



Central California Pediatrics

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Specialty information for physicians who treat children and expectant mothers.



Metabolic Syndrome, Prediabetes and Diabetes in Children and Adolescents

Moinuddin Mokhashi, MD

Valley Children's Pediatric Endocrinologist

November is National Diabetes Month, a time when communities across the country team up to bring attention to diabetes. This year's focus is on prediabetes and preventing diabetes.

A growing number of children are being diagnosed with diabetes, both Type 1 and Type 2. A study that tracked millions of kids and teenagers in six areas of the U.S. found that young patients living with Type 1 diabetes (T1D) had surged by 45% between 2001 and 2017. During that same 16-year period, there had been a 95% increase in the kids living with Type 2 diabetes (T2D). Since the COVID-19 pandemic began, several reports/studies have shown an almost doubling of new cases of diabetes in youth, again both T1D and T2D. Our internal data at Valley Children's affirms the trend seen nationwide and internationally.

As the proportion of the population with obesity continues to rise, the prevalence of metabolic syndrome is increasing in both children and adolescents. The median prevalence of metabolic syndrome in obese populations was 29.2% (range 10–66%). Clinical features seen in metabolic syndrome: obesity, dyslipidemia, hypertension, glucose intolerance and T2D, nonalcoholic fatty liver disease (NAFLD), polycystic ovarian syndrome (PCOS) and inflammatory markers.

The prevalence of prediabetes was approximately 30% among adolescents with obesity, with 22.7% having impaired fasting glucose (IFG) and 9.5% having impaired glucose tolerance (IGT). The Pediatric Endocrine Society with the Endocrine Society and the American Diabetes Association (ADA) endorse screening for prediabetes/T2D in high-risk youth.¹

Individuals with IFG, IGT, or both are included under the broad definition of prediabetes. With the updated diagnostic hemoglobin A1c (HbA1c) criteria for diabetes in 2010, also came an HbA1c range associated with increased risk for diabetes: 5.7%-6.4%. The ADA states that the term "prediabetes" may be applied to this group and that those with HbA1c in the 6.0%-6.4% group are at particularly high risk for developing diabetes. However, it has been suggested that HbA1c is not sufficiently sensitive or specific enough to make the diagnosis of prediabetes alone, but should be used in combination with oral glucose tolerance test (OGTT).

Youth have unique circumstances affecting the likelihood of progression of prediabetes to T2D. Youth have differences in the degree of obesity, dietary choices, physical activity patterns and other behaviors when compared with adults. In addition, elevations in hormones necessary to achieve final growth and physical development, particularly growth hormone and insulin-like growth factor-1, contribute strongly to the normal physiologic decrease in insulin sensitivity that occurs during puberty. As growth hormone/insulin-like growth factor-1 levels decrease toward the end of puberty, insulin sensitivity improves. Thus, there is a high rate of spontaneous remission of prediabetes in youth with obesity when puberty ends. Thus, the risk for progression of HbA1c from the prediabetes to diabetes category was not equal amongst all youth with baseline HbA1c in the prediabetes range. Studies in adults indicate that lifestyle modification can prevent or delay the onset of T2D. However, one must exercise caution in extrapolating from adult data, because the phenotype of T2D differs in youth from that of adults.

RETURN SERVICE REQUESTED

Although this report addresses prediabetes as a precursor to T2D in the overweight/obese child and adolescent, T1D still remains the more common cause of diabetes during childhood, and should be kept under consideration by the clinician regardless of the child's BMI. This is particularly true in youth less than 10 years of age and/or who are prepubertal. The diagnosis of diabetes, regardless of age group, must fulfil the criteria.²

¹High risk is defined as (1) age \geq 10 years or pubertal (if this occurs before age 10 years), and meeting the following weight criteria: body mass index (BMI) \geq 85th percentile for age and sex on the standard Centers for Disease Control and Prevention growth charts, weight for height $>$ 85th percentile, or weight $>$ 120% of ideal (50th percentile) for height, and (2) the presence of at least two of the following risk factors: family history of T2D in a first- or second-degree relative; minority race/ethnicity (Native American, black, Hispanic, Asian American, Pacific Islander); conditions or signs associated with insulin resistance (acanthosis nigricans, PCOS, hypertension, dyslipidemia, small for gestational age); and maternal diabetes or gestational diabetes during the child's gestation.

²The ADA defines diabetes as: (1) a fasting (no caloric intake for at least 8 hours) glucose of $>$ 125 mg/dL, or (2) a 2-hour glucose on an OGTT of \geq 200 mg/dL (in the absence of unequivocal hyperglycemia, the ADA recommends that the result should be confirmed with repeat testing), or (3) a random glucose of \geq 200 mg/dL with the classic diabetes symptoms, or (4) a HbA1c of \geq 6.5% by a National Glycohemoglobin Standardization Program-certified device, standardized to the Diabetes Control and Complications Trial assay (in the absence of unequivocal hyperglycemia, the ADA recommends that the result should be confirmed with repeat testing).

Communication Preferences For Referring Providers

Valley Children's now has the capability for you to customize your clinical communications from our organization at any time. Visit valleychildrens.org/preferences to update your preferences today.

Additionally, Valley Children's now faxes two new daily summary reports: the Daily Referral Status Report and Daily Patient Activity Report.

- The **Daily Referral Status Report** provides referring providers with prompt referral status updates, including notification that Valley Children's received your referral, when your patient is scheduled and any "no shows."
- The **Daily Patient Activity Report** provides referring providers with an update of all patient encounters from the previous day, including Emergency Visits, Inpatient Discharges and all Outpatient encounters.

If you have questions or if you would like to discuss your specific needs, please reach out to our Physician Relations Team at 559-353-7229 or email physicianrelations@valleychildrens.org.

Medical Staff News

The following pediatric specialists recently joined Valley Children's:

Anesthesiology

Sujana Dontukurthy, MD
Michelle Grua, MD

Cardiology

Thomas Fagan, MD

Gastroenterology

Nathan Minkoff, MD

Hospitalist

Jeffry Gill, MD
Amber Baisz, MD
(Bakersfield Memorial)
Matthew Kolosky, DO
(Bakersfield Memorial)

Neuro-Oncology

Audrey Green-Murphy, DO

Pediatrics

Ramandeep Kaur, MD
(Sky Park Pediatrics)

Urology

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