**Executive Summary**

**Guideline Overview**

GHC-SCW has agreed to endorse the 2017 American Diabetes Association (ADA) Standards of Medical Care in Diabetes, with additional recommendations for screening constructed internally. This guideline contains recommendations for diagnostic criteria and therapeutic actions which are known or believed to favorably affect health outcomes of patients with diabetes.

**Key Revisions (2017 Periodic Review)**

1. Key revisions are outlined on pages s4-5 of the full ADA guideline.
2. Constructed recommendations for screening in asymptomatic adult patients using published evidence primarily reviewed by the U.S. Preventive Services Task Force and American Diabetes Association.
3. Added new collateral tool for the outpatient management of Type 1 diabetes in children.

**Companion Documents**

**AMBULATORY**

- 2017 Diabetes Guideline: Key Practice Recommendations
- Management of Hyperglycemia in Type 2 Diabetes

(Adult only):

- Preoperative Instructions for Ambulatory Procedures

(Pediatric only):

- Outpatient Management of Type 1 Diabetes Mellitus in Children
- Outpatient Management of Type 2 Diabetes Mellitus in Children

**INPATIENT/EMERGENCY DEPARTMENT**

- 2017 Diabetes Guideline: Key Practice Recommendations
- Management of Hyperglycemia in Type 2 Diabetes
- Glycemic Goals for Hospitalized Patients
- Steps for Coordinating Glucose Monitoring, Meals, and Medications
- Continuous Glucose Monitoring (CGM): Information for Clinicians

(Adult only):

- Adult Hypoglycemia Algorithm
- Adult Diabetic Ketoacidosis (DKA) Management Algorithm
- Adult Inpatient Insulin to Carbohydrate Ratios (ICRs)
- Cautions Regarding Oral Agents for Diabetes in the Hospital Setting
- Medication Adjustment for Hospitalized Patients who are NPO
- Transition from Intravenous (IV) to Subcutaneous (SC) Insulin Administration Algorithm
- Initiation of Insulin in Non-Critically Ill Insulin-Naïve Hyperglycemic Adult Patients Algorithm

(Pediatric only):

- Pediatric Hypoglycemia Algorithm
- Pediatric ED Diabetic Ketoacidosis (DKA) Management Algorithm
Scope
Disease/Condition(s): Diabetes mellitus

Clinical Specialty: Endocrinology, Internal Medicine, Family Medicine, Pediatrics, Obstetrics and Gynecology, Cardiovascular Medicine, Surgery, Hospitalists, Ophthalmology, Pathology & Laboratory Medicine, Clinical Nutrition, Pharmacy

Intended Users: Physicians, Advanced Practice Providers, Registered Nurses, Licensed Practice Nurses, Medical Assistants, Nursing Assistants, Pharmacists, Nutritionists

Objective(s): To provide standardized, evidence-based guidelines for diabetes care throughout a patient’s lifetime.

Target Population: Pediatric and adult patients with a prediabetes or diabetes mellitus diagnosis. Screening recommendations also apply to asymptomatic patients.

Major Outcomes Considered:
- Identification of prediabetes and diabetes
- Blood glucose control
- Prevention of diabetes complications
- Psychosocial support

Methodology
Methods Used to Collect/Select the Evidence:
Electronic database searches were conducted by the guideline workgroup members to collect evidence for review. Expert opinion and clinical experience were also considered during discussions of the evidence.

Methods Used to Formulate the Recommendations:
The workgroup members agreed to adopt recommendations developed by external organizations and/or arrived at a consensus through discussion of the literature and expert experience. All recommendations endorsed or developed by the guideline workgroup were reviewed and approved by other stakeholders or committees (as appropriate).

Methods Used to Assess the Quality of the Evidence/Strength of the Recommendations:
Recommendations developed by external organizations maintained the evidence grade assigned within the original source document and were adopted for use.

Internally developed recommendations, or those adopted from external sources without an assigned evidence grade, were evaluated by the guideline workgroup using an algorithm adapted from the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology (see Figure 1 in Appendix A).

Rating Scheme for the Strength of the Evidence/Recommendations:
See Appendix A for the rating scheme(s) used within this document.

Recognition of Potential Health Care Disparities: See pages s6-10 of the full guideline.¹
Introduction
Diabetes mellitus is a complex, chronic illness requiring continuous medical care with multifactorial risk reduction strategies beyond glycemic control. The American Diabetes Association (ADA)'s Standards of Care are intended to provide clinicians, patients, researchers, payers, and other interested individuals with the components of diabetes care, general treatment goals, and tools to evaluate the quality of care.

Recommendations
????? endorses the recommendations found within the full 2017 ADA guideline located online at http://care.diabetesjournals.org/content/40/Supplement_1, except for the topics listed in this section, as alternative recommendations are described below.

Type 2 Diabetes Screening (Adults)
The 2017 ADA Standards recommend universal screening in patients after age 45 years; however, ????? recommends targeted screening in all adult patients based on risk.

Screening for type 2 diabetes with an informal assessment of risk factors should be considered in asymptomatic adults. (ADA Grade B) It is reasonable to perform a risk assessment annually. (Very low quality evidence, weak/conditional recommendation)

Testing for type 2 diabetes should be considered in all adult patients who are overweight or obese (BMI > 25 kg/m² or > 23 kg/m² in Asian Americans) and have one or more of the following risk factors: (Moderate quality evidence, weak/conditional recommendation):

- A1C > 5.7%, impaired glucose tolerance, or impaired fasting glucose on previous testing
- First-degree relative with diabetes
- High-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, Pacific Islander)
- Women who were diagnosed with gestational diabetes mellitus (GDM)
- History of cardiovascular disease
- Hypertension (> 140/90 mmHg or on therapy for hypertension)
- HDL cholesterol level < 35 mg/dL and/or a triglyceride level > 250 mg/dL
- Women with polycystic ovary syndrome
- Physical inactivity
- Chronic glucocorticoid exposure
- Atypical antipsychotic use
- Sleep disorders, including obstructive sleep apnea, chronic sleep deprivation, and night-shift occupation
- Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans).

Testing Options
To test for type 2 diabetes, fasting plasma glucose, 2-hour plasma glucose after 75-g oral glucose tolerance test, and A1C are equally appropriate. (ADA Grade B) In patients with polycystic ovary syndrome, a 2-hour 75-g oral glucose challenge is recommended over the other screening testing options. (Low quality evidence, strong recommendation)

Screening Frequency
The appropriate interval between screening tests is not known. In patients age ≥ 40 years, testing for type 2 diabetes was not associated with a reduction in all-cause, cardiovascular or diabetes-related mortality over 10 years. Modeling simulation studies have found screening every 3-5 years to be cost-effective, particularly in patients age 30 or older. A large open cohort study in Japan which stratified patients age 30-74 years by risk (BMI and 10-yr. cardiovascular risk) demonstrated that screening frequencies could be extended to 8-10 year intervals in patients at lower risk. Therefore, subsequent screening tests, especially in patients aged 18-44 years, should be based upon individual clinical judgement that is influenced by the patient’s clinical status, any prior test results, and the presence of or changes in risk factors. (Very low quality evidence, weak/conditional recommendation) If prior test results are normal and patients do not demonstrate other significant risk, testing should not be repeated more frequently than every 3 years. (Low quality evidence, weak/conditional recommendation)

It is important to recognize that not all of the risk factors are weighted equally. The following alternative testing frequencies may need to be considered based on the presence of comorbid clinical conditions or prescription therapies:

- Patients with HIV should be screened for diabetes and prediabetes with a fasting glucose every 6-12 months before starting antiretroviral therapy and 3 months after starting or changing antiretroviral therapy. If initial screening results are normal, checking fasting glucose every year is advised. If prediabetes is detected, continue to measure fasting glucose levels every 3-6 months to monitor for progression to diabetes. (ADA Grade E)
- Annually screen people who are prescribed atypical antipsychotic medications for prediabetes or diabetes. (ADA Grade B)
- At least annual monitoring for the development of diabetes in those with prediabetes is suggested. (ADA Grade E) Prediabetes is defined as an A1C of 5.7-6.4%, impaired oral glucose tolerance (140-199 mg/dL), or impaired fasting glucose (100-125 mg/dL) on previous testing.2
- It is suggested that patients with polycystic ovary syndrome and normal glucose tolerance be rescreened every 2 years or sooner if additional risk factors are identified. Those with impaired glucose tolerance should be screened annually.5
- Women with a history of gestational diabetes mellitus (GDM) should have lifelong screening for the development of diabetes or prediabetes at least every 3 years. (ADA Grade B)

Screening for Cognitive Impairment
In lieu of the screening recommendations outlined within the 2017 ADA Standards, does not recommend screening for cognitive impairment in most adult patients. Refer to the Preventive Health Care – Adult/Pediatric – Ambulatory Guideline for more information.

Disclaimer
Clinical practice guidelines assist clinicians by providing a framework for the evaluation and treatment of patients. This guideline outlines the preferred approach for most patients. It is not intended to replace a clinician’s judgment or to establish a protocol for all patients. It is understood that some patients will not fit the clinical condition contemplated by a guideline and that a guideline will rarely establish the only appropriate approach to a problem.
Appendix A. Evidence Grading Scheme(s)

Table 1. ADA Grading Scheme

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td><strong>A</strong></td>
<td>Clear evidence from well-conducted, generalizable RCTs that are adequately powered, including:</td>
</tr>
<tr>
<td></td>
<td>• Evidence from a well-conducted multicenter trial</td>
</tr>
<tr>
<td></td>
<td>• Evidence from a meta-analysis that incorporated quality ratings in the analysis</td>
</tr>
<tr>
<td></td>
<td>Compelling nonexperimental evidence, i.e., “all or none” rule developed by the Center for Evidence-Based Medicine at the University of Oxford</td>
</tr>
<tr>
<td></td>
<td>Supportive evidence from well-conducted RCTs that are adequately powered, including:</td>
</tr>
<tr>
<td></td>
<td>• Evidence from a well-conducted trial at one or more institutions</td>
</tr>
<tr>
<td></td>
<td>• Evidence from a meta-analysis that incorporated quality ratings in the analysis</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Supportive evidence from well-conducted cohort studies</td>
</tr>
<tr>
<td></td>
<td>• Evidence from a well-conducted prospective cohort study or registry</td>
</tr>
<tr>
<td></td>
<td>• Evidence from a well-conducted meta-analysis of cohort studies</td>
</tr>
<tr>
<td></td>
<td>Supportive evidence from a well-conducted case-control study</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Supportive evidence from poorly controlled or uncontrolled studies</td>
</tr>
<tr>
<td></td>
<td>• Evidence from randomized clinical trials with one or more major of three or more minor methodological flaws that could invalidate the results</td>
</tr>
<tr>
<td></td>
<td>• Evidence from observational studies with high potential for bias (such as case series with comparison with historical controls)</td>
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<tr>
<td></td>
<td>• Evidence from case series or case reports</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>Conflicting evidence with the weight of evidence supporting the recommendation</td>
</tr>
</tbody>
</table>

Figure 1. GRADE Methodology
### Table 2. GRADE Ranking of Evidence

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>High</td>
<td>We are confident that the effect in the study reflects the actual effect.</td>
</tr>
<tr>
<td>Moderate</td>
<td>We are quite confident that the effect in the study is close to the true effect, but it is also possible it is substantially different.</td>
</tr>
<tr>
<td>Low</td>
<td>The true effect may differ significantly from the estimate.</td>
</tr>
<tr>
<td>Very Low</td>
<td>The true effect is likely to be substantially different from the estimated effect.</td>
</tr>
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</table>

### Table 3. GRADE Ratings for Recommendations For or Against Practice

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong</td>
<td>The net benefit of the treatment is clear, patient values and circumstances are unlikely to affect the decision.</td>
</tr>
<tr>
<td>Weak/Conditional</td>
<td>Recommendation may be conditional upon patient values and preferences, the resources available, or the setting in which the intervention will be implemented.</td>
</tr>
</tbody>
</table>
References


