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Diabetes Diagnostic and Screening Criteria Reviewed

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April 14, 2010 — Guidelines for diagnosis and screening for diabetes in the family practice setting are provided in a review published in the April 1 issue of the *American Family Physician*.

"Prevention, timely diagnosis, and treatment are important in patients with diabetes mellitus," write Parita Patel, MD, and Allison Macerollo, MD, from the Department of Family Medicine at the Ohio State University in Columbus. "Many of the complications associated with diabetes, such as nephropathy, retinopathy, neuropathy, cardiovascular disease, stroke, and death, can be delayed or prevented with appropriate treatment of elevated blood pressure, lipids, and blood glucose. In 1997, the American Diabetes Association (ADA) introduced an etiologically based classification system and diagnostic criteria for diabetes, which were updated in 2010."

In this classification system, types of diabetes based on cause are type 1 diabetes mellitus, type 2 diabetes mellitus, latent autoimmune diabetes, maturity-onset diabetes of youth, and miscellaneous causes. By far, the most prevalent cause is type 2 diabetes, which accounts for approximately 90% to 95% of all cases of diabetes in the United States, and which is associated with obesity and insulin resistance. Approximately 5% to 10% of diabetes cases are type 1, typically associated with autoimmune-mediated insulin deficiency.

Criteria for diagnosis include measurements of hemoglobin A1c (HbA1c) level, fasting or random blood glucose levels, or results from oral glucose tolerance testing. The American Diabetes Association defines diabetes as having 2 separate occasions of fasting blood glucose levels of at least 126 mg/dL after an 8-hour fast. Other criteria are random blood glucose level of at least 200 mg/dL in the presence of polyuria, polydipsia, weight loss, fatigue, or other characteristic symptoms of diabetes. Testing of random glucose level can be used for screening and diagnosis, but sensitivity is only 39% to 55%.

First-line diagnostic testing for diabetes is the oral glucose tolerance test, in which the patient fasts for 8 hours and is then given a 75-g glucose load. Diabetes is diagnosed if blood glucose level then exceeds 199 mg/dL, whereas impaired fasting glucose level is defined as a blood glucose level of 140 to 199 mg/dL at 2 hours after glucose load. Impaired fasting glucose was also defined by the American Diabetes Association as a fasting glucose level between 100 and 125 mg/dL.

Testing of HbA1c level, which does not require fasting, is useful both for diagnosis and screening. Diabetes can be diagnosed from a level of at least 6.5% on 2 separate occasions. Limitations include low sensitivity and interference with interpretation by race, presence of anemia, and use of different medications.

Ingestion of a 50-g glucose solution (*Glucola*; Ames Diagnostics, Elkhart, Indiana) is the most commonly performed screening test for gestational diabetes. A 75-g or 100-g oral glucose tolerance test is needed to confirm a positive screening test result.

Diabetic ketoacidosis is typically associated with type 1 diabetes or, sometimes, with type 2 diabetes in obese black patients. This condition is diagnosed from a blood glucose level higher than 250 mg/dL, an arterial pH of 7.3 or less, and moderate ketonemia.

Despite some inconsistencies in existing guidelines, most of these guidelines recommend diabetes screening for patients with hypertension or hyperlipidemia. Diabetes risk calculators help identify individuals with a low probability of diabetes because these screening tools have a high negative predictive value.

Classification of diabetes type or determination of the continued need for insulin may be facilitated by testing of C peptide levels. Testing of autoantibodies to islet cells, insulin, glutamic acid decarboxylase (GADA), tyrosine phosphatase (IA-2 α and IA-2 β), and other markers of immune-mediated beta cell destruction may also be helpful. Availability, cost, and predictive value limit the usefulness of antibody testing.

Key Recommendations

Specific key clinical recommendations for practice, and their accompanying level of evidence rating, are as follows:

- Diabetes screening should be performed for patients with a sustained blood pressure higher than 135/80 mm Hg (level of evidence, A).
- Diabetes screening should be performed for patients with hypertension or hyperlipidemia (level of evidence, B).
- Risk calculators can be used to identify patients who do not need further screening for diabetes (level of evidence, C).
- Diabetes can be diagnosed when the HbA1c value is greater than 6.5% on 2 separate occasions (level of evidence, C).
- For patients at increased risk for diabetes, counseling is recommended regarding effective strategies to reduce risk, including weight loss and exercise (level of evidence, C).

"Clinical judgment using a patient's phenotype, history, presentation, and selective laboratory testing is the best way to manage patients with diabetes," the study authors write. "...As with any condition, a rationale for screening should first be established....Early treatment of diabetes that was identified primarily by symptoms improves microvascular outcomes. However, it is not clear whether universal screening reduces diabetes-associated morbidity and mortality."

In an accompanying editorial, Jeff Unger, MD, from Catalina Research Institute in Chino, California, describes latent autoimmune diabetes in adults (LADA).

"...LADA is a slowly progressive form of autoimmune diabetes mellitus characterized by older age at diagnosis, the presence of pancreatic autoantibodies, and the lack of an absolute insulin requirement at diagnosis," Dr. Unger writes. "Although patients with LADA present with more preserved beta cell function than those with classic type 1 diabetes, they tend to have a rapid and progressive loss of beta cell function necessitating intensive insulin intervention. Family physicians care for most patients in the United States with type 2 diabetes and, therefore, should be aware that approximately 10 percent of these patients have LADA."

The review authors have disclosed no relevant financial relationships.

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