

American Diabetes Association®

# Type 1 Diabetes Toolkit





# Resources in this Toolkit

Recognizing the symptoms of type 1 diabetes is crucial for treatment. Misdiagnosis of type 1 diabetes is common and occurs in all age groups. A positive antibody test does not mean immediate diagnosis. New treatments and clinical trials can possibly delay the onset of type 1 diabetes.

The American Diabetes Association (ADA) has created a toolkit full of resources and educational materials to help health care professionals understand screening for type 1 diabetes and glycemic management. These resources can also be used to have conversations with your patients about screening for type 1 diabetes.

CLICK ON THE UNDERLINED TITLES TO JUMP TO THE PAGE.

## **Clinical Workflow**

A systematic approach to facilitate the incorporation of early detection screening for type 1 diabetes within adult and pediatric primary care clinical practice.

## **Type 1 Diabetes Screening Discussion Guide**

A conversation outline to help explain key considerations around screening and monitoring and/or management plan in a patient-centered way.

## **Professional Infographics**

Understand the *Standards of Care in Diabetes* recommendations in easy to digest and actionable insights.

[Which Type is It](#)

[Type 1 Diabetes Glycemic Management](#)

[Understanding Diabetic Ketoacidosis DKA in Clinical Practice](#)

## **Patient Infographics**

Help your patients understand their risk for type 1 diabetes and what to expect from being screened.

[Understanding Type 1 Diabetes in Adults](#)

[Understanding Risk for Type 1 Diabetes in Children](#)

Use this toolkit today and take the next step in advancing your expertise and improving patient care.

# TYPE 1 DIABETES SCREENING WORKFLOW



## IDENTIFY PEOPLE AT RISK

- Family members of people with existing type 1 diabetes
- People with other autoimmune diseases comorbid with type 1 diabetes
  - >> Conduct a search utilizing EHRs (electronic health records) <<
- People who self-refer



## CONDUCT SCREENING

- **Autoantibody Testing:**
  - > Insulin Autoantibodies (IAA) (CPT\* code: 86337)
  - > Glutamic Acid Decarboxylase Autoantibodies (GAD65) (CPT code: 86341)
  - > Islet Antigen-2 Autoantibodies (IA-2) (CPT code: 86341)
  - > Zinc Transporter 8 Autoantibodies (ZnT8A) (CPT code: 86341)
- **Lab Centers:**
  - > Quest Diagnostics Diabetes Type 1 Autoantibody Panel (code: 13621)
  - > Labcorp Diabetes Autoimmune Profile (code: 504050)
- Engage in shared decision-making regarding type 1 diabetes screening
- Work toward seamless screening processes in offices, labs, and trials
- Add “best practice alerts” (BPAs) to EHR
- Supply take-home information on the benefits of type 1 diabetes screening



## CLASSIFY RISK AND STAGE

Check for hyperglycemia

- **Low risk:** single antibody, normoglycemia
- **Increased risk:** 2 or more autoantibodies
  - > Autoantibody and other diagnostics testing (FPG, IGT, or A1C) in 3 months (PCP-led)
- **Staging of type 1 diabetes:**
  - > **Stage 1:** normglycemia, multiple autoantibodies
  - > **Stage 2:** dysglycemia, multiple autoantibodies
    - ① **Consider referral to endocrinology for close monitoring**
    - ① **Consider for approved therapy to potentially delay the development of clinical diabetes**
  - > **Stage 3:** hyperglycemia, autoantibodies may become absent
    - ① **Urgent referral to endocrinology for initiation of insulin**
- Communicate next steps of process when test results are positive
- Inform patients that test results may be delivered to their electronic chart before you have a chance to review and discuss this with them



## MONITOR AND MANAGE

- Main goal is preventing diabetic ketoacidosis (DKA) and hospitalization
- Monitoring varies by number of positive antibodies glycemia, age, and other factors
- **Low risk:** single antibody
  - > Periodic, PCP-led retesting
- **Increased risk:** 2 or more autoantibodies, but presymptomatic
  - > Monitoring using A1C approximately every 6 months and 75-g oral glucose tolerance test (i.e., fasting and 2-h plasma glucose) annually
    - ① **Urgent referral to endocrinology for initiation of insulin**
- Provide educational resources and behavioral health support
- Offer research study participation for interested individuals
- Provide guidance on eating patterns, physical activity, and weight
- Educate on stage 3 (clinical) type 1 diabetes symptoms

The science behind type 1 diabetes screening and staging is evolving fast. This document is intended to provide health care professionals guidance on clinical workflow for type 1 diabetes screening based on an American Diabetes Association® (ADA) expert panel discussion and doesn't necessarily represent the official recommendations in ADA's Standards of Care in Diabetes.

A1C, glycated hemoglobin; DKA, diabetic ketoacidosis; EHR, electronic health record; PCP, primary care professional; FPG, fasting plasma glucose; IGT, impaired glucose tolerance.

\*CPT is the registered trademark of the American Medical Association.

# TYPE 1 DIABETES SCREENING: HOW TO GET STARTED

To implement the ideal clinical workflow, health care practices should:



**Nominate an internal champion** who can:

- ✓ Stay up to date on advances in type 1 diabetes screening.
- ✓ Share information and resources with clinical staff.
- ✓ Integrate policies and procedures into practice.
- ✓ Coordinate with other members of the diabetes care team.
- ✓ Serve as a point of contact or “navigator” for patients and families.

**The champion need not be a physician.** In fact, other health care professionals might be best suited, and the role would give them a chance to practice at the top of their license.

**Obtain educational materials** including patient-provider conversation guides, consumer handouts, and information about clinical trials.



**Educate all patient-facing team members** on the type 1 diabetes screening program.

**Identify the nearest labs** that can perform type 1 diabetes autoantibody testing.



**Source contact information for local referral options** that is readily available for your team to access.

# Type 1 Diabetes

## Screening Discussion Guide for Health Care Professionals

### Starting the screening conversation

- You could be **at risk** for type 1 diabetes if you have a family member with type 1 diabetes or if you have an autoimmune disease.
- One major reason why we want to screen for type 1 diabetes is to **lower the risk of developing dangerously high levels of blood glucose** which may result in the formation of ketones in your body **which can lead to a dangerous condition called diabetic ketoacidosis (DKA)**.
- Screening for type 1 diabetes involves testing for diabetes-associated **autoantibodies**.
  - Insulin antibodies
  - Glutamic acid decarboxylase antibodies (GAD)
  - Islet antigen 2 antibodies (IA-2)
  - Zinc transporter 8 antibodies (ZnT8)
- These autoantibodies show up in the blood when the immune system is attacking the cells that make insulin. Insulin is a hormone that helps your body use blood glucose as energy.
- Screening is performed with a **blood test**.
- By screening for these autoantibodies, the risk for type 1 diabetes can be found earlier, and people can be followed closely and receive the education they need.

There are management options for type 1 diabetes depending on your results.

Depending on the test results, screening could show different stages of type 1 diabetes:

- **Stage 1:**  
You have positive antibodies, your blood glucose (blood sugar) levels are within the normal range, and you are not experiencing any diabetes-related symptoms.
- **Stage 2:**  
You have positive antibodies, your blood glucose levels are getting higher, but still you are not experiencing any diabetes-related symptoms.
- **Stage 3:**  
You have positive antibodies, your blood glucose levels are higher, and you have symptoms of type 1 diabetes.

### Interpret the autoantibody results and discuss them with your patient

**No autoantibodies found with family history or personal history of other autoimmune conditions**



You will be tested again in the future.

**One autoantibody present**



Your results showed you have one autoantibody present. We are going to retest to confirm that no other autoantibodies are present.

**Two or more autoantibodies present**



Your results showed you have two autoantibodies present. This means you are in a stage of developing type 1 diabetes development. Let's create a plan based on your blood glucose levels and other symptoms.

**Risk based on stage:****Stage 1  
Type 1 Diabetes**

The 5-year risk of developing type 1 diabetes is about 44%, but this could vary on many things such as age and genetics.

**Stage 2  
Type 1 Diabetes**

There is a 60% risk by 2 years and a 75% risk within five years of developing type 1 diabetes.

**Considerations when discussing with your patient:**

- Positive antibody testing should be coupled with providing education about the risk of developing diabetes, diabetes symptoms, and preventing diabetic ketoacidosis (DKA).
- It is important to consider the mental health implications for people when they receive their results. This may require additional referrals to other members of the care team, such as diabetes care and education specialists (DCES) and/or psychologists.

**For patients who test positive at stage 2 type 1 diabetes, if appropriate, discuss:**

Teplizumab-mzwv has been approved to delay the onset of type 1 diabetes in adults and children 8 years or older with stage 2 type 1 diabetes.

- This treatment is a 14-day regimen via intravenous infusion provided at certain infusion locations.
- In a clinical trial, teplizumab-mzwv delayed the onset of stage 3 type 1 diabetes by 48 months (median time).

There are several clinical trials taking place to prevent or delay the onset of stage 3 type 1 diabetes. ClinicalTrials.gov and TrialNet.org have more information.

**For patients that test negative and who are high risk, encourage retesting in the future and discuss the symptoms of type 1 diabetes****Adult symptoms of type 1 diabetes:**

- Excessive thirst
- Frequent urination or getting up at night to urinate
- Unexplained weight loss or poor weight gain
- Change in appetite—feeling very hungry
- Low energy
- Blurred vision
- Cuts / bruises that are slow to heal
- Weight loss—even though you are eating more

**Children and adolescent symptoms of type 1 diabetes:**

- Urinating often
- Wetting the bed when they typically do not
- Feeling thirsty
- Feeling very hungry, even though they are eating
- Extreme fatigue
- Blurry vision
- Fungal infections (oral thrush, diaper rash, urinary tract infection)
- Weight loss, even though they are eating more

# Professional Infographics



# Which Type Is It?

## What is recommended for diagnosing type 1 diabetes?

Misdiagnosis of type 1 diabetes is common and occurs in all age groups.



## The AABCC approach

- A** **Age** (e.g., for individuals <35 years old, consider type 1 diabetes)
- A** **Autoimmunity** (e.g., personal or family history of autoimmune disease or polyglandular autoimmune syndromes)
- B** **Body habitus** (e.g., BMI <25 kg/m<sup>2</sup>)
- B** **Background** (e.g., family history of type 1 diabetes)
- C** **Control** (e.g., glucose management on noninsulin therapies)
- C** **Comorbidities** (e.g., treatment with immune checkpoint inhibitors for cancer can cause acute autoimmune type 1 diabetes)

ANTIBODY TESTING	IDENTIFY STAGE		
	STAGE 1	STAGE 2	STAGE 3
GAD	<ul style="list-style-type: none"> <li>Autoimmunity</li> <li>Normoglycemia</li> <li>Presymptomatic</li> </ul>	<ul style="list-style-type: none"> <li>Autoimmunity</li> <li>Dysglycemia</li> <li>Presymptomatic</li> </ul>	<ul style="list-style-type: none"> <li>Autoimmunity</li> <li>Overt hyperglycemia</li> <li>Symptomatic</li> </ul>
IA-2			
ZnT8			
	DIAGNOSTIC CRITERIA		
	<ul style="list-style-type: none"> <li>Multiple islet autoantibodies</li> <li>No IGT or IFG</li> </ul>	<ul style="list-style-type: none"> <li>Islet autoantibodies (usually multiple)</li> <li>Dysglycemia: IFG and/or IGT                             <ul style="list-style-type: none"> <li>FPG 100–125 mg/dL (5.6–6.9 mmol/L)</li> <li>2-h PG 140–199 mg/dL (7.8–11.0 mmol/L)</li> </ul> </li> <li>A1C 5.7–6.4% (39–47 mmol/mol) or ≥10% increase in A1C</li> </ul>	<ul style="list-style-type: none"> <li>Autoantibodies may become absent</li> <li>Diabetes by standard criteria</li> </ul>

FPG, fasting plasma glucose; IFG, impaired fasting glucose; IGT, impaired glucose tolerance; 2-h PG, 2-h plasma glucose.  
 Alternative additional stage 2 diagnostic criteria of 30-, 60-, or 90-min plasma glucose on oral glucose tolerance test ≥200 mg/dL (≥11.1 mmol/L) and confirmatory testing in those aged ≥18 years have been used in clinical trials.

This infographic is based on recommendations from the ADA's Standards of Care in Diabetes—2024

# Type 1 Diabetes Glycemic Management

## Treatment Goals for Adults

Improving glucose levels is essential to preventing both acute and chronic complications of diabetes.

### When setting treatment goals, remember to:

- Identify and work to address social determinants of health that impact diabetes management
- Set and reassess treatment goals regularly

## A1C

### MEASURE OF LONG-TERM GLYCEMIA

- A1C is an indirect measure of average glycemia over approximately 2–3 months\*
- Check A1C at least twice a year. Assess more frequently for individuals not meeting treatment goals
- A1C goal for most non-pregnant adults with diabetes is <7%.
- A1C goals <7% may be acceptable and even beneficial if achieved safely, without significant hypoglycemia, and without significant treatment burden\*
- Less stringent A1C goals, such as up to 8%, may be appropriate for individuals with limited life expectancy or where harms of more intensive treatment (hypoglycemia, treatment burden, side effects) outweigh its benefits

## GLUCOSE LEVEL

### MEASURE OF CURRENT OR SHORT-TERM GLYCEMIA

- Glucose levels can be measured using capillary (finger-stick) devices or continuous glucose monitors (CGMs)
- Goal (preprandial) fasting blood glucose is 80–130 mg/dL
- CGMs should be offered to all people with type 1 diabetes
- For those using a CGM, optimize time in range (TIR), time below range (TBR), and time above range (TAR) goals:

### CGM GOALS:

TAR >250 mg/dL (>13.9 mmol/L)	<5% (most adults) <10% (older adults)
TAR 181–250 mg/dL (10.1–13.9 mmol/L)	<25% (most adults) <50% (older adults)
TIR 70–180 mg/dL (3.9–10.0 mmol/L)	>70% (most adults) >50% (older adults)
TBR 54–69 mg/dL (3.0–3.8 mmol/L)	<4% (most adults) <1% (older adults)
TBR <54 mg/dL (<3.0 mmol/L)	<1%

**Adults with type 1 diabetes nearly always require insulin therapy.**

Individuals should receive education on insulin administration techniques and technology management.



## Prevent Acute Diabetes Complications: Severe Hypoglycemia and Diabetic Ketoacidosis (DKA)

### SEVERE HYPOGLYCEMIA

- Screen all people with type 1 diabetes for risk of hypoglycemia, fear of hypoglycemia, and impaired awareness of hypoglycemia

*“Have you ever had a low blood sugar that required you to treat it? That required someone else to help you treat it?”  
“Can you always feel when your blood sugar is low?”*

- Refer all people at risk for hypoglycemia or impaired awareness of hypoglycemia for diabetes self-management education and support (DSMES) and a behavioral health professional
- Prescribe glucagon to all people taking insulin or at high risk for hypoglycemia and educate caregivers on glucagon use

### DKA

- Educate all people with type 1 diabetes on the recognition, prevention, and treatment of DKA.
- Provide guidance on frequent glucose monitoring and appropriate insulin therapy for times of fasting and illness. Basal insulin should not be discontinued during fasting or illness.
- Refer to DSMES to help support education and a behavioral health professional.



\*These glycemic goals are appropriate for most non-pregnant adults with type 1 diabetes, but higher or lower goal ranges may be appropriate depending on the individual's risk for hypoglycemia, treatment burden, life expectancy, and specific situation.

# Understanding Diabetic Ketoacidosis (DKA) in Clinical Practice

## Early recognition and treatment are critical.

- DKA is a life-threatening complication of diabetes caused by a lack of insulin, leading to hyperglycemia, ketosis, and metabolic acidosis.
- Occurs primarily in type 1 diabetes but can also occur in type 2 under certain stress conditions (infection, trauma, etc.).

## Pathophysiology and Diagnostic Criteria

**Insulin insufficiency/deficiency +/- triggers**  
(new-onset type 1 diabetes, insulin omission, infection, myocardial infarction, surgery, substance use)

- Diabetes/hyperglycemia:** Glucose  $\geq 200$  mg/dL (11.1 mmol/L) OR prior history of diabetes
- Ketosis:**  $\beta$ -Hydroxybutyrate concentration  $\geq 3.0$  mmol/L OR urine ketone strip 2+ or greater
- Metabolic acidosis:** pH  $< 7.3$  and/or bicarbonate concentration  $< 18$  mmol/L



## Symptoms



Polyuria



Polydipsia



Weight loss



Fatigue



Kussmaul breathing



Vomiting



Abdominal pain



Altered mental status

## Management Goals

### GOALS

- Restore circulatory volume and tissue/organ perfusion
- Resolve ketoacidosis
- Correct electrolyte imbalances, particularly potassium.

### TREATMENT PROTOCOL

#### Fluid Replacement:

- 0.9% NaCl or other crystalloid for severe hypovolemia at 1L/hour or at a clinically appropriate rate aiming to replace 50% of the estimated fluid deficit in the first 8–12 hours.
- Add dextrose to the fluids once blood glucose is  $< 250$  mg/dL.

#### Insulin Therapy:

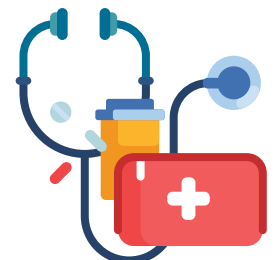
- IV regular insulin: 0.1 units/kg IV bolus, then start a continuous IV infusion 0.1 units/kg per hour.
- Continue the drip until plasma ketone  $< 0.6$  mmol/L and venous pH  $\geq 7.3$  or bicarbonate  $\geq 18$  mmol/L and patient is able to tolerate food.
- Transition to subcutaneous insulin 1-2 hours before stopping IV insulin to prevent rebound hyperglycemia.

#### Electrolyte Management:

- Monitor and replace potassium—patients with DKA have a large total body K<sup>+</sup> deficit. Potassium should be given as long as it is less than 5.0 mmol/L.
- Potassium monitoring and replacement critical, as insulin therapy drives potassium into cells.

#### Bicarbonate Therapy:

- Generally not recommended unless pH  $< 7.0$ .



This infographic is based on recommendations from the ADA's Standards of Care in Diabetes—2024

## Prevention and Education

When seeing people with diabetes:



Educate on daily glucose monitoring, ketone monitoring, sick-day management, maintaining hydration, and adjusting insulin doses.



Emphasize the importance of early medical intervention. If symptoms of DKA appear, recommend immediate follow up with healthcare professional

# Patient Infographics





Learn more about type 1 diabetes at [diabetes.org/type1](https://diabetes.org/type1)

# Understanding Type 1 Diabetes in Adults

You can develop type 1 diabetes at any age.



## SYMPTOMS OF TYPE 1 DIABETES



Urinating often



Feeling very thirsty



Feeling very hungry—even though you are eating



Extreme fatigue



Blurry vision



Cuts/bruises that are slow to heal



Weight loss—even though you are eating more

Talk with your doctor about your risk for type 1 diabetes and if you should be tested.

Learning you have type 1 diabetes early lets you take steps early to stay healthy.

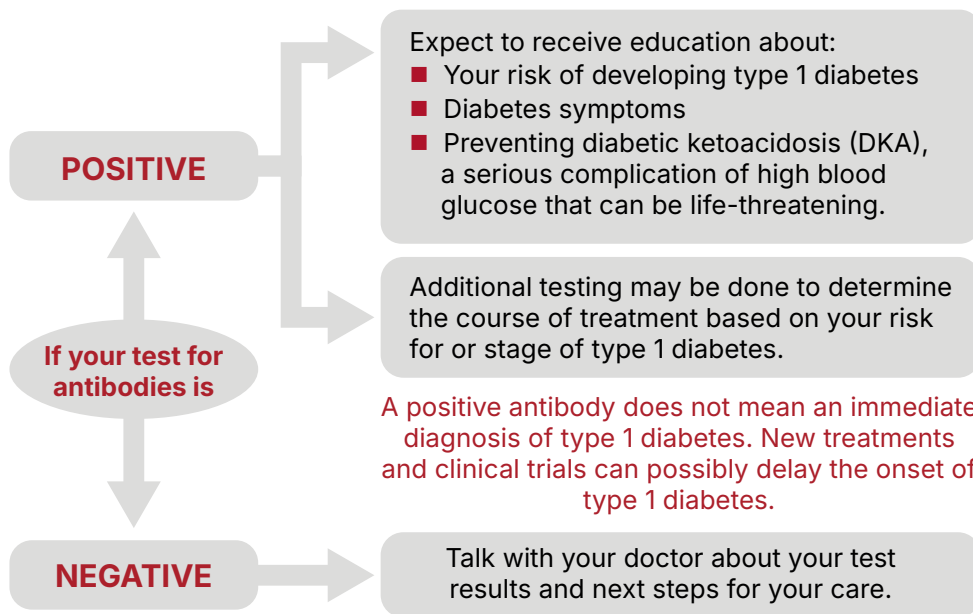
### YOUR TYPE 1 DIABETES RISK

Your doctor may screen for type 1 diabetes if you:

- show symptoms
- have a family history of type 1 diabetes
- have other autoimmune diseases
- are not able to manage your diabetes without insulin
- develop diabetes at age <35

Your doctor can screen for type 1 diabetes through:

- Antibody testing
- Blood glucose testing



A positive antibody does not mean an immediate diagnosis of type 1 diabetes. New treatments and clinical trials can possibly delay the onset of type 1 diabetes.

Talk with your doctor to determine if you are high risk for type 1 diabetes.



# Understanding Risk for Type 1 Diabetes in Children

Your child can develop  
type 1 diabetes at any age.



## COMMON SYMPTOMS OF TYPE 1 DIABETES



Urinating  
often or bed  
wetting



Feeling  
very thirsty



Feeling very  
hungry—even  
though they are  
eating



Extreme  
fatigue



Blurry  
vision



Fungal infections  
(oral thrush,  
diaper rash,  
urinary tract  
infection)



Weight loss—  
even though  
they are eating  
more

These symptoms overlap with other health conditions.  
Talk with your doctor if your child is experiencing these.

## Your Child's Type 1 Diabetes Risk

If your child has a family history of type 1 diabetes and/or is experiencing symptoms for several days to a few weeks, their doctor can screen by testing blood for:

- antibodies
- blood glucose levels

Based on the results, your child's doctor may need to repeat or order more testing.



Know that there are new treatments for early type 1 diabetes  
that may delay the need for insulin use.





[professional.diabetes.org/T1D](https://professional.diabetes.org/T1D)