

When To Go To The ER

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Be prepared for hypoglycemia by always carrying a sugar source with you.

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A diagnosis of diabetes can be very frightening and overwhelming. There is so much to learn. One of the most important things to know is how to recognize two very serious conditions, called [hypoglycemia](#) (low blood sugar) and hyperglycemia (high blood sugar). These can occur at any time and need to be treated immediately to avoid a medical emergency.

Hyperglycemia happens when you haven't had enough insulin (if you are Type 1) or that your insulin receptors are not working like they should (with Type 2). Perhaps your food intake was higher than you thought, or you were under stress or had an illness. Hyperglycemia can occur in insulin dependent diabetics who miss a dose of insulin, or if they are sick or have an infection.

It's a good rule of thumb to check your urine for ketones if your blood sugar is over 240 mg/dl. Hyperglycemia can progress to a condition known as [diabetic ketoacidosis \(DKA\)](#). When blood sugar goes too high, ketones start to build up in the blood and it becomes too acidic. Cell damage can occur and if it continues to progress, it can cause coma or death. DKA needs immediate medical intervention.

Hypoglycemia occurs when blood sugar drops, usually below 60 mg/dl although this varies from person to person. Hypoglycemia may be treated at home if the symptoms are not yet severe and the blood sugar has not fallen too low.

Taking glucose tablets, or a glass of orange juice, or other fast sugar sources such as regular soda, cake decorating gel, or a few sugar cubes, can relieve the symptoms within minutes. If blood sugar has a tendency to fall very low, very quickly, a person may carry glucagon with them in addition to glucose tablets. Glucagon is an injection that stimulates the liver to release sugar into the blood. It can be self-administered and usually brings the blood sugar up to an acceptable level within 15 minutes.

Hypoglycemia can be life-threatening if left untreated, resulting in coma and death. If blood sugar is severely low, or if taking in some form of sugar is not raising the blood sugar, or if a person is unable to take in a sugar source due to vomiting or unconsciousness, it is critical that the person receives emergency care as soon as possible.

If you have these symptoms please call your health care professional and/or go to the emergency room.

Hyperglycemia

- Increased thirst
- increased urination
- Nausea/vomiting
- Deep and/or rapid breathing
- Abdominal pain
- Fruity smelling breath
- Loss of consciousness

Hypoglycemia

- Trembling or weakness
- Lack of coordination
- Drowsiness or confusion
- Headache
- Dizziness
- Double vision
- Convulsions or unconsciousness

When it comes to emergency care, use these symptoms as a guideline, but also listen to your instinct. If you feel that something is wrong, it is never a bad idea to call your healthcare professional or go to an emergency room.

It's a good idea to have some kind of identification that lets emergency personnel know that you have diabetes, like an ID bracelet or wearable emblem. It can speak for you, when you are unable to speak for yourself.

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Diabetes

- [Diabetes Overview](#)
- [Diabetes Causes](#)
- [Diabetes Symptoms](#)
- [When to Seek Medical Care](#)
- [Exams and Tests](#)
- [Diabetes Treatment](#)
- [Self-Care at Home](#)
- [Medical Treatment](#)
- [Medications](#)
- [Next Steps](#)
- [Follow-up](#)
- [Prevention](#)
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Diabetes Overview

Diabetes mellitus (DM) is a set of related diseases in which the body cannot regulate the amount of sugar (specifically, [glucose](#)) in the blood.

Glucose in the blood gives you energy to perform daily activities, walk briskly, run for a bus, ride your bike, take an [aerobic exercise class](#), and perform your day-to-day chores.

- From the foods you eat, glucose in the blood is produced by the liver (an organ on the right side of the abdomen near your stomach).
- In a healthy person, the blood glucose level is regulated by several hormones, including insulin. Insulin is produced by the pancreas, a small organ between the stomach and liver. The pancreas secretes other important enzymes that help to digest food.
- Insulin allows glucose to move from the blood into liver, muscle, and fat cells, where it is used for fuel.
- People with diabetes either do not produce enough insulin (type 1 diabetes) or cannot use insulin properly (type 2 diabetes), or both (which occurs with several forms of diabetes).
- In diabetes, glucose in the blood cannot move into cells, so it stays in the blood. This not only harms the cells that need the glucose for fuel, but also harms certain organs and tissues exposed to the high glucose levels.

Type 1 diabetes: The body stops producing insulin or produces too little insulin to regulate blood glucose level.

- Type 1 diabetes comprises about 10% of total cases of diabetes in the United States.
- Type 1 diabetes is typically recognized in childhood or adolescence. It used to be known as juvenile-onset diabetes or insulin-dependent diabetes mellitus.
- Type 1 diabetes can occur in an older individual due to destruction of pancreas by alcohol, disease, or removal by surgery. It also results from progressive failure of the pancreatic beta cells, which produce insulin.

- People with type 1 diabetes require daily [insulin treatment](#) to sustain life.

Type 2 diabetes: The pancreas secretes insulin, but the body is partially or completely unable to use the insulin. This is sometimes referred to as insulin resistance. The body tries to overcome this resistance by secreting more and more insulin. People with insulin resistance develop type 2 diabetes when they do not continue to secrete enough insulin to cope with the higher demands.

- At least 90% of patients with diabetes have type 2 diabetes.
- Type 2 diabetes is typically recognized in adulthood, usually after age 45 years. It used to be called adult-onset diabetes mellitus, or non-insulin-dependent diabetes mellitus. These names are no longer used because type 2 diabetes does occur in younger people, and some people with type 2 diabetes need to use insulin.
- Type 2 diabetes is usually controlled with [diet](#), weight loss, [exercise](#), and oral medications. More than half of all people with type 2 diabetes require insulin to control their blood sugar levels at some point in the course of their illness.

Gestational diabetes is a form of diabetes that occurs during the second half of [pregnancy](#).

- Although gestational diabetes typically goes away after delivery of the baby. Women who have gestational diabetes are more likely than other women to develop type 2 diabetes later in life.
- Women with gestational diabetes are more likely to have large babies.

Metabolic syndrome (also referred to as syndrome X) is a set of abnormalities in which insulin-resistant diabetes (type 2 diabetes) is almost always present along with [hypertension](#), high fat levels in the blood (increased serum lipids, predominant [elevation of LDL cholesterol](#), decreased [HDL cholesterol](#), and elevated triglycerides), central [obesity](#), and abnormalities in blood clotting and inflammatory responses. A high rate of [cardiovascular disease](#) is associated with the metabolic syndrome.

Pre-diabetes is a common condition related to diabetes. In people with pre-diabetes, the blood sugar level is higher than normal but not high enough to be considered diabetic.

- Pre-diabetes increases your risk of developing type 2 diabetes and of heart disease or [stroke](#).
- Pre-diabetes can typically be reversed without insulin or medication by losing a modest amount of weight and increasing your physical activity. This weight loss can prevent, or at least delay, the onset of type 2 diabetes.
- An international expert committee of the American Diabetes Association redefined the criteria for pre-diabetes, lowering the blood sugar level cut-off point for pre-diabetes. Approximately 20% more adults are now believed to have this condition and may develop diabetes within 10 years if they do not exercise or maintain a healthy weight.

About 17 million Americans (6.2% of adults in North America) are believed to have diabetes. About one third of diabetic adults do not know they have diabetes.

- About 1 million new cases occur each year, and diabetes is the direct or indirect cause of at least 200,000 deaths each year.
- The incidence of diabetes is increasing rapidly. This increase is due to many factors, but the most significant are the increasing incidence of obesity and the prevalence of sedentary lifestyles.

Complications of diabetes

Both forms of diabetes ultimately lead to high blood sugar levels, a condition called hyperglycemia. Over a long period of time, hyperglycemia damages the retina of the eye, the kidneys, the nerves, and the blood vessels.

- Damage to the retina from diabetes ([diabetic retinopathy](#)) is a leading cause of blindness.
- Damage to the kidneys from diabetes (diabetic nephropathy) is a leading cause of kidney failure.
- Damage to the nerves from diabetes (diabetic neuropathy) is a leading cause of foot wounds and ulcers, which frequently lead to foot and leg amputations.
- Damage to the nerves in the autonomic nervous system can lead to paralysis of the stomach (gastroparesis), chronic [diarrhea](#), and an inability to control heart rate and blood pressure during postural changes.
- Diabetes accelerates atherosclerosis, (the formation of fatty plaques inside the arteries), which can lead to blockages or a clot (thrombus). Such changes can then lead to [heart attack](#), stroke, and decreased circulation in the arms and legs ([peripheral vascular disease](#)).
- Diabetes predisposes people to high blood pressure and high cholesterol and triglyceride levels. These conditions independently and together with hyperglycemia increase the risk of heart disease, kidney disease, and other blood vessel complications.

In the short run, diabetes can contribute to a number of acute (short-lived) medical problems.

- Many **infections** are associated with diabetes, and infections are frequently more dangerous in someone with diabetes because the body's normal ability to fight infections is impaired. To compound the problem, infections may worsen glucose control, which further delays recovery from infection.
- **Hypoglycemia**, or [low blood sugar](#), occurs from time to time in most people with diabetes. It results from taking too much diabetes medication or insulin (sometimes called an [insulin reaction](#)), missing a meal, doing more exercise than usual, drinking too

much alcohol, or taking certain medications for other conditions. It is very important to recognize hypoglycemia and be prepared to treat it at all times. [Headache](#), feeling dizzy, poor concentration, tremors of hands, and sweating are common symptoms of hypoglycemia. You can faint or have a [seizure](#) if blood sugar level gets too low.

- [Diabetic ketoacidosis](#) is a serious condition in which uncontrolled hyperglycemia (usually due to complete lack of insulin or a relative deficiency of insulin) over time creates a buildup in the blood of acidic waste products called ketones. High levels of ketones can be very harmful. This typically happens to people with type 1 diabetes who do not have good blood glucose control. Diabetic ketoacidosis can be precipitated by infection, [stress](#), trauma, missing medications like insulin, or medical emergencies like stroke and heart attack.
- **Hyperosmolar hyperglycemic nonketotic syndrome** is a serious condition in which the blood sugar level gets very high. The body tries to get rid of the excess blood sugar by eliminating it in the urine. This increases the amount of urine significantly and often leads to [dehydration](#) so severe that it can cause seizures, coma, and even death. This syndrome typically occurs in people with type 2 diabetes who are not controlling their blood sugar levels, who have become dehydrated, or who have stress, injury, stroke, or are taking certain medications, like steroids.

Diabetes Causes

Type 1 diabetes: Type 1 diabetes is believed to be an autoimmune disease. The body's immune system attacks the cells in the pancreas that produce insulin.

- A predisposition to develop type 1 diabetes may run in families, but genetic causes (a positive family history) is much more common for type 2 diabetes.
- Environmental factors, including common unavoidable viral infections, may also contribute.
- Type 1 diabetes is most common in people of non-Hispanic, Northern European descent (especially Finland and Sardinia), followed by African Americans, and Hispanic Americans. It is relatively rare in those of Asian descent.
- Type 1 diabetes is slightly more common in men than in women.

Type 2 diabetes: Type 2 diabetes has strong genetic links, meaning that type 2 diabetes tends to run in families. Several genes have been identified and more are under study which may relate to the causes of type 2 diabetes. Risk factors for developing type 2 diabetes include the following:

- High blood pressure
- High blood triglyceride (fat) levels
- Gestational diabetes or giving birth to a baby weighing more than 9 pounds

- High-fat diet
- High alcohol intake
- Sedentary lifestyle
- Obesity or being overweight
- Ethnicity, particularly when a close relative had type 2 diabetes or gestational diabetes: certain groups, such as African Americans, Native Americans, Hispanic Americans, and Japanese Americans, have a greater risk of developing type 2 diabetes than non-Hispanic whites.
- Aging: Increasing age is a significant risk factor for type 2 diabetes. Risk begins to rise significantly at about age 45 years, and rises considerably after age 65 years.

Diabetes Symptoms

Symptoms of type 1 diabetes are often dramatic and come on very suddenly.

- Type 1 diabetes is usually recognized in childhood or early adolescence, often in association with an illness (such as a virus or [urinary tract infection](#)) or injury.
- The extra stress can cause diabetic ketoacidosis.
- Symptoms of ketoacidosis include [nausea and vomiting](#). Dehydration and often-serious disturbances in blood levels of [potassium](#) follow.
- Without treatment, ketoacidosis can lead to coma and death.

Symptoms of type 2 diabetes are often subtle and may be attributed to aging or obesity.

- A person may have type 2 diabetes for many years without knowing it.
- People with type 2 diabetes can develop hyperglycemic hyperosmolar nonketotic syndrome.
- Type 2 diabetes can be precipitated by steroids and stress.
- If not properly treated, type 2 diabetes can lead to complications like blindness, [kidney failure](#), heart disease, and nerve damage.

Common symptoms of both major types of diabetes:

- **Fatigue:** In diabetes, the body is inefficient and sometimes unable to use glucose for fuel. The body switches over to metabolizing fat, partially or completely, as a fuel source. This process requires the body to use more energy. The end result is feeling fatigued or constantly tired.

- **Unexplained weight loss:** People with diabetes are unable to process many of the calories in the foods they eat. Thus, they may lose weight even though they eat an apparently appropriate or even excessive amount of food. Losing sugar and water in the urine and the accompanying dehydration also contributes to weight loss.
- **Excessive thirst (polydipsia):** A person with diabetes develops high blood sugar levels, which overwhelms the kidney's ability to reabsorb the sugar as the blood is filtered to make urine. Excessive urine is made as the kidney spills the excess sugar. The body tries to counteract this by sending a signal to the brain to dilute the blood, which translates into thirst. The body encourages more water consumption to dilute the high blood sugar back to normal levels and to compensate for the water lost by excessive urination.
- **Excessive urination (polyuria):** Another way the body tries to get rid of the extra sugar in the blood is to excrete it in the urine. This can also lead to dehydration because excreting the sugar carries a large amount of water out of the body along with it.
- **Excessive eating (polyphagia):** If the body is able, it will secrete more insulin in order to try to deal with the excessive blood sugar levels. Moreover, the body is resistant to the action of insulin in type 2 diabetes. One of the functions of insulin is to stimulate hunger. Therefore, higher insulin levels lead to increased hunger and eating. Despite increased caloric intake, the person may gain very little weight and may even lose weight.
- **Poor wound healing:** High blood sugar levels prevent white blood cells, which are important in defending the body against bacteria and also in cleaning up dead tissue and cells, from functioning normally. When these cells do not function properly, wounds take much longer to heal and become infected more frequently. Also, long-standing diabetes is associated with thickening of blood vessels, which prevents good circulation including the delivery of enough oxygen and other nutrients to body tissues.
- **Infections:** Certain infection syndromes, such as frequent yeast infections of the genitals, skin infections, and frequent urinary tract infections, may result from suppression of the immune system by diabetes and by the presence of glucose in the tissues, which allows bacteria to grow well. They can also be an indicator of poor blood sugar control in a person known to have diabetes.
- **Altered mental status:** Agitation, unexplained irritability, inattention, extreme lethargy, or confusion can all be signs of very high blood sugar, ketoacidosis, hyperosmolar hyperglycemia nonketotic syndrome, or hypoglycemia (low sugar). Thus, any of these merit the immediate attention of a medical professional. Call your health care provider or 911.
- **Blurry vision:** Blurry vision is not specific for diabetes but is frequently present with high blood sugar levels.

When to Seek Medical Care

If you someone you know are not known to have diabetes but are having any symptoms that suggest diabetes or concern you in any way, make an appointment to see a healthcare provider as soon as possible. When you make the appointment, tell the operator that you are concerned about diabetes. He or she may make arrangements for blood sugar testing before the appointment.

If the patient is known to have diabetes, call a healthcare provider right away if any of the following apply:

- The patient is experiencing diabetes symptoms. This may mean that your blood sugar level is not being controlled despite treatment.
- The patient's blood sugar levels, when tested, are consistently high (more than 200 mg/dL). Persistently high blood sugar levels are the root cause of all of the complications of diabetes.
- The patient's blood sugar level is often low (less than 60 mg/dL). This may mean that management strategy is too aggressive. It also may be a sign of infection or other stress on the system such as kidney failure, liver failure, adrenal gland failure, or the concomitant use of certain medications.
- The patient has an injury to the foot or leg, no matter how minor. Even the tiniest cut or blister can become very serious in a person with diabetes. Early diagnosis and treatment of problems with the feet and lower extremities, along with regular [diabetic foot care](#), are critical in preserving the function of the legs and preventing amputation.
- The patient has a low-grade fever (less than 101.5°F). [Fever](#) is a sign of infection. In patients with diabetes, many common infections can potentially be more dangerous for them than for other people. Note any symptoms, such as painful urination, redness or swelling of the skin, [abdominal pain](#), [chest pain](#), or cough, that may indicate where the infection is located.
- The patient is nauseated or vomiting but can keep liquids down. The healthcare provider may adjust medications while the patient is sick and will probably recommend an urgent office visit or a visit to the emergency department. Persistent nausea and vomiting can be a sign of diabetic ketoacidosis, a potentially life-threatening condition, as well as several other serious illnesses.
- The patient has a small sore (ulcer) on the foot or leg. Any non-healing sore or ulcer on the feet or legs of someone with diabetes needs to be seen by a medical professional right away. A sore less than 1 inch across, not draining pus, and not exposing deep tissue or bone can safely be evaluated in a healthcare provider's office as long as the patient does not have fever and their blood sugar levels are in control.

When you call a healthcare provider, tell the operator that you or someone you know has diabetes and are concerned.

- The patient will probably be referred to a nurse who will ask questions and make a recommendation about what to do.
- Be prepared for this conversation. Have a list of medications, medical problems, allergies to medicines, and a blood sugar diary handy by the phone.
- The nurse may need any or all of this information to decide both the urgency of the patient's condition and how best to recommend treatment for the problem.

Diabetic emergencies

The following situations can become 911 medical emergencies and warrant an immediate visit to a hospital emergency department.

- The person with a severe diabetic complication may travel to the emergency department by car or ambulance.
- A companion should go along to speak for the person if the person is not able to speak for himself or herself with the emergency care provider.
- Bring a list of medical problems, medications, allergies to medications, and the blood sugar diary to the emergency department. This information will help the emergency care provider diagnose the problem and treat it appropriately.

The following are signs and symptoms of diabetic complications that warrant emergency care.

- **Altered mental status:** Lethargy, agitation, forgetfulness, or just strange behavior can be a sign of very low or very high blood sugar levels.
 - If the person is a known diabetic, try giving him or her some fruit juice (about 6 ounces) or cake icing if the person is awake enough to swallow normally without [choking](#). Avoid giving things such as hard candy that can lodge in the throat. The healthcare provider can prescribe glucose wafers or gels that melt under the tongue.
 - If the person does not wake up and behave normally within about 15 minutes, call 911.
 - If the person is not a known diabetic, these symptoms can be signs of stroke, drug intoxication, [alcohol intoxication](#), oxygen starvation, and other serious medical conditions. Call 911 immediately.
- **Nausea or vomiting:** If the patient is known to have diabetes and cannot keep food, medications, or fluids down at all, they may have diabetic ketoacidosis, hyperosmolar hyperglycemic nonketotic syndrome, or another complication of diabetes.

- If the patient has not already taken the latest insulin dose or oral diabetes medicine, do not take it without talking to a medical professional.
 - If the patient already has low blood sugar levels, taking additional insulin or medication will drive the blood sugar level down even further, possibly to dangerous levels.
-
- **Fever of more than 101.5°F:** If the primary healthcare provider cannot see the patient right away, seek emergency care for a high fever if they are diabetic. Note any other symptoms such as cough, painful urination, abdominal pain, or chest pain.
 - **High blood sugar level:** If the patient's blood sugar level is more than 400 mg/dL, and the primary healthcare provider cannot see them right away. Very high blood sugar levels can be a sign of diabetic ketoacidosis or hyperosmolar hyperglycemic nonketotic syndrome, depending on the type of diabetes you have. Both of these conditions can be fatal if not treated promptly.
 - **Large sores or ulcers on the feet or legs:** If the patient has diabetes, a non-healing sore larger than 1 inch in diameter can be a sign of a potentially limb-threatening infection.
 - Other signs and symptoms that merit immediate care are exposed bone or deep tissue in the wound, large areas of surrounding redness and warmth, swelling, and severe pain in the foot or leg.
 - If left untreated, such a sore may ultimately require amputation of the limb.
 - **Cuts or lacerations:** Any cut penetrating all the layers of skin, especially on the legs, is a potential danger to a person with diabetes. Proper [wound care](#), although important to anyone's recovery, is especially important in diabetics to assure good wound healing.
 - **Chest pain:** If the patient is diabetic, take very seriously any pain in the chest, particularly in the middle or on the left side, and seek medical attention immediately.
 - People with diabetes are more likely than non-diabetic people to have a heart attack, with or without experiencing chest pain.
 - Irregular heartbeats and unexplained shortness of breath may also be signs of heart attack.

- **Severe abdominal pain:** Depending on the location, this can be a sign of heart attack, abdominal [aortic aneurysm](#) (widening of the large artery in the abdomen), diabetic ketoacidosis, or interrupted blood flow to the bowels.
 - All of these are more common in people with diabetes than in the general population and are potentially life-threatening.
 - Those with diabetes also get other common causes of severe abdominal pain such as [appendicitis](#), perforated ulcer, inflammation and infection of the [gallbladder](#), [kidney stones](#), and bowel obstruction.
 - Severe pain anywhere in the body is a signal for timely medical attention.

Exams and Tests

Doctors use special tests in diagnosing diabetes and also in monitoring blood sugar level control in known diabetics.

If the patient is having symptoms but are not known to have diabetes, evaluation should always begin with a thorough medical interview and physical examination. The healthcare provider will ask about symptoms, risk factors for diabetes, past medical problems, current medications, allergies to medications, family history of diabetes or other medical problems such as high cholesterol or heart disease, and personal habits and lifestyle.

A number of laboratory tests are available to confirm the diagnosis of diabetes.

Finger stick blood glucose: This is a rapid screening test that may be performed anywhere, including community-based screening programs.

- A fingerstick blood glucose test is not as accurate as testing the patient's blood in the laboratory but is easy to perform, and the result is available right away.
- The test involves sticking the patient's finger for a blood sample, which is then placed on a strip. The strip goes into a machine that reads the blood sugar level. These machines are only accurate to within about 10% of true actual laboratory values.
- Fingerstick blood glucose values may be inaccurate at very high or very low levels, so this test is only a preliminary screening study. This is the way most people with diabetes monitor their blood sugar levels at home.

Fasting plasma glucose: The patient will be asked to eat or drink nothing for 8 hours before having blood drawn (usually first thing in the morning). If the blood glucose level is greater than or equal to 126 mg/dL without eating anything, they probably have diabetes.

- If the result is abnormal, the fasting plasma glucose test may be repeated on a different day to confirm the result, or the patient may undergo an oral glucose tolerance test or a glycosylated hemoglobin test (often called "hemoglobin A1c") as a confirmatory test.

- If fasting plasma glucose level is greater than 100 but less than 126 mg/dL, then the patient has what is called impaired fasting glucose, or IFG. This is considered to be pre-diabetes. The patient does not have diabetes, but they are at high risk of developing diabetes in the near future.

Oral glucose tolerance test: This test involves drawing blood for a fasting plasma glucose test, then drawing blood for a second test at two hours after drinking a very sweet drink containing 75 grams of sugar.

- If the blood sugar level after the sugar drink is greater than or equal to 200 mg/dL, the patient has diabetes.
- If the blood glucose level is between 140 and 199, then the patient has impaired glucose tolerance (IGT), which is also a pre-diabetic condition.

Glycosylated hemoglobin or hemoglobin A1c: This test is a measurement of how high blood sugar levels have been over about the last 120 days (the average life-span of the red blood cells on which the test is based).

- Excess blood glucose hooks on to the hemoglobin in red blood cells and stays there for the life of the red blood cell.
- The percentage of hemoglobin that has had excess blood sugar attached to it can be measured in the blood. The test involves having a small amount of blood drawn.
- A hemoglobin A1c test is the best measurement of blood sugar control in people known to have diabetes. A hemoglobin A1c result of 7% or less indicates good glucose control. A result of 8% or greater indicates that blood sugar levels are too high for too much of the time.
- The hemoglobin A1c test is less reliable to diagnose diabetes than for follow-up care. Still, a hemoglobin A1c result greater than 6.1% is highly suggestive of diabetes. Generally, a confirmatory test would be needed before diagnosing diabetes.
- The hemoglobin A1c test is generally measured about every three to six months for people with known diabetes, although it may be done more frequently for people who are having difficulty achieving and maintaining good blood sugar control.
- This test is not used for people who do not have diabetes or are not at increased risk of diabetes.
- Normal values may vary from laboratory to laboratory, although an effort is under way to standardize how measurements are performed.

Diagnosing complications of diabetes

If you or someone you know has diabetes, the patient should be checked regularly for early signs of diabetic complications. The healthcare provider can do some of these checks; for others, the patient should be referred to a specialist.

- The patient should have their eyes checked at least once a year by an eye specialist (ophthalmologist) to screen for diabetic retinopathy, a leading cause of blindness.
- The patient's urine should be checked for protein (microalbumin) on a regular basis, at least one to two times per year. Protein in the urine is an early sign of diabetic nephropathy, a leading cause of kidney failure.
- Sensation in the legs should be checked regularly using a tuning fork or a monofilament device. Diabetic neuropathy is a leading cause in diabetic lower extremity ulcers, which frequently lead to amputation of the feet or legs.
- The healthcare provider should check the feet and lower legs at every visit for cuts, scrapes, blisters, or other lesions that could become infected.
- The patient should be screened regularly for conditions that may contribute to heart disease, such as high blood pressure and high cholesterol.

Diabetes Treatment

Self-Care at Home

If you or someone you know has diabetes, they would be wise to make healthful lifestyle choices in diet, exercise, and other health habits. These will help to improve glycemic (blood sugar) control and prevent or minimize complications of diabetes.

Diet: A healthy diet is key to controlling blood sugar levels and preventing diabetes complications.

- If the patient is obese and has had difficulty losing weight on their own, talk to a healthcare provider. He or she can recommend a dietitian or a weight modification program to help the patient reach a goal.
- Eat a consistent, well-balanced diet that is high in fiber, low in saturated fat, and low in concentrated sweets.
- A consistent diet that includes roughly the same number of calories at about the same times of day helps the healthcare provider prescribe the correct dose of medication or insulin.
- It will also help to keep blood sugar at a relatively even level and avoid excessively low or high blood sugar levels, which can be dangerous and even life-threatening.

Exercise: Regular exercise, in any form, can help reduce the risk of developing diabetes. Activity can also reduce the risk of developing complications of diabetes such as heart disease, stroke, kidney failure, blindness, and leg ulcers.

- As little as 20 minutes of walking three times a week has a proven beneficial effect. Any exercise is beneficial; no matter how light or how long, some exercise is better than no exercise.
- If the patient has complications of diabetes (eye, kidney, or nerve problems), they may be limited both in type of exercise and amount of exercise they can safely do without worsening their condition. Consult with your health care provider before starting any exercise program.

Alcohol use: Moderate or eliminate consumption of alcohol. Try to have no more than seven alcoholic drinks in a week and never more than two or three in an evening. One drink is considered 1.5 ounces of liquor, 6 ounces of wine, or 12 ounces of beer. Excessive alcohol use is a known risk factor for type 2 diabetes. Alcohol consumption can cause low or high blood sugar levels, nerve pain called neuritis, and increase in triglycerides, which is a type of fat in our blood.

Smoking: If the patient has diabetes, and you [smoke cigarettes](#) or use any other form of tobacco, they are raising the risks markedly for nearly all of the complications of diabetes. Smoking damages blood vessels and contributes to heart disease, stroke, and poor circulation in the limbs. If someone needs help quitting, talk to a healthcare provider.

Self-monitored blood glucose: Check blood sugar levels frequently, at least before meals and at bedtime, and record the results in a logbook.

- This log should also include insulin or oral medication doses and times, when and what the patient ate, when and for how long they exercised, and any significant events of the day such as high or low blood sugar levels and how they treated the problem.
- Better equipment now available makes testing blood sugar levels less painful and less complicated than ever. A daily blood sugar diary is invaluable to the healthcare provider in seeing how the patient is responding to medications, diet, and exercise in the treatment of diabetes.
- Medicare now pays for diabetic testing supplies, as do many private insurers and Medicaid.

Medical Treatment

The treatment of diabetes is highly individualized, depending on the type of diabetes, whether the patient has other active medical problems, whether the patient has complications of diabetes, and age and general health of the patient at time of diagnosis.

- A healthcare provider will set goals for lifestyle changes, blood sugar control, and treatment.

- Together, the patient and the healthcare provider will devise a plan to help meet those goals.

Education about diabetes and its treatment is essential in all types of diabetes.

- When the patient is first diagnosed with diabetes, the diabetes care team will spend a lot of time with the patient, teaching them about their condition, treatment, and everything they need to know to care for themselves on a daily basis.
- The diabetes care team includes the healthcare provider and his or her staff. It may include specialists in foot care, neurology, kidney diseases, and eye diseases. A professional dietitian and a diabetes educator also may be part of the team.

The healthcare team will see you at appropriate intervals to monitor your progress with your goals.

Type 1 diabetes

Treatment of diabetes almost always involves the daily injection of insulin, usually a combination of short-acting insulin [for example, [lispro](#) (Humalog) or [aspart](#) (NovoLog)] and a longer acting insulin [for example, [NPH](#), Lente, [glargine](#) (Lantus), detemir, or ultralente].

- Insulin must be given as an injection. If taken by mouth, insulin would be destroyed in the stomach before it could get into the blood where it is needed.
- Most people with type 1 diabetes give these injections to themselves. Even if someone else usually gives the patient injections, it is important that the patient knows how to do it in case the other person is unavailable.
- A trained professional will show the patient how to store and inject the insulin. Usually this is a nurse who works with the healthcare provider or a diabetes educator.
- Insulin is usually given in two or three injections per day, generally around mealtimes. Dosage is individualized and is tailored to the patient's specific needs by the healthcare provider. Longer acting insulins are typically administered one or two times per day.
- Some people have their insulin administered by continuous infusion pumps to provide adequate blood glucose control. Supplemental mealtime insulin is programmed into the pump by the individual as recommended by his or her healthcare provider.
- It is very important to eat if the patient has taken insulin, as the insulin will lower blood sugar regardless of whether they have eaten. If insulin is taken without eating, the result may be hypoglycemia. This is called an insulin reaction.
- There is an adjustment period while the patient learns how insulin affects them, and how to time meals and exercise with insulin injections to keep blood sugar level as even as possible.

- Keeping accurate records of blood sugar levels and insulin dosages is crucial for the patient's diabetes management.
- Eating a consistent, healthy diet appropriate for the patient's size and weight is essential in controlling blood sugar level.

Type 2 diabetes

Depending on how elevated the patient's blood sugar and glycosylated hemoglobin (HbA1c) are at the time of diagnosis, they may be given a chance to lower blood sugar level without medication.

- The best way to do this is to lose weight if obese and begin an exercise program.
- This will generally be tried for three to six months, then blood sugar and glycosylated hemoglobin will be rechecked. If they remain high, the patient will be started on an oral medication, usually a sulfonylurea or biguanide [[metformin](#) (Glucophage)], to help control blood sugar level.
- Even if the patient is on medication, it is still important to eat a healthy diet, lose weight if they are overweight, and engage in moderate physical activity as often as possible.
- The healthcare provider will monitor the patient's progress on medication very carefully at first. It is important to get just the right dose of the right medication to get the blood sugar level in the recommended range with the fewest side effects.
- The doctor may decide to combine two types of medications to get blood sugar level under control.
- Gradually, even people with type 2 diabetes may require insulin injections to control their blood sugar levels.
- It is becoming more common for people with type 2 diabetes to take a combination of oral medication and insulin injections to control blood sugar levels.

Medications

Many different types of medications are available to help lower blood sugar levels in type 2 diabetes. Each type works in a different way. It is very common to combine two or more types to get the best effect with fewest side effects.

- **Sulfonylureas:** These drugs stimulate the pancreas to make more insulin.
- **Biguanides:** These agents decrease the amount of glucose produced by the liver.
- **Alpha-glucosidase inhibitors:** These agents slow absorption of the starches one eats. This slows down glucose production.

- **Thiazolidinediones:** These agents increase sensitivity to insulin.
- **Meglitinides:** These agents stimulate the pancreas to make more insulin.
- **D-phenylalanine derivatives:** These agents stimulate the pancreas to produce more insulin more quickly.
- **Amylin synthetic derivatives:** Amylin is a naturally occurring hormone secreted by the pancreas along with insulin. An amylin derivative, such as [pramlintide](#) (Symlin), is indicated when blood sugar control is not achieved despite optimal insulin therapy. Pramlintide is administered as a subcutaneous injection along with insulin and helps achieve lower blood sugar levels after meals, helps reduce fluctuation of blood sugar levels throughout the day, and improves hemoglobin A1C levels.
- **Incretin mimetics:** Incretin mimetics promote insulin secretion by the pancreas and mimic other blood sugar level lowering actions that naturally occur in the body. [Exenatide](#) (Byetta) is the first incretin mimetic agent approved in the United States. It is indicated for diabetes mellitus type 2 in addition to metformin or a sulfonylurea when these agents have not attained blood sugar level control alone.
- **Insulins:** Human insulin is the only type of insulin available in the United States; it is less likely to cause allergic reactions than animal-derived varieties of insulin. The type of insulin chosen to customize treatment for an individual is based on the goal of providing optimal blood sugar control. Different types of insulin are available and categorized according to their times of action onset and duration. Commercially prepared mixtures of some insulins may also be used to provide constant (basal) control and immediate control.
 - Rapid-acting insulins
 - Regular insulin (Humulin R, Novolin R)
 - Insulin lispro (Humalog)
 - Insulin aspart (Novolog)
 - Insulin glulisine (Apidra)
 - Prompt insulin zinc (Semilente, slightly slower acting)
 - Intermediate-acting insulins
 - Isophane insulin, neutral protamine Hagedorn (NPH) (Humulin N, Novolin N)
 - Insulin zinc (Lente)
 - Long-acting insulins
 - Extended insulin zinc insulin (Ultralente)
 - Insulin glargine (Lantus)

- Insulin detemir (Levemir)

Next Steps

Follow-up

Treatment:

- Follow the healthcare provider's treatment recommendations. Keep records of blood sugar levels as often as recommended by the healthcare provider, including the times the levels were checked, when and how much insulin or medication was taken, when and what was eaten, and when and for how long the patient exercised. Call the healthcare provider if the patient has any problems with their treatment or symptoms that suggest poor glucose control.

Education:

- Attend diabetes education classes at the local hospital. The more educated the patient and their family are about the disease, the better they are likely to do.
- Regular visits to the primary healthcare provider
- If the patient takes insulin, they should see the healthcare provider about every three months or more often. For other diabetics, every three to six months is generally adequate, unless they are having problems.
- Recognize low blood sugar levels and know how to treat them
- The patient and their family should be taught how to recognize the signs and symptoms of low blood sugar levels. The patient should have a clear plan for treating low blood sugar levels and know when to call 911. Mild symptoms include confusion and sweating, moreover, these symptoms can progress to lethargy, agitation (sometimes with violent, jerking motions), or even seizures.

Prevention

We do not yet know of a way to prevent type 1 diabetes. Type 2 diabetes, however, can be prevented in some cases.

- Control weight to normal or near-normal levels by eating a healthy low-fat, high-fiber diet.
- Regular exercise is crucial to the prevention of type 2 diabetes.
- Keep alcohol consumption low.
- Quit smoking.

- If you have high blood fat levels (such as high cholesterol) or high blood pressure, take your medication as directed.
- Lifestyle modification and/or certain medications can be used in people with prediabetes to prevent progression to diabetes. Pre-diabetes can be diagnosed by checking fasting glucose and two hours after ingesting 75 grams of glucose.

If you or someone you know already have diabetes, your focus should be on preventing the complications, which can cause serious disabilities such as blindness, kidney failure requiring dialysis, amputation, or even death.

- **Tight glucose control:** The single best thing the patient can do is to keep their blood sugar level within the suggested range every day. The only way to do this is through a combination of regular blood sugar checks, a balanced diet low in simple sugars and fat and high in complex carbohydrates and fiber, and appropriate medical treatment. Please consult a nutritionist or check with the doctor with questions in regard to diet.
- Quit smoking
- Maintain a healthy weight
- Increase physical activity levels. Aim for moderately vigorous physical activity for at least 30 minutes every day.
- Drink an adequate amount of water and avoid taking too much salt.
- The skin should be taken care of; keep it supple and hydrated to avoid sores and cracks that can become severely infected.
- Brush and floss the teeth every day. See a dentist regularly to prevent gum disease.
- The feet should be washed and examined daily, looking for small cuts, sores, or blisters that may cause problems later. The toenails should be filed rather than cut to avoid damaging the surrounding skin. A specialist in foot care (podiatrist) may be necessary to help care for the feet.

Outlook

Diabetes is a leading cause of death in all industrialized nations. Overall, the risk of premature death of people with diabetes is twice that of people who do not have diabetes. Prognosis depends on the type of diabetes, degree of blood sugar control, and development of complications.

Type 1 diabetes

About 15% of people with type 1 diabetes die before age 40 years, which is about 20 times the rate of that age group in the general population.

- The most common causes of death in type 1 diabetes are diabetic ketoacidosis, kidney failure, and heart disease.
- The good news is that prognosis can be improved with good blood sugar control. Maintaining tight blood sugar control has been proven to prevent, slow the progression of, and even improve established complications of type 1 diabetes.

Type 2 diabetes

The life expectancy of people who are diagnosed with type 2 diabetes in their 40s decreases by 5-10 years because of the disease.

- Heart disease is the leading cause of death for people with type 2 diabetes.
- Excellent glycemic control, tight blood pressure control, and keeping the "bad" cholesterol (LDL) level at the recommended level of <100 mg/dL (or lower, particularly if other risk factors for cardiovascular disease are present) and the "good" (HDL) cholesterol as high as possible. Use of [aspirin](#) when indicated can prevent, slow the progression of, and improve established complications in diabetes.

Support Groups and Counseling

You may wish to join a support group with other people to share your experiences. The [American Diabetes Association](#) and the [Juvenile Diabetes Research Foundation](#) are both excellent resources. Your health care provider will have information about local groups in your area. The following groups also provide support:

[American Association of Diabetes Educators](#)

100 W Monroe, Suite 400
Chicago, IL 60603
(800) 338-3633

[American Diabetes Association](#)

1701 North Beauregard Street
Alexandria, VA 22311
(800) DIABETES (342-2383)
AskADA@diabetes.org

[American Dietetic Association](#)

120 South Riverside Plaza, Suite 2000
Chicago, IL 60606-6995
(800) 877-1600

[Juvenile Diabetes Research Foundation International](#)

120 Wall Street
New York, NY 10005-4001

(800) 533-CURE (2873)
info@jdrf.org

[National Diabetes Education Program](#)

One Diabetes Way
Bethesda, MD 20814-9692
(800) 438-5383
ndep@info.nih.gov

For More Information

Web Links

American Diabetes Association, [Diabetes Statistics](#)

National Diabetes Education Program, [About Diabetes and Pre-diabetes](#)

National Diabetes Information Clearinghouse, National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, [Treatments for Diabetes](#)

US Food and Drug Administration (FDA), [Diabetes Information](#)

Centers for Disease Control and Prevention, [Diabetes: Disabling, Deadly, and on the Rise](#)

American Diabetes Association, [Nutrition & Recipes](#)

The Hormone Foundation, <http://www.hormone.org>

Synonyms and Keywords

adult-onset diabetes mellitus, amputation, autoimmune disease, blindness, blood glucose, blood sugar, diabetes mellitus, diabetic coma, diabetic eye care, diabetic foot care, diabetic foot ulcer, diabetic ketoacidosis, gestational diabetes, home glucose monitor, hyperglycemia, hyperosmolar hyperglycemic nonketotic syndrome, hypoglycemia, insulin, insulin-dependent diabetes mellitus, IDDM, insulin reaction, insulin resistance, juvenile-onset diabetes mellitus, kidneys, nephropathy, nerves, nervous system, neuropathy, noninsulin-dependent diabetes mellitus, pancreas, pre-diabetes, prediabetes, retina, retinopathy, sugar diabetes, type 1 diabetes, juvenile diabetes, type 2 diabetes, diabetes, excessive thirst, polydipsia, excessive eating, polyphagia, excessive urination, polyuria, hemoglobin A1c

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