

## Hypoglycemia Hand Out

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*INTRODUCTION- The following handout was obtained from UpToDate, an internet-based information resource for physicians. It was written for patients by experts in the thyroid field to provide helpful information in a general way, but should not replace the specific advice provided by your physicians for your particular case. The information has been edited in a few places to better meet the needs of our own patients. After reading this handout, feel free to ask the doctor or nursing staff any additional questions you may have about hypoglycemia or any particular concerns you may have about your own case.*

Hypoglycemia, also known as low blood sugar, occurs when levels of glucose (sugar) in the blood are too low. Hypoglycemia is common in people with diabetes who take insulin and some (but not all) oral diabetes medications.

Hypoglycemia happens when a person with diabetes does one or more of the following:

- Takes too much insulin (or an oral diabetes medication that cause insulin to be secreted)
- Does not eat enough food
- Exercises vigorously without eating a snack or decreasing the dose of insulin beforehand
- Waits too long between meals
- Drinks excessive alcohol, although even moderate alcohol use can increase the risk of hypoglycemia in patients with type 1 diabetes

**SYMPTOMS** — The symptoms of hypoglycemia vary from person to person, and can change over time. People who drink excessive amounts of alcohol, are tired, or who take a beta-blocker (commonly used to control high blood pressure) may not notice their symptoms, or may not recognize that the symptoms are due to hypoglycemia.

During the early stages of a hypoglycemic episode, symptoms may include:

- Sweating
- Tremor
- Hunger
- Anxiety

If untreated, symptoms can become more severe, and can include:

- Lack of coordination
- Weakness

- Lethargy
- Blurred vision
- Bizarre behavior or personality change
- Confusion
- Unconsciousness or seizure

When possible, hypoglycemia should be confirmed by measuring the blood glucose level. A person with symptoms and a blood glucose level below 60 mg/dL (3.3 mmol/L) has hypoglycemia.

Some people with diabetes develop symptoms of hypoglycemia at slightly higher levels. People whose blood glucose levels are high for long periods of time may have symptoms of low blood glucose and feel poorly when levels approach 100 mg/dL (5.6 mmol/L). Getting blood glucose levels under better control can lower the level at which a person feels symptoms.

**Hypoglycemia unawareness** — Hypoglycemia unawareness occurs when a person does not have the early symptoms of low blood glucose. As a result, the person cannot respond in the early stages, and severe signs of hypoglycemia, such as loss of consciousness or seizures, are more likely. It is a common occurrence, especially in people who have had type 1 diabetes for greater than five to 10 years.

Hypoglycemia and hypoglycemia unawareness occur more frequently in people who tightly control their blood glucose levels with insulin, called intensive therapy. Frequent low blood glucose levels reduce the production of the hormones that cause symptoms of low blood glucose.

Hypoglycemia unawareness can also occur in people who take medications that stimulate insulin secretion (for example Micronase® [glyburide]), especially in elderly people with heart or kidney disease who take certain oral medications that stimulate insulin secretion.

**Nocturnal hypoglycemia** — Low blood glucose that occurs when a person is sleeping (nocturnal hypoglycemia) can disrupt sleep and often goes unrecognized. Nocturnal hypoglycemia is a form of hypoglycemia unawareness. Thus, a person with nocturnal hypoglycemia is less likely to have symptoms that alert them to the need for treatment. Nocturnal hypoglycemia can be difficult to diagnose, and can increase the risk of hypoglycemia unawareness in the 48 to 72 hours that follow.

**PREVENTION** — The best way to prevent hypoglycemia is to monitor blood glucose levels frequently and be prepared to treat it promptly at all times. The person as well as a close friend or relative need to learn the symptoms, and patients at risk for hypoglycemia (those treated with insulin and some oral medications,) should always carry glucose tablets, hard candy, or other sources of fast-acting carbohydrate. Glucose tablets are recommended since they have a pleasant taste, but are not likely to be eaten for reasons other than hypoglycemia. Candy can be tempting to eat, even when blood glucose levels are normal, especially for children with diabetes.

Hypoglycemia can be frightening and unpleasant, and it is common for people who have experienced severe hypoglycemia to be fearful of future episodes. People who experience this fear may keep their blood glucose excessively high, which can lead to long term complications.

It may be helpful to discuss fears of hypoglycemia with a healthcare provider. In addition, ask about blood glucose awareness education and training in the use of glucagon injections which can raise blood glucose levels quickly. Blood glucose awareness training can improve a person's ability to recognize low blood glucose earlier, which may help to prevent episodes of severe hypoglycemia.

**TREATMENT** — While the blood glucose level should be tested as soon as possible, treatment should not be delayed if monitoring equipment (blood glucose meter, test strips, lancet) is not readily available. Treatment of hypoglycemia should be quick, especially if blood glucose levels are less than 40 mg/dL (2.2 mmol/L).

- If the blood glucose is 51 to 70 mg/dL, eat 10 to 15 grams of fast-acting carbohydrate (eg, 1/2 cup fruit juice, 6 to 8 hard candies, 3 to 4 glucose tablets).
- If the level is less than 50 mg/dL, eat 20 to 30 grams of fast-acting carbohydrates.

This amount of food is usually enough to raise the blood glucose into a safe range without causing high blood glucose levels (called hyperglycemia). Foods that contain fat (like candy bars) or protein (cheese) should initially be avoided, since they slow down the body's ability to absorb glucose.

Retest after 15 minutes and repeat treatment if needed. If the next meal is more than an hour away, eat an additional 15 grams of carbohydrate and 1 ounce of protein. Examples of this include crackers with cheese or one-half of a sandwich with peanut butter. It is important not to eat too much because this can raise blood glucose levels above the target level and lead to weight gain over the long term.

**Glucagon** — If hypoglycemia is severe, the person may become unconscious or unable to eat. A close friend or relative should be trained to recognize severe hypoglycemia and treat it quickly. Dealing with a loved one who is pale, sweaty, acting in a bizarre way, or unconscious and convulsing can be scary. An injection of glucagon stops these symptoms quickly.

Glucagon is a hormone that raises blood glucose levels. Glucagon is available in emergency kits, which can be bought with a prescription in a pharmacy. Directions are included in each kit; a roommate, spouse, or parent should familiarize themselves with the injection procedure before an emergency occurs.

It is important that the glucagon kit is easy to locate, is not expired, and that the friend or relative is able to stay calm. It is important that the kit is refilled when the expiration date approaches, though administering an expired kit is unlikely to cause harm.

Procedure — Glucagon is injected subcutaneously (under the skin) of the thigh or abdomen. The injection sites and technique are similar to an insulin injection.

- Remove the needle protector and inject the entire content of the syringe (a clear solution) into the glucagon powder. Do not remove the plastic clip on the syringe. Remove syringe from the bottle.
- Swirl the mixture gently until the powder is dissolved. The solution should be clear. Do not use the solution if it is discolored.
- Hold the bottle upside down and withdraw the contents into the syringe (1 mg mark on syringe for adults and children over 44 pounds [20 kilograms]). Children under 44 pounds need one-half the dose, and only 1/2 the solution should be withdrawn (0.5 mg mark on syringe).
- Choose an injection site in the abdomen or thigh.
- Insert the needle into the skin.
- Press the plunger to inject the glucagon.
- Withdraw the needle, and replace the syringe in the storage case (do not attempt to re-cap the needle). Press lightly at the injection site.
- Turn the person to his or her side. This prevents choking if he/she vomits.

Symptoms should resolve within 10 to 15 minutes, although nausea and vomiting may follow 60 to 90 minutes later. As soon as the person is awake and able to swallow, a fast-acting carbohydrate such as glucose tablets or juice should be offered. After the person begins to feel better, he or she should eat a snack with protein, such as crackers and cheese or a peanut butter sandwich.

If the patient is not conscious within 10 minutes, another glucagon injection should be given, if a second kit is available. Emergency help should be called immediately.

**WHEN TO SEEK HELP** — A family member or friend should take the person to the hospital or call for emergency assistance (911 in many US communities) immediately if the person:

- Remains confused or in an altered mental state after being treated with glucagon
- Is unconscious (or nearly unconscious) and glucagon is not available
- Continues to have low blood glucose despite eating adequate amounts of a fast-acting carbohydrate or receiving glucagon

Once in a hospital or ambulance, intravenous glucose is given to raise levels immediately.

**FOLLOW UP CARE** — After the blood glucose level is normal and symptoms are gone, the person can usually resume his or her normal activities. Anyone who required glucagon should speak with his or her healthcare provider. This can help to identify the cause of a severely low blood glucose level, and adjustments can be made to prevent future reactions. Patients who require emergency care may be observed for a few hours before being released. A friend or relative should drive the person home.

In the first 48 to 72 hours after a hypoglycemic episode, a person may have difficulty recognizing the symptoms of low blood glucose. In addition, the body's ability to counteract low blood glucose levels is decreased.

**WHERE TO GET MORE INFORMATION** — Your healthcare provider is the best source of information for questions and concerns related to your medical problem. Because no two patients are exactly alike and recommendations can vary from one person to another, it is important to seek guidance from a provider who is familiar with your individual situation.

This discussion will be updated as needed every four months on our web site ([www.uptodate.com/patients](http://www.uptodate.com/patients)). Additional topics as well as selected discussions written for healthcare professionals are also available for those who would like more detailed information.

A number of web sites have information about medical problems and treatments, although it can be difficult to know which sites are reputable. Information provided by the National Institutes of Health, national medical societies and some other well-established organizations are often reliable sources of information, although the frequency with which they are updated is variable.

- National Library of Medicine

([www.nlm.nih.gov/medlineplus/healthtopics.html](http://www.nlm.nih.gov/medlineplus/healthtopics.html))

- National Institute of Diabetes & Digestive & Kidney Diseases

([www.niddk.nih.gov](http://www.niddk.nih.gov))

- American Diabetes Association (ADA)

(800)-DIABETES (800-342-2383)

([www.diabetes.org](http://www.diabetes.org))

- The Endocrine Society

([www.endo-society.org](http://www.endo-society.org))

- The Hormone Foundation

([www.hormone.org/public/diabetes.cfm](http://www.hormone.org/public/diabetes.cfm), available in English and Spanish)

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