



Clinical Practice Guideline for Care of Children and Adolescents with Type I Diabetes mellitus

Criteria for the diagnosis of Diabetes mellitus (DM)

1. Symptoms of DM in association with a significantly elevated random plasma glucose ≥ 200 mg/dl (11.1 mmol/L). Random is defined as any time of day; without regard to the time period since the last meal. The classic symptoms of DM include: polyuria, polydipsia, and unexplained weight loss.
OR
2. a fasting plasma glucose ≥ 126 mg/dl (7.0 mmol/L). Fasting is defined as no caloric intake for at least eight (8) hours.
OR
3. a two (2)-hour plasma glucose ≥ 200 mg/dl (11.1 mmol/L) during an oral glucose tolerance test (GTT). The GTT should be performed, as described by the World Health Organization (WHO), using a glucose load of 75 grams of anhydrous glucose dissolved in water or 1.75 gm/kg body wt, if the weight is < 40 pounds (18 kg).

In the absence of unequivocal hyperglycemia, these diagnoses should be confirmed by repeat laboratory testing on a different day. The oral GTT is not recommended for routine clinical use, but may be required in the evaluation of patients when DM is still suspected despite a normal fasting plasma glucose level.

Major developmental issues and their effect on DM in children and adolescents

Developmental stage (approximate ages)	Normal developmental tasks	Type IDM management priorities	Family issues in type I DM management
Infancy (0–12 months)	• Developing a trusting relationship/“bonding” with primary caregiver(s)	• Preventing and treating hypoglycemia	• Coping with stress
		• Avoiding extreme fluctuations in blood glucose levels	• Sharing the “burden of care” to avoid parent burnout
Toddler (13–36 months)	• Developing a sense of mastery and autonomy	• Preventing and treating hypoglycemia	• Establishing a schedule
		• Avoiding extreme fluctuations in blood glucose levels due to irregular food intake	• Managing the “picky eater” • Setting limits and coping with toddler’s lack of cooperation with regimen
			• Sharing the burden of care
Preschooler and early elementary school-age (3–7 years)	• Developing initiative in activities and confidence in self	• Preventing and treating hypoglycemia	• Reassuring child that DM is no one’s fault
		• Unpredictable appetite and activity	• Educating other caregivers about DM management
		• Positive reinforcement for cooperation with regimen	
		• Trusting other	

		caregivers with DM management	
Older elementary school-age (8–11 years)	• Developing skills in athletic, cognitive, artistic, social areas	• Making DM regimen flexible to allow for participation in school/peer activities	• Maintaining parental involvement in insulin and blood glucose monitoring tasks while allowing for independent self-care for “special occasions”
	• Consolidating self-esteem with respect to the peer group	• Child learning short- and long-term benefits of optimal control	• Continue to educate school and other caregivers
Early adolescence (12–15 years)	• Managing body changes	• Managing increased insulin requirements during puberty	• Renegotiating parents and teen’s roles in diabetes management to be acceptable to both
	• Developing a strong sense of self-identity	• DM Management and blood glucose control become more difficult	• Learning coping skills to enhance ability to self-manage
		• Weight and body image concerns	• Preventing and intervening with diabetes-related family conflict
			• Monitoring for signs of depression, learning disorders, risky behaviors
Later adolescence (16–19 years)	• Establishing a sense of identity after high school (decision about location, social issues, work, education)	• Begin discussion of the transition to a new DM team	• Supporting the transition to independence
		• Integrating DM into new lifestyle	• Learning coping skills to enhance ability to self-manage
			• Preventing and intervening with diabetes-related family conflict
			• Monitoring for signs of depression, eating disorders, risky behaviors

Components of the initial visit

Medical history

- Symptoms, and results of laboratory tests, related to the diagnosis of DM
- Recent or current infections or illnesses
- Previous growth records, including growth chart, and pubertal development
- Family history of DM, diabetic complications, and other endocrine disorders
- Current or recent use of medications that may affect blood glucose levels (e.g., glucocorticoids, chemotherapeutic agents, atypical antipsychotics, etc.)
- History and treatment of other conditions, including endocrine and eating disorders, and diseases known to cause secondary DM (e.g., cystic fibrosis)
- Lifestyle, cultural, psychosocial, educational, and economic factors that might influence the management of DM
- Use of tobacco, alcohol, and/or recreational drugs
- Physical activity and exercise
- Contraception and sexual activity (if applicable)
- Risk factors for atherosclerosis: smoking, hypertension, obesity, dyslipidemia, and family history
- Review of Systems (ROS) should include gastrointestinal function (including symptoms of celiac disease) and

symptoms of other endocrine disorders (especially hypothyroidism and Addison's disease)

- Prior Hemoglobin A1c records
- Details of previous treatment programs, including nutrition and diabetes self-management education, attitudes, and health beliefs
- Results of past testing for chronic diabetic complications, including ophthalmologic examination and microalbuminemia screening
- Frequency, severity, and cause of acute complications such as ketoacidosis and hypoglycemia
- Current treatment of DM, including medication(s), the meal plan, and results of glucose monitoring and a patient's use of their own data

Physical examination

- Height, weight, and a BMI calculation (and comparison to age and sex-specific norms) and previous measurements
- Blood pressure determination and comparison to age-, sex-, and height-related norms
- Yearly funduscopic examination by an eye-care professional
- Oral examination
- Thyroid palpation
- Cardiac examination
- Abdominal examination (e.g., for hepatomegaly)
- Staging of sexual maturation
- Evaluation of pulses
- Hand/finger examination
- Foot examination
- Skin examination (for Acanthosis nigricans, SMBG testing sites, insulin-injection sites, etc.)
- Neurological examination

Laboratory evaluation

- *If clinical evidence for DKA:*
 - Serum glucose, electrolytes, arterial or venous pH, serum or urine ketones
- *If signs and symptoms are suggestive of type II DM:*
 - Evidence of islet autoimmunity (e.g., islet cell [ICA] 512 or IA-2, GAD, and insulin autoantibodies)
 - Evidence of β -cell secretory capacity (e.g., C-peptide levels) after 1 year, if diagnosis is in doubt
 - A1C
 - Lipid profile
 - Annual screening for microalbuminuria
 - Thyroid-stimulating hormone (TSH) levels
 - Celiac antibodies at diagnosis or initial visit if not done previously

Referrals and screening

- Yearly ophthalmologic evaluation.
- Medical nutrition therapy (by a registered dietitian)
- As part of initial team education and on referral, as needed; generally requires a series of sessions over the initial 3 months after diagnosis, then at least annually, with young children requiring more frequent reevaluations
- Diabetes nurse educator
 - As part of initial team education, or referral as needed at diagnosis; generally requires a series of sessions during the initial 3 months of diagnosis, then at least annual reeducation
- Behavioral specialist
 - As part of initial team education, or referral as needed optimally for evaluation and counseling of patient and family at diagnosis, then as indicated to enhance support and empowerment to maintain family involvement in DM care tasks and to identify and discuss ways to overcome barriers in successful DM management
- Depression screening annually for children ≥ 10 years of age, with a specialist referral when indicated

Plasma blood glucose and A1C goals for type 1 diabetes by age group

Values by age	Plasma blood glucose goal range (mg/dl)		A1C	Rationale
	Before meals	Bedtime/overnight		
Toddlers and preschoolers (<6 years)	100–180	110–200	<8.5 (but >7.5) %	<ul style="list-style-type: none"> • High risk and vulnerability to hypoglycemia
School age (6–12 years)	90–180	100–180	<8%	<ul style="list-style-type: none"> • Risks of hypoglycemia and relatively low risk of complications prior to puberty
Adolescents and young adults (13–19 years)	90–130	90–150	<7.5%	<ul style="list-style-type: none"> • Risk of hypoglycemia • Developmental and psychological issues
<p>Key concepts in setting glycemc goals:</p> <ul style="list-style-type: none"> • Goals should be individualized and lower goals may be reasonable based on benefit–risk assessment • Blood glucose goals should be higher than those listed above in children with frequent hypoglycemia or hypoglycemia unawareness • Postprandial blood glucose values should be measured when there is a disparity between pre-prandial blood glucose values and Hemoglobin A1c levels 				

A lower goal (<7.0%) is reasonable if it can be achieved without excessive hypoglycemia.

Reference: Care of Children and Adolescents With Type 1 Diabetes: A statement of the American Diabetes Association. DIABETES CARE, VOLUME 28, NUMBER 1, JANUARY 2005.

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