. 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. A

- Offer follow-up counseling and maintenance programs for long-term success in preventing diabetes. B
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 >35 kg/m², aged < 60 years, and women with prior gestational diabetes (GDM). A
Recommendations: Prevention or Delay of T2DM (3)

- 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 (4)

- 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
5. Glycemic Targets
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 be a useful adjunct to SMBG in selected patients.
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
Recommendations: Glucose Monitoring (2)

- Patients on multiple-dose insulin (MDI) or insulin pump therapy should do SMBG B
  - 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
  - Possibly also post-prandially
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
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
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
## 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>
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<td>178</td>
<td>179</td>
<td>206</td>
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<td>9</td>
<td>212</td>
<td>11.8</td>
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<tr>
<td>10</td>
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<td>13.4</td>
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<tr>
<td>11</td>
<td>269</td>
<td>14.9</td>
<td></td>
<td></td>
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<tr>
<td>12</td>
<td>298</td>
<td>16.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Mean Plasma Glucose: Average fasting and pre-meal glucose levels.

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

Lowering A1C to <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. B

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 hx of severe hypoglycemia, limited life expectancy, or other conditions that make <7% difficult to attain. B
A1C and CVD Outcomes

- **DCCT:** Lower risk of CVD events with intensive control
- **EDIC:** 57% reduction in risk of nonfatal MI, stroke, or CVD death
- Benefit of intensive glycemic control persists for decades and is associated with a modest reduction in all-cause mortality.
- **ACCORD, ADVANCE, VADT** suggested no significant reduction in CVD outcomes with intensive glycemic control.

Care.DiabetesJournals.org
# Approach to the Management of Hyperglycemia

## Patient/Disease Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Stringent Levels</th>
<th>A1C 7%</th>
<th>Less Stringent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risks associated with hypoglycemia &amp; other drug adverse effects</td>
<td>more</td>
<td>high</td>
<td>less</td>
</tr>
<tr>
<td>Disease Duration</td>
<td>newly diagnosed</td>
<td>long-standing</td>
<td></td>
</tr>
<tr>
<td>Life expectancy</td>
<td>long</td>
<td>short</td>
<td></td>
</tr>
<tr>
<td>Important comorbidities</td>
<td>absent</td>
<td>Few/mild</td>
<td>severe</td>
</tr>
<tr>
<td>Established vascular complications</td>
<td>absent</td>
<td>Few/mild</td>
<td>severe</td>
</tr>
<tr>
<td>Patient attitude &amp; expected treatment efforts</td>
<td>highly motivated</td>
<td>less motivated, adherent, excellent self-care capabilities</td>
<td>less motivated, nonadherent, poor self-care capabilities</td>
</tr>
<tr>
<td>Resources &amp; support system</td>
<td>readily available</td>
<td>limited</td>
<td></td>
</tr>
</tbody>
</table>

---

Glycemic Recommendations for Nonpregnant Adults with Diabetes

A1C

<7.0%*
(<53 mmol/mol)

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 hours after the beginning of the meal.
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.
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

Prescribe glucagon for all patients at significant risk of severe hypoglycemia. Instruct caregivers in administration. E

Hypoglycemia unawareness or one or more episodes of severe hypoglycemia should trigger treatment re-evaluation. 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
6. 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:

<table>
<thead>
<tr>
<th>Category</th>
<th>BMI Range</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/m(^2))</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>Bariatric 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
Diets 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 high-intensity lifestyle interventions that employ very low calorie diets 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. A
Bariatric Surgery

- Guidelines support gastric banding, gastrectomy, and bypass as effective treatments for overweight T2DM patients.
- In 72% of patients, bariatric surgery helped achieve near- or complete normalization of glycemia 2 yrs post-surgery.
- In one meta-analysis, gastric banding resulted in less weight loss than gastrectomy or Roux-en-Y.
Recommendations: Bariatric Surgery

- Bariatric surgery may be considered for adults with BMI >35 and T2DM, especially if diabetes or associated comorbidities are difficult to control with lifestyle & medications. B

- Patients with T2DM who have undergone bariatric surgery need lifelong lifestyle support and annual medical monitoring, at a minimum. B

Although small trials have shown glycemic benefit of bariatric surgery in patients with T2DM and BMI 30–35, there is currently insufficient evidence to generally recommend surgery in patients with BMI ≤35. E
Disadvantages

- Costly
- Some associated risks
- Outcomes vary
- Patients undergoing bariatric surgery may be at higher risk for substance abuse

7. Approaches to Glycemic Treatment
Recommendations: Pharmacological Therapy For Type 1 Diabetes

- Most people with T1DM should be treated with multiple dose insulin (MDI) injections (3–4 injections /day of basal & prandial 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
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* 2016; 39 (Suppl. 1): S52-S59
Pancreas and Islet Cell Transplantation

- Can normalize glucose but require lifelong immunosuppression.
- Reserve 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.
Recommendations: Pharmacological Therapy For T2DM

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

- In patients with newly dx’d T2DM and markedly symptomatic and/or elevated blood glucose levels or A1C, consider insulin therapy (with or without additional agents). E

American Diabetes Association Standards of Medical Care in Diabetes. Approaches to glycemic treatment. Diabetes Care 2016; 39 (Suppl. 1): S52-S59
• 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

• Use a patient-centered approach to treatment. E

• Don’t delay insulin initiation in patients not achieving glycemic goals. B
Insulin Therapy in T2DM

- The progressive nature of T2DM should be regularly & objectively explained to T2DM patients.
- For T2DM patients not achieving glycemic goals, promptly initiate insulin therapy.
- Avoid using insulin as a threat, describing it as a failure or punishment.
- Give patients a self-titration algorithm.
Inhaled Insulin

- Now available
- Prandial use
- Limited dosing range
- May require serial lung function testing before and after starting therapy
8. 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.
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.
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
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, such as younger patients, if it can be achieved without undue treatment burden. C
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, such as younger patients, if it can be achieved without undue treatment burden. B
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
Recommendations: Hypertension/Blood Pressure Control (5)

Treatment (2):

- In older adults, pharmacological therapy to achieve treatment goals of $<130/70$ are not recommended. B
- Lifestyle intervention including B:
  - Weight loss if overweight
  - DASH-style diet including reduced sodium, increased potassium
  - Moderation of alcohol intake
  - Increased physical activity
Treatment (3):

- Pharmacological therapy for patients with diabetes and HTN includes:
  - either an ACE inhibitor or angiotensin II receptor blocker \( \text{B} \)
  - if one class is not tolerated, substitute the other \( \text{C} \)

- Multiple drug therapy (two or more agents at maximal doses) generally required to achieve BP targets. \( \text{B} \)
Treatment (4):

- If using ACE inhibitors, ARBs, or diuretics, monitor serum creatinine / eGFR & potassium levels. E

- In pregnant patients with DM and chronic hypertension, BP targets of 110–129/65–79 are suggested; ACE inhibitors, ARBs, contraindicated during pregnancy. E
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
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 n-3 fatty acids, viscous fiber, plant stanols/sterols
- Increased physical activity
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.
<table>
<thead>
<tr>
<th>Age</th>
<th>Risk Factors</th>
<th>Statin Intensity*</th>
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</thead>
<tbody>
<tr>
<td>&lt;40 years</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>ASCVD risk factor(s)**</td>
<td>Moderate or high</td>
</tr>
<tr>
<td></td>
<td>ASCVD</td>
<td>High</td>
</tr>
<tr>
<td>40–75 years</td>
<td>None</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>ASCVD risk factors</td>
<td>High</td>
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<tr>
<td></td>
<td>ACS &amp; LDL &gt;50 who can’t tolerate high dose statin</td>
<td>Moderate + ezetimibe</td>
</tr>
<tr>
<td>&gt;75 years</td>
<td>None</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>ASCVD</td>
<td>Moderate or high</td>
</tr>
<tr>
<td></td>
<td>ACS &amp; LDL &gt;50 who can’t tolerate high dose statin</td>
<td>High</td>
</tr>
</tbody>
</table>

* In addition to lifestyle therapy.  ** ASCVD risk factors include LDL cholesterol ≥100 mg/dL (2.6 mmol/L), high blood pressure, smoking, overweight and obesity, and family history of premature ASCVD.
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 or in patients who can’t tolerate high-intensity statin therapy. A
• 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 $\geq 204 \text{ mg/dL} \ (2.3 \text{ mmol/L})$ and HDL $\leq 34 \text{ mg/dL} \ (0.9 \text{ mmol/L})$. 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

Recommendations: Lipid Management (5)

American Diabetes Association Standards of Medical Care in Diabetes. Cardiovascular disease and risk management. Diabetes Care 2016; 39 (Suppl. 1): S60-S71
<table>
<thead>
<tr>
<th>High Intensity Statin Therapy</th>
<th>Moderate-Intensity Statin Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowers LDL by ≥50%</td>
<td>Lowers LDL by 30 - &lt;50%</td>
</tr>
<tr>
<td>Atorvastatin 40-80 mg</td>
<td>Atorvastatin 10-20 mg</td>
</tr>
<tr>
<td>Rosuvastatin 20-40 mg</td>
<td>Rosuvastatin 5-10 mg</td>
</tr>
<tr>
<td></td>
<td>Simvastatin 20-40 mg</td>
</tr>
<tr>
<td></td>
<td>Pravastatin 40-80 mg</td>
</tr>
<tr>
<td></td>
<td>Lovastatin 40 mg</td>
</tr>
<tr>
<td></td>
<td>Fluvastatin XL 80 mg</td>
</tr>
<tr>
<td></td>
<td>Pitavastatin 2-4 mg</td>
</tr>
</tbody>
</table>

* Once-daily dosing
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 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
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: 10-year CVD risk <5%, 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
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
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
9. Microvascular Complications and Foot Care
Screening

- At least once a year, assess urine albumin excretion 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>GFR (mL/min/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.

Recommendations: Diabetic Kidney Disease

Treatment

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

- Optimize blood pressure control (<140/90 mmHg) to reduce risk or slow progression of diabetic kidney disease. A
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. A
Treatment (3)

- Either an ACE inhibitor or ARB is recommended for treatment of nonpregnant patients with diabetes & modestly elevated urinary albumin excretion (30–299 mg/day) B and is strongly recommended for patients w/ urinary albumin excretion ≥300 mg/day and/or eGFR <60. A
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) & 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
  o Uncertainty about the etiology of disease
  o Difficult management issues
  o Rapidly progressing kidney disease.
# Management of CKD in Diabetes

<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>

*American Diabetes Association Standards of Medical Care in Diabetes. Microvascular complications and foot care. *Diabetes Care* 2016; 39 (Suppl. 1): S72-S80*
<table>
<thead>
<tr>
<th>GFR</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-44</td>
<td>Monitor eGFR every 3 months&lt;br&gt;Monitor electrolytes, bicarbonate, calcium, phosphorus, parathyroid hormone, hemoglobin, albumin weight every 3–6 months&lt;br&gt;Consider need for dose adjustment of medications</td>
</tr>
<tr>
<td>&lt;30</td>
<td>Referral to a nephrologist</td>
</tr>
</tbody>
</table>
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 (2)

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
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 or sight-threatening, more frequent exams required. **B**
Screening (3):

- High-quality fundus photographs can detect most clinically significant diabetic retinopathy. E

- Image interpretation should be performed by a trained eye care provider. E

- Retinal photography may serve as a screening tool for retinopathy, but is not a substitute for a comprehensive eye exam. E

- Perform comprehensive eye exam at least initially and at recommended intervals. E
**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 1\textsuperscript{st} trimester and quarterly for 1 year postpartum or as indicated by degree of 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
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. A

- Retinopathy is not a contraindication to aspirin therapy for cardioprotection, as it does not increase the risk of retinal hemorrhage. A
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.
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, and at least one of the following: pinprick, temperature, and vibration sensation. B

● Symptoms of autonomic neuropathy should be assessed in patients with microvascular & neuropathic complications. E
Recommendations: Neuropathy (3)

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

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
Recommendations: Foot Care (2)

- 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 history of ulcers or amputations, foot deformities, insensate feet & PAD are at increased risk for ulcers and amputations and should have their feet examined at every visit. C
Patients with symptoms of claudication, decreased, or absent pedal pulses should be referred for ABI & further vascular assessment. C

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

10. 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 reviewed.
- At higher risk for depression
Recommendations: Older Adults

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

- Determine targets & therapeutic approaches by assessment of medical, functional, mental, and social geriatric domains for diabetes management. E
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. E

Hypoglycemia should be avoided in older adults with diabetes. It should be screened for and managed by adjusting glycemic targets and pharmacologic interventions. B
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 virtually all older adults
- Lipid-lowering and aspirin therapy may benefit those with life expectancy at least equal to the time frame of primary or secondary prevention trials.
Recommendations: Older Adults (4)

- 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. E
Recommendations: Older Adults (5)

- Screening for geriatric syndromes may be appropriate in older adults with limitations in basic and instrumental activities of daily living. \( \text{E} \)

- Older adults with DM should be considered a high-priority population for depression screening and treatment. \( \text{B} \)
Recommendations: Older Adults (4)

- 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
11. 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.
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
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, as appropriate. E
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

Consider mental health professionals as an integral member of the pediatric diabetes multidisciplinary team. E
Type 1 Diabetes: Glycemic Control

- 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><strong>Before meals</strong>&lt;br&gt;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><strong>Bedtime/overnight</strong>&lt;br&gt;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: 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
Consider screening children with T1DM for celiac disease soon after the diagnosis of diabetes. E

Consider screening in children 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
Children 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

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
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
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.

- 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.

- Goal of therapy is LDL <100 mg/dL.
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
Type 1 Diabetes: Nephropathy

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. B
Type 1 Diabetes: Retinopathy

- An initial dilated & comprehensive eye exam is recommended at age $\geq 10$ 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
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
Distinguishing between type 1 and type 2 can be challenging.

Excessive weight is common in type 1.

Diabetes-associated autoantibodies and ketosis may be present in patients with features of type 2 such as obesity and AN).

Accurate diagnosis is critical.
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.
Type 2 Diabetes (3)

- 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
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
12. Management of Diabetes in Pregnancy
● Provide preconception counseling that addresses the importance of tight glycemic control, ideally <6.5%, to reduce the risk of congenital anomalies. B

● Family planning should be discussed and effective contraception should be prescribed and used until a woman is prepared and ready to become pregnant. A
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

- Preferred medications in GDM are insulin and metformin; glyburide may be used but may have a higher rate of neonatal hypoglycemia and macrosomia than insulin or metformin. Other agents have not been adequately studied. Most oral agents cross the placenta and all lack long-term safety data. A
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, preprandial & postprandial SMBG are recommended in both GDM and pregestational diabetes in pregnancy to achieve glycemic control. 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% (42–48mmol/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.
The American College of Obstetricians and Gynecologists (ACOG) recommends the following targets for women with pregestational type 1 or type 2 diabetes:

- Fasting ≤90 mg/dL (5.0 mmol/L)
- One-hour postprandial ≤130–140 mg/dL (7.2–7.8 mmol/L)
- Two-hour postprandial ≤120 mg/dL (6.7 mmol/L)
Glycemic Targets in GDM

For women with gestational diabetes, the following targets are recommended by the Fifth International Workshop-Conference on Gestational Diabetes Mellitus:

- Fasting $\leq 95 \text{ mg/dL (5.3 mmol/L)}$
- One-hour postprandial $\leq 140 \text{ mg/dL (7.8 mmol/L)}$
- Two-hour postprandial $\leq 120 \text{ mg/dL (6.7 mmol/L)}$

13. Diabetes Care in the Hospital
Consider getting an A1C on all patients with diabetes or hyperglycemia admitted to the hospital if not performed in the prior 3 months.  C

Start insulin therapy for persistent hyperglycemia starting at a threshold ≥180 mg/dL (10 mmol/L). Then a target glucose of 140–180 mg/dL (7.8–10 mmol/L) 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 110–140 mg/dL (6.1–7.8 mmol/L) may be appropriate for selected critically ill patients, if achievable without significant hypoglycemia. C

- Intravenous insulin infusions should be administered using validated protocols that allow for predefined adjustments in the infusion rate based on glycemic fluctuations and insulin dose. E
Recommendations: Diabetes Care in the Hospital (3)

- A basal + bolus correction regimen is the preferred treatment for noncritically ill patients with poor oral intake or those who are NPO. An insulin regimen with basal, nutritional & correction components is the preferred treatment for 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
Recommendations: Diabetes Care in the Hospital (5)

- The treatment regimen should be reviewed and changed if necessary to prevent further hypoglycemia when a blood glucose value is <70 mg/dL (3.9 mmol/L). C

- There should be a structured discharge plan tailored to the individual patient. B
14. Diabetes Advocacy
Advocacy Position Statements

● ADA publishes evidence-based, peer-reviewed statements 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
Thank you