

Management of Diabetes in Children and Adolescents



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KEYWORDS

- Type 1 diabetes • Type 2 diabetes • Monogenic diabetes • Insulin and metformin
- Diabetes technology • Children • Adolescents

KEY POINTS

- Diabetes is among the most common chronic diseases in children and adolescents.
- Proper diagnosis of the type of diabetes in children and adolescents is important in order to implement an effective treatment plan.
- Technology to assist with diabetes treatment is advancing rapidly.
- A multidisciplinary pediatric diabetes team with the child/adolescent and caregiver at the center of the team is essential to achieve desired outcomes.

INTRODUCTION

Diabetes mellitus (DM) is the third most common disease in children and adolescents under 18 years of age (youth).¹ Managing DM in youth can be challenging because of factors such as physical growth, sexual maturity, family dynamics, developmental stages, and psychological adjustment as youth transition from being dependent to independent.² To achieve the best outcomes, it is necessary to have a multidisciplinary pediatric team of specialists including physicians/advanced practice providers, certified DM educators to teach diabetes self-management education (DSME) and medical nutrition therapy (MNT), and psychosocial support personnel with the patient and family^{3,4} at the center of the team. Treatment plans will need to be revised frequently, so it is important that the team works together closely. This article will discuss the prevalence, diagnostic criteria, types, and treatment of DM in youth, as well as transitioning from pediatric to adult care.

PREVALENCE OF DIABETES IN YOUTH IN THE UNITED STATES

Most youth with DM have type 1 diabetes (T1DM); however, type 2 diabetes (T2DM) is becoming epidemic in youth. The prevalence of DM in youth in the United States was

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unknown until the early 2000s. The SEARCH for Diabetes in Youth study (SEARCH), an ongoing multicenter national study sponsored by the US Centers for Disease Control and Prevention (CDC) and The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), was launched in 2000 and will continue until at least 2020 with the aim of discovering the prevalence of DM in youth in the United States.⁵ The prevalence of T1DM in youth in 2001 was 1.48 cases per 1000 youth, and in 2009, it was 1.93 cases per 1000 youth, increasing by 21.1%. The prevalence of T2DM in youth in 2001 was 0.34 cases per 1000 youth in 2001, and in 2009 it was 0.46 cases per 1000 youth, increasing by 30.5%.⁶

DIAGNOSING DIABETES IN YOUTH

Diagnostic criteria for DM in youth are the same as for adults. The diagnosis is based on 1 of the following criteria:

- Hemoglobin A1c (HbA1c) of at least 6.5% performed by a National Glycohemoglobin Standardization Program (NGSP) laboratory standardized to the Diabetes Control and Complication Trial (DCCT) assay
- Fasting plasma glucose of at least 126 mg/dL (no caloric intake for at least 8 hours)
- Two-hour plasma glucose of at least 200 mg/dL during an oral glucose tolerance test using a glucose load containing 75 g anhydrous glucose dissolved in water
- Presence of classic symptoms of hyperglycemia or hyperglycemic crisis with a random plasma glucose of at least 200 mg/dL³

The laboratory results should be repeated if unequivocal hyperglycemia is absent. The American Diabetes Association (ADA) recommends using blood glucose rather than HbA1c to diagnose T1DM.⁷

TYPES OF DIABETES

Diabetes is classified into the following categories³:

- T1DM
- T2DM
- Gestational diabetes mellitus (GDM)
- Specific types of DM due to other causes

Gestational DM in youth will not be discussed in this article.

IMPORTANCE OF GLYCEMIC CONTROL

The current glycemic targets for DM are based on several key landmark trials. The Diabetes Control and Complications Trial (DCCT) was a randomized controlled trial conducted from 1982 to 1993 with 1441 subjects aged 13 to 39 years with T1DM, comparing conventional diabetes treatment (CON) with intensive insulin management (INT). Patients with hypertension, hypercholesterolemia, severe diabetic complications, or medical conditions were excluded. The subjects were also divided into a primary prevention arm for those with T1DM 1 to 5 years duration and without any diabetic retinopathy (DR) or urinary albumin excretion of at least 40 mg per 24 hours, and a secondary intervention arm for those with T1DM 1 to 15 years duration with mild-to-moderate DR. The patients in the CON arm of the study were treated with 1 to 2 daily insulin injections with daily urine or finger stick blood glucose monitoring (FSBG). No changes were made in their DM treatment plan unless the HbA1c

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