Understanding Diabetes Mellitus

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by Garry L. Huff, MD, CCS

Diabetes mellitus represents a group of disorders that are characterized by hyperglycemia. The clinical and ICD-9-CM classification of diabetes mellitus have evolved as understanding of insulin physiology has expanded. This article will explain diabetes mellitus and its ICD-9-CM classification.

Understanding the Disease

Insulin is produced and stored by beta cells found only within the pancreas. The main stimulus for insulin secretion is the level of glucose in the blood. When the blood glucose rises, insulin is secreted. As the glucose declines, insulin release decreases. Insulin stimulates the uptake of glucose from the blood by the liver, skeletal muscle, and adipose tissue. It also suppresses the production of glucose by the liver and the breakdown of fat by the adipose tissue.

Diabetes mellitus results from depressed levels or action of insulin, which leads to a decrease in the uptake of glucose from the blood and an increased production of glucose by the liver. The former is responsible for the elevated blood sugar seen after eating (postprandial hyperglycemia) and the latter for the fasting hyperglycemia. Additionally, in cases of severe insulin deficiency, the body will begin to breakdown fat, causing an overproduction of ketone bodies, which can lead to diabetic ketoacidosis.

Classifying Diabetes Mellitus

Diabetes mellitus arises from either a defect in the secretion of insulin by the beta cell or a resistance to the action of the insulin by the target tissues, particularly liver, skeletal muscle, and adipose tissue. The current classification of diabetes mellitus is based on these abnormalities of insulin metabolism and is not predicated on age or whether the patient requires insulin for control of hyperglycemia. Therefore, the terms adult onset or juvenile onset diabetes mellitus and insulin dependent diabetes mellitus do not appear in the most recent clinical classification of diabetes mellitus presented by the American Diabetes Association (ADA):

Category I (Type 1 diabetes mellitus) is characterized by an absolute deficiency of insulin. An autoimmune process destroys the beta cells in the pancreas. The onset of this type of diabetes is usually before age 30. Because of the low insulin levels, diabetic ketoacidosis is frequently observed. Most of the patients previously delineated as having juvenile onset or ketosis prone diabetes fall into this category.

Category II (Type 2 diabetes mellitus) results from a resistance to the effects of insulin and a decreased beta cell responsiveness to release appropriate amounts of insulin in a timely manner to an elevated blood glucose. These patients often have elevated insulin levels (hyperinsulinemia), which are required to overcome the body's resistance to the insulin to maintain a normal blood glucose. This category represents nearly 90 percent of all cases of diabetes mellitus in the US.

Category III (Other specific types of diabetes) includes a heterogeneous group of disorders in which the diabetes mellitus is due to a specific genetic defect, a side effect of a drug, or is secondary to some other disease process. Found in this category are diabetes arising from disorders of the pancreas, steroid induced diabetes, and other disorders of the endocrine glands. These endocrine disorders, which include hyperthyroidism, Cushing syndrome, and acromegaly are characterized by an overproduction of other hormones that counteract the effect of insulin, creating a secondary diabetic state.

Category IV (Gestational diabetes mellitus) is defined by an impaired glucose tolerance that only appears during pregnancy. This condition is attributed to an increased insulin resistance that arises during pregnancy in susceptible individuals. Upon delivery, the glucose intolerance returns to normal. Gestational diabetes does not include pre-existing type 1 or 2 diabetes mellitus that is exacerbated by pregnancy.

Diagnosing Diabetes

The current classification scheme for diabetes mellitus renders the terms insulin-dependent (IDDM) and non-insulin dependent diabetes mellitus obsolete. Because many physicians are using the term IDDM interchangeably with insulin requiring, the term IDDM should not be used as the sole basis for assigning the type of diabetes mellitus.

In ICD-9-CM, only patients falling into categories I (Type 1 diabetes mellitus) and II (Type 2 diabetes mellitus) of the American Diabetes Association classification are assigned to category 250. Patients included in category III (Other specific types of diabetes mellitus) should be coded to the underlying disease with a code from category 251 to delineate the secondary diabetic state. Gestational diabetes mellitus (category IV) is assigned to subcategory 648.8.

The current criterion used to diagnose diabetes mellitus reflects the level of impaired glucose metabolism associated with development of complications rather than some arbitrary value above normal. The criteria include:

- Symptoms of diabetes (excessive urination and thirst, increased appetite, weight loss, etc.) plus a random blood glucose equal to or greater than 200 mg/dl or
- Fasting blood plasma glucose equal to or greater than 126 mg/dl or
- Two-hour plasma glucose equal to or greater than 200 mg/dl during an oral glucose tolerance test

Some include a hemoglobin A1c level greater than 6 percent as a potential criterion for the diagnosis of diabetes mellitus. However, this is not universally accepted.

A Progressive Disease

Both type 1 and type 2 diabetes mellitus are progressive diseases. There is a continual decline in insulin secretion and/or increase in insulin resistance. This results in a progression of glucose intolerance from a subclinical state to one that can be demonstrated by either an abnormal glucose tolerance test or fasting hyperglycemia.

The natural history of type 1 and 2 diabetes mellitus is quite dissimilar. With type 1 diabetes mellitus there is a rapid onset of overt diabetes mellitus because of the rapid steady destruction of the beta cells, which results in absolute insulin deficiency. These patients will require insulin early in their course and often present for the first time with diabetic ketoacidosis. Because type 1 diabetes mellitus is a result of irreversible insulin deficiency, once insulin is required, it will always be needed, though the dosage of insulin needed may fluctuate during times of stress. It is unusual to see the significant long-term complications of diabetes mellitus such as neuropathy, nephropathy, and vascular disease at the time of initial presentation.

In contrast, patients with type 2 diabetes mellitus have a much slower evolution of their glucose metabolism impairment, because the pathogenesis involves the gradual onset of insulin resistance rather than a rapid development of insulin deficiency. Additionally, the insulin resistance may fluctuate acutely with stress, or more chronically with changes in body fat resulting in a variable need for insulin. Unlike type 1 diabetics, these individuals may be able to reverse their need for insulin. Because of the slow progression of type 2 diabetes mellitus, up to 50 percent of patients may have long-term complications of diabetes at the time of their initial presentation.

Early Detection Key

The focus of treatment is early detection and institution of strict control of the blood glucose. This is important, as studies have shown that the development of diabetic complications can be delayed through normalization of the blood glucose. The “ideal goals” for glycemic control established by the American Diabetes Association are:

- Average preprandial (before meal) blood glucose of less than 120 mg/dl
- Average bedtime glucose of less than 140 mg/dl
- Hemoglobin A1c levels of less than 7 percent

It must be stressed that the above parameters represent goals only. The level of control must be individualized depending on patient factors such as drug compliance, level of understanding, socioeconomic factors, and family support.

The only effective medical treatment for type 1 diabetes mellitus is insulin. None of the oral medications used in type 2 diabetes mellitus are effective in treating type 1 diabetes mellitus. Oral medications used to treat type 2 diabetes mellitus fall into the following categories:

A. Insulin secretagogues: These medications work by increasing the release of stored insulin from the beta cells of the pancreas. The most commonly used drugs in this category are the second-generation sulfonylureas such as glyburide and glipizide.

B. Biguanides: These drugs work by decreasing the liver's production of glucose that is responsible for fasting hyperglycemia. Metformin is the prototype drug of this category.

C. Thiazolidinediones: A newer class of agents, which work by lowering the level of insulin resistance through enhancing the sensitivity of the target organs, particularly skeletal muscle and adipose tissue, to secreted insulin. Examples of drugs in this class include rosiglitazone and pioglitazone.

D. Alpha-Glucosidase Inhibitors: Drugs in this category reduce postprandial hyperglycemia by inhibiting glucose absorption from the diet. Acarbose is an example of this type of drug. This is the only oral medication that is currently beneficial in type 1 diabetic patients.

The development of new types of oral medications with different mechanisms has enabled physicians to individualize drug regimens that will maximize the glycemic control and delay the need for insulin. However, insulin will eventually be required in a substantial number of type 2 diabetic patients.

Effective Coding

Code selection is driven by physician documentation. However, in cases of diabetes mellitus, the documentation may be ambiguous. With an understanding of the pathophysiology, classification, and treatment of diabetes mellitus, the coder is more apt to capture the correct type of diabetes and recognize the need to clarify ambiguous terms such as insulin dependent diabetes mellitus and poorly controlled diabetes. Additionally, coders will be able to have a more effective dialogue with physicians to clarify these issues.

Garry Huff *(huffdrg@aol.com) is associate director of DRG Review, Inc.*

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