



A Client Care Module:

UNDERSTANDING BLOOD SUGAR

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A Client Care Module:

Understanding Blood Sugar

WHAT IS BLOOD SUGAR

You probably work with a number of clients who have diabetes. You may hear about these clients having **high blood sugar** or **low blood sugar**. You may even be responsible for checking their blood sugar levels with a glucometer. But what is the big deal about blood sugar anyway? Why is it so important for diabetics to control their blood sugar levels?

Let's start at the beginning. Our bodies turn most of the food we eat into sugar. This sugar flows through our blood, ready to give our cells the energy that they need. *But there's a catch!* **The only way for the blood sugar to get into our cells is by being "carried" in by insulin.** (Insulin is a hormone that our bodies make naturally.)

People with diabetes do not have enough--or any-- insulin to carry all the sugar from their blood to their cells. Their bodies don't get the energy they need, and the extra sugar in their blood can do lots of damage.



Controlling diabetes means keeping a balance between the amount of blood sugar and the amount of insulin.

The trick is for diabetics to eat the right foods and to take the right medicines so that they have just enough insulin to carry the sugar from their blood into their cells. **Too much insulin can make a patient just as sick as too much blood sugar.**

The best way to know if a diabetic client is in balance is to keep track of the blood sugar level. By learning more about blood sugar, you can play an important role in helping your clients control their diabetes.

Normal Blood Sugar Levels

Whether you have been trained to check blood sugar levels yourself, or a nurse or your clients do the checking, it's important to know the *recommended* levels for blood sugar. Here are the typical normal levels:

- Normal blood sugar *before breakfast* should be between **70 mg/dl and 100 mg/dl**. (A blood sugar level of 126 mg/dl or higher after fasting overnight probably means the person has diabetes.)

- After a meal, blood sugar should be less than **180 mg/dl**.
- During everyday activities, blood sugar should range from **100 mg/dl to 140 mg/dl**.

NOTE: "Milligrams per deciliter" (mg/dl) is the traditional unit for measuring blood sugar.

- Blood sugar should be tested four times per day, before every meal, and before bed time. Even one missed test can lead to an emergency! Help your diabetic clients stick to a regular daily schedule of monitoring their blood sugar.



Why Bother Checking Blood Sugar Levels?

Is it really necessary for diabetics to check their blood sugar levels several times each day? YES! There are several reasons why this is important, including:



Feeling better.

When diabetic clients have stable blood sugar levels, they feel better... physically, emotionally, and mentally. Frequent monitoring is the only way to make sure that diabetics have achieved that delicate balance between blood sugar and insulin.

Preventing long term problems.

Research shows that high blood sugar can lead to serious diseases, such as kidney disease. If your clients have their blood sugar under control, it will lessen the risk of developing any of these complications.

Avoiding emergencies.

Diabetics who don't check their blood sugar are much more likely to have an immediate emergency. If a client complains of some of the symptoms of high or low blood sugar, do not ignore them. Even if they test normally, consult your supervisor or the client's doctor immediately!

Encourage clients to get in the habit of charting and tracking their blood sugar levels. This helps them watch for any patterns developing in their blood sugar. Sometimes, there are long term health problems that can be detected through these patterns. Tracking daily levels can be very beneficial to the client and to healthcare workers.



The Whole Blood Glucose Test

- The **Whole Blood Glucose Test** is performed using a simple kit. Many diabetics learn to complete this test themselves by doing a finger prick with a small needle called a *lancet*. A small droplet of blood from the finger is then placed on a machine called a *glucometer*.
- After a few seconds, the glucometer comes up with a blood sugar reading, determining if the client has low, normal, or high blood sugar. This test is the easiest test to perform without professional help. In some states, nursing assistants are allowed to use a glucometer.
- If you are helping clients check their blood sugar levels, make sure that their hands *and yours* are cleaned with soap and water.
- It is less painful to prick the side of a finger near the fingernail. This avoids damage on the frequently used “pad” of the fingertip.

The Oral Glucose Tolerance Test

- The **Oral Glucose Tolerance Test** is performed to understand the different reactions a client may have to normal levels of sugar. A client can't eat or drink for eight hours before the start of the test.
- To begin, the person's blood is drawn to get a “baseline” blood sugar reading. This level will most likely be low, since the person has fasted for eight hours. The person is then asked to drink a beverage containing 75 grams of *glucose*.
- After two hours, the person's blood is drawn again, and a blood sugar reading is taken. The “before” and “after” readings are compared, and a doctor is able to understand how well the person's body reacts to a normal amount of sugar.



The Fasting Plasma Glucose Test

- The **Fasting Plasma Glucose Test** measures the level of sugar in the plasma portion of the blood. A sample of blood is drawn from a vein on the inside of the elbow. The blood is then spun at a high speed inside of a machine called a *centrifuge*.
- As the tube of blood spins, the plasma separates from the blood cells. The plasma rises to the top of the tube, and can then be measured for sugar levels. The normal level of glucose for this type of test is less than 120 mg/dl.
- Like the Oral Glucose Tolerance Test, this test must be performed on an empty stomach. This means that a client must not eat or drink anything for eight hours. If you have a client who is scheduled for these tests, make sure to remind them they can't eat or drink!

What Is Hypoglycemia?

- Hypoglycemia is the medical term for low blood sugar (<70mg/dl). A potentially serious condition, low blood sugar usually develops fairly quickly, sometimes within just a few minutes.
- Low blood sugar is uncommon in people who do not have diabetes.
- Among diabetics, people who take insulin are more likely to suffer from hypoglycemia than people who use pills or diet to manage their condition.
- A sudden drop in your client's blood sugar may be due to an illness or infection, too much diabetes medication, skipping meals or snacks, consuming alcoholic beverages, or getting more exercise than usual.



The Signs and Symptoms of Hypoglycemia

As the body reacts to a sudden drop in blood sugar levels, a number of symptoms may occur. Watch your diabetic clients for these signs of hypoglycemia:

- All over feelings of weakness
- Drowsiness
- Hunger
- Dizziness
- Pale skin color
- Persistent sweating
- Wet or clammy skin
- Depressed mood
- Irritability
- Trouble focusing and/or confusion
- Unexpected fainting
- Unusually fast heart beat

Remember...if the blood sugar is **LOW**, the client will be **SLOW** and **WET**.

Insulin Shock

If hypoglycemia goes untreated, it can lead to a life threatening condition known as "insulin shock." The following symptoms are signs of a severe hypoglycemic problem:

- Severe headache
- Continued symptoms of hypoglycemia after eating
- Seizures
- Loss of consciousness

If you notice any of these signs in your clients, notify your supervisor right away. Your client is facing a medical emergency!

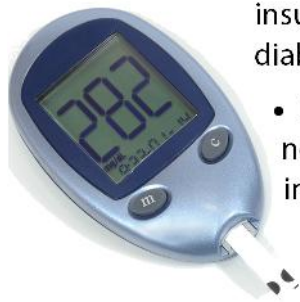


IMPORTANT:

More than half of all episodes of low blood sugar occurs at night, when the person is most likely to sleep through the early warning signs. **GET HELP IMMEDIATELY** if you ever have trouble waking up a diabetic client.

What Is Hyperglycemia?

- Hyperglycemia is the medical term for high blood sugar (>180mg/dl). Hyperglycemia is a dangerous condition and is the major cause of complications among people with diabetes.



- High blood sugar can occur when diabetics:
 - Get off schedule with their insulin injections or diabetes medication.
 - Eat more food than normal or eat foods high in sugar.
 - Feel stressed out.
- Undergo surgery.
- Suffer from an infection or illness.
- The onset of high blood sugar is usually slow. It can take from a few hours to a few days to develop—depending on the cause.

The Signs and Symptoms of Hyperglycemia

There are many warning signs that a client is developing high blood sugar. Some symptoms may be so subtle that they go unnoticed. Be prepared to watch for all the symptoms of hyperglycemia.

- Constant fatigue
- Body aches

- Dry or itchy skin
- Dry mouth
- Excessive thirst
- Excessive hunger
- Frequent urination
- Blurred vision
- Headaches
- And some *long term* signs:
 - Weight loss
 - Slow healing time for cuts and scrapes

Remember...if the blood sugar is **HIGH**, the client will feel **DRY**.

Diabetic Coma...And More!

- If a person with high blood sugar is not treated, something called a “diabetic coma” can occur. This condition occurs when the body does not have enough insulin.



- This condition can be life threatening, and should be treated immediately. There are several symptoms which include:
 - Dry mouth.
 - Nausea and/or vomiting.
 - Shortness of breath.
- High blood sugar can lead to some of the following complications if not treated:
 - Nerve damage
 - Kidney disease
 - Damaged blood vessels
 - Eye disorders

The Facts on Diabetes

- Diabetes is a chronic disease for which there is no cure.
- It's true! Diabetes is definitely on the rise—in the U.S. and around the globe. Every year, more than one million Americans learn that they have diabetes...and many more face a high risk for the disease.
- Nearly one in four Americans over the age of 65 have diabetes.
- Diabetes has jumped up to the fourth leading cause of death in the United States. Most of these deaths are the result of heart disease and high blood pressure.
- The risk of stroke and heart disease is 2 to 4 times higher in people with diabetes.
- Up to 65% of people with diabetes have high blood pressure and up to 70% have some level of nerve damage.
- Over 20,000 people lose their sight every year due to complications from diabetes.
- Every year, more people die from diabetes than all the deaths from AIDS, breast cancer, and car accidents combined.



Diabetes Can Happen To Anyone!

Have you heard of Elvis Presley, Ernest Hemingway, Arthur Ashe, Sugar Ray Robinson, Mary Tyler Moore, Halle Barry, Thomas Edison, or Elizabeth Taylor? Did you know they were all diabetics?

- The Centers for Disease Control wants everyone to know that more and more people are developing diabetes, especially the elderly and certain minority populations. Doctors are working on a cure for diabetes, but for right now, if you have diabetes, you have it for life.



- \$176 billion are spent every year in the United States taking care of diabetic patients. Much of this money is spent treating the *complications* caused by diabetes. And, why are there so many complications?
- New studies show that one in three American children will develop diabetes in their lifetime. Why? Many American kids do not exercise enough and are taught to overeat. These unhealthy habits increase a person's risk for developing diabetes later in life.
- Two out of three people who have diabetes will develop some type of complication, whether it is heart disease, blindness, or kidney failure.

Thirty Negative Effects of Eating Sugar

The average American consumes about **150 pounds of sugar** every year! In addition to the risk for diabetes, consuming a high sugar diet can:

1. Weaken the immune system.
2. Make the body less able to fight off bacterial infections.
3. Cause kidney damage.
4. Increase the risk for cancer of the gall bladder.
5. Lead to cancer of the breast, ovaries, prostate, and rectum.
6. Weaken eyesight drastically.
7. Increase the risk for hypoglycemia—low blood sugar!
8. Heighten the risk for developing coronary heart disease.
9. Speed up the aging process, promoting grey hair and wrinkles!
10. Contribute to alcoholism.
11. Promote tooth decay.
12. Add to excess weight gain and obesity. (Sugar is stored as fat within the body, and is very hard to burn off during exercise.)
13. Promote the development of arthritis.
14. Increase the likelihood of developing gallstones.
15. Trigger the onset of appendicitis.
16. Contribute to the development of osteoporosis in the elderly.
17. Decrease growth hormone levels in the body.
18. Increase blood cholesterol levels.
19. Cause a jump in the systolic blood pressure.
20. Generate food allergies.
21. Provoke cardiovascular disease.
22. Damage the composition of a person's DNA.
23. Increase the amount of fat in a person's liver.
24. Put an extreme amount of stress on the pancreas.
25. Be a factor in constipation.
26. Influence vision, causing nearsightedness.
27. Cause hypertension.
28. Lead to headaches, including painful and persistent migraines.
29. Cause depression.
30. Increase the risk for developing Alzheimer's disease.



Eating a diet full of excess sugar can be very unhealthy for *anyone*. However, for people with diabetes, surplus sugar can have serious...and immediate...consequences. You can help your diabetic clients avoid hyperglycemia by encouraging a balanced and nutritious diet and steering them away from sugar-filled foods.

More than 8% of the U.S. population has diabetes. This means that there are more than 26 million Americans with diabetes. Unfortunately, nearly one third of them have NOT been diagnosed.

Blood Sugar Q & A

Q: I've heard that diabetics should eat *complex* carbohydrates rather than *simple* carbohydrates. What's the difference and why does it matter?

A: Simple carbohydrates—like candy, cake, jam, and white flour—are absorbed and digested by the body very quickly. This causes a sudden *surge* of sugar into the bloodstream, which can lead to problems, especially for a diabetic whose health depends on a stable blood sugar level. **Complex carbohydrates**—such as whole wheat bread and pasta, brown rice, dried beans, and vegetables—are absorbed and digested *slowly*, resulting in a steady level of sugar in the blood. It is a healthy practice for everyone, especially people with diabetes, to include plenty of complex carbohydrates in their daily diet in order to maintain the body's delicate blood sugar balance.



Q: My diabetic client eats a fairly balanced diet, but he loves to drink a glass of cola every day. Should I try to get him to switch to fruit juice instead?

A: While fruit juice offers more nutrition than cola, they will both have a similar impact on your client's blood sugar. An 8-oz glass of cola contains about 6 teaspoons of sugar...and a glass of orange juice is about the same! Diet drinks are one way to avoid excess sugar, although some researchers have found that any sweet food or drink, even those containing artificial sweeteners, may cause a person's blood sugar to spike. Sweet drinks also keep a person's "sweet tooth" active. Your client would be better off drinking a big glass of water with a slice of lemon. Or, try flavoring a glass of water with just an *ounce* of fruit juice.

Q: I'd like to learn more about how to read food labels so that I know when a food is high in sugar. What are some other names for "sugar" that I might see listed on a food label?

A: You're right! Sugar has many different names and can be "hidden" in a long list of ingredients. Check food labels for any of the following ingredients—all of which are some form of sugar:

- Barley malt
- Glucose, maltose, dextrose, sucrose, fructose, lactose—and other words ending in "ose"
- Corn syrup, corn sweetener
- Sorghum or molasses
- Rice syrup
- Honey
- Grape sugar or grape sweetener
- Mannitol, xylitol or sorbitol
- Maple syrup
- Turbinado
- Fruit juice concentrate

Key Points About Blood Sugar

- If your diabetic client ever passes out, **it is an emergency!** This could happen if the blood sugar gets very high or very low.
 - Most diabetics have been taught what to do when they feel the symptoms of low blood sugar. Ask your diabetic clients if their doctor told them to eat or drink one of these things:
 - 4 ounces of regular cola
 - 1 tablespoon of honey
 - 6 hard candies (chewed)
 - 1 cup of skim milk
 - 4 ounces of orange juice
 - 4 teaspoons of sugar
 - 6 sugar cubes
 - Your clients should not eat chocolate or ice cream when they feel like their blood sugar is low. These foods are high in fat, and that slows the sugar from getting into the blood where it is needed.
 - A few episodes of high blood sugar are common for diabetics. The problems really start when the blood sugar stays high for a *long* time.
 - Why do many diabetic clients have an amputation? High blood sugar causes damage to blood vessels. When the blood vessels are weakened, blood can't move as easily from the heart to the rest of the body—especially the feet, legs, and skin. If body tissue doesn't get a good blood supply, it dies.
 - Diabetics should always take their insulin or diabetes pills, especially when they are sick. Let your supervisor know if your patient has the flu and refuses to take his diabetic medicine. Remember, when your client is sick, their blood sugar levels can rise!
 - How can a diabetic client have a bad cut on the leg and not notice? High blood sugar damages nerves. When this happens, the patient may no longer feel pain. A sore or cut can get infected quickly because the patient doesn't even realize it's there.
 - Because the kidneys work so hard to filter out sugar, too much sugar in the blood can cause damage. Diabetes can also cause heart trouble, stroke, and blindness when blood vessels are damaged by the extra sugar.
 - People with diabetes should always be diligent to check their blood sugar regularly. They should be especially careful and test more often when they are:
 - Sick.
 - Pregnant.
 - Traveling.
 - Driving.
 - Changing their exercise or eating plan.
 - Drinking alcohol.
 - Starting new medications.
- These factors can trigger a different body response, so your clients should be extra cautious.
- Reminding your diabetic clients to check their blood sugar may be the best way to help control their diabetes. Ask your supervisor for other ways you can help each *individual* client who has diabetes.

