

How Can I Manage My Type 1 Diabetes Better?

This Guide Tells You About Counting Carbohydrates, Treating Low and High Blood Sugars, and More.



My blood sugar was too low or too high so often. I tried counting carbs. Now my blood sugar is in control.

I am prepared for emergencies. I have ketone strips and Glucagon now.



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Dear Reader

We are a group of adults, children, parents of children, and teens with Type 1 Diabetes. We gave advice on putting this guide together. We also gave advice on other guides you may want to read:

- Is the Insulin Pump Right for Me?
- How Do I Use an Insulin Pump?
- Is the Insulin Pen Right for Me?
- Is the Continuous Glucose Monitor Right for Me?
- How Can a Continuous Glucose Monitor Help Me Manage My Diabetes Better?
- How Can a Continuous Glucose Monitor Help and Carb Counting Help Me Manage My Diabetes Better?

Some of us use an insulin pump. Some of us use insulin pens and some use vials and syringes. Our group got together to look at all the ways to treat Type 1 Diabetes. We did this to help us learn how to treat our Type 1 Diabetes better.

We want to try to help people understand what we have learned from our teachers and from each other. That is why we want to share it with you.

We hope that in the future there will be even more ways to help us manage diabetes and one day cure it. In the meantime, we invite you to be curious and explore all the ways we have for treating diabetes.

This Guide is written for you as if you were doing all of your own diabetes care. We know that you may be getting help from a parent or guardian. We wrote it this way knowing that at some point when you are an adult and living on your own, you will be doing all of your own care. This is a good time to start thinking about it and planning. You can do it!

Let's get started!

THIS IS WHAT GUS AND HIS MOM, SYLVIA HAD TO SAY ABOUT MANAGING TYPE 1 DIABETES:

Sylvia: “As a parent, it was hard to hear that I had to let go. At first, I was taking total control of all Gus’ care. I didn’t allow Gus to do anything by himself. Then his doctor asked me if he was going to live with me his whole life. I want Gus to live the most normal life possible. To do this, he has to start caring for himself. Of course, when kids are younger, parents have to be in charge. But as he grew older, I learned he can slowly handle things on his own. Gus is now 14, and checks his glucose, keeps track of his numbers, changes his pump site and is even learning to carb count. We fight less about diabetes and I feel less stressed when he walks out the door.”

Gus: “I know my mom worries about me, but I have to learn how to take care of my own diabetes. I know I may still need help sometimes. Like when I am sick, or if I don’t understand something.”



Carb Counting?
Carb Ratios?
Food Labels?
Do I have to go to a school
to learn all of this stuff?

It can be hard at first. But it
gets easier with practice. My
family helps me.



Introduction

As a teen, what should I know about managing my Type 1 Diabetes better?

If you were diagnosed with Type 1 as a child, your parent or guardian managed your diabetes for you. In your teen years, you will take on more and more of your own care. This is called “Transition”. You will want to transition at your own pace. Don't let anyone force you until you are ready.

It is important for you to think about a transition plan. Start taking steps to manage your diabetes on your own. Transition is important because you need to be ready for when you become an adult or for when you are on your own. Talk with the parent or guardian who has been helping you manage your diabetes and work on this together. Also, remember that it may be hard for your parent or guardian to hand over control of your diabetes care because they have been doing it all this time. Small steps can help. You can check out this resource for other tips too. <https://kidshealth.org/LurieChildrens/en/parents/toc-diabetes.html>

How can I learn more about ways to manage my diabetes better?

We are glad you are curious to learn more about ways you can manage your diabetes better. This guide has basic information about staying healthy with Type 1 Diabetes.

We want to help you learn about some ideas that can help you:

- Improve your blood sugar control
- Keep you safe in an emergency
- Have more freedom

This guide can help you manage your Type 1 Diabetes better whether you decide to use the insulin pump, pen or stay on shots with a vial and syringe.

Do you have more guides I could read?

Yes. After reading this guide you may want to read our other guides:

- Is the Insulin Pump Right for Me?
- How Do I Use an Insulin Pump?
- Is the Insulin Pen Right for Me?
- Is the Continuous Glucose Monitor Right for Me?
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- How Can a Continuous Glucose Monitor Help and Carb Counting Help Me Manage My Diabetes Better

I'm the one who needs to make decisions about how I treat my Type 1 Diabetes.

That's right. This is about your health, your life, and your choice to become the most active member on your diabetes team.

In this guide, we talk about your "team". That is because it often takes many people to take care of your diabetes.

The first part of your team is always you. Family members and friends that you include in helping you with your diabetes are part of your team. Then you have your doctor. You may also see a diabetes educator, a nurse, nurse practitioner or physician assistant. You may see a dietitian and maybe a social worker or a psychologist. Your pharmacist and eye doctor are part of your team, and anyone else you want to include. All these people are part of your diabetes team. Each can help you take better care of your diabetes.

Thank you for inviting us to join your team!

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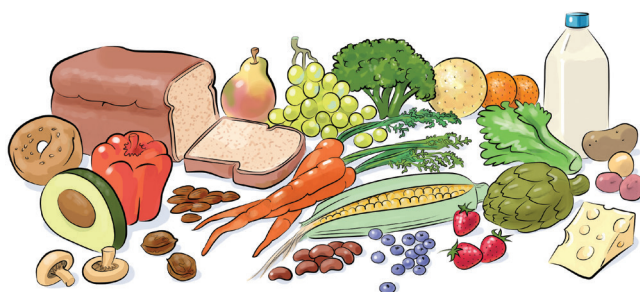
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SECTION 1 — How Do I Give the Right Amount of Insulin For the Food I Eat?



Why do I need to learn about carbohydrates?

When you have type 1 diabetes your body does not make insulin. So, you must give yourself insulin. The amount of insulin you give yourself depends on your blood sugar level and the food you eat. It also on depends whether or not you plan on exercising.

Most of the insulin you give goes to helping your body use carbohydrates. A carbohydrate is called a carb for short. Carbs give you energy. They also keep your brain and muscles working. You need insulin and carbs to stay alive and healthy!

The problem with carbs is that people do not eat the same thing every day. One day you may eat rice. The next day you may eat potatoes. One day you may eat more, the next day less. That means you need to give a different amount of insulin before the meal to keep your blood sugar level normal.

In this section, you can learn more about:

- Carbs
- How to count carbs
- Food labels
- Fiber
- Carb ratios
- Correction doses

All this will help you to give the right amount of insulin for the food you eat.



Can you tell me more about carbs?

All food is made up of three parts:

1. Fat
2. Protein
3. Carbs

Carbs are the main source of energy for our bodies. Carbs become sugar in our blood stream.

There are three types of carbs:

1. Sugars
2. Starches
3. Fiber

Can you tell me more about sugars?

Sugars are simple carbs. They come in many forms. And there are over 25 kinds of sugars. Some common names for sugar are table sugar, corn syrup and honey.



Your stomach absorbs sugars very quickly. Then they go into your blood stream. Even your mouth absorbs sugars. So, if you suck on a piece of candy, the sugar goes straight from your mouth into your blood stream. That means these simple sugar carbs are great for treating low blood sugar. But if you eat too much, they can also cause high blood sugar levels.

Simple carbs include:

- Honey



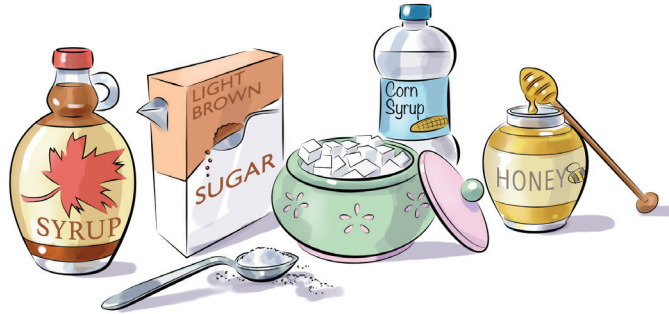
- Milk



- Syrup



- Table sugar and anything with sugar added to it



- Fruit juices



- Regular sodas



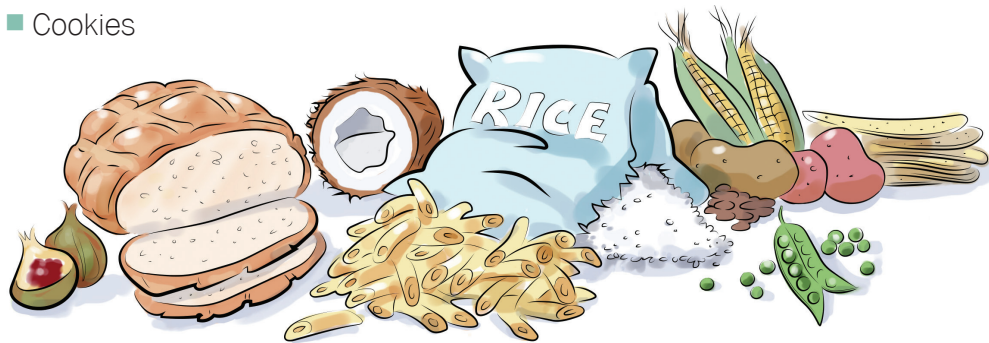
Can you tell me more about starches?

Starches are complex carbs. They take longer to digest. They may raise your blood sugar levels for a long time after you eat them.

There are many types of complex carbs. They include green vegetables (veggies), pasta, rice, bread and potatoes.

Complex carbs include all:

- Green veggies
- Starchy veggies such as potatoes, sweet potatoes, corn and pumpkin
- Beans, lentils and peas
- Whole grains and food made from them, such as oatmeal, pasta, and whole-grain breads
- Anything made with flour like:
 - Breads
 - Pastas
 - Tortillas
 - Cereals
 - Cookies



Can you tell me more about fiber?

Fiber is a form of carbohydrate that does not go into your blood stream. It comes from plants. Your body cannot digest it. Fiber adds bulk to your diet. It is very important for keeping your intestines healthy.

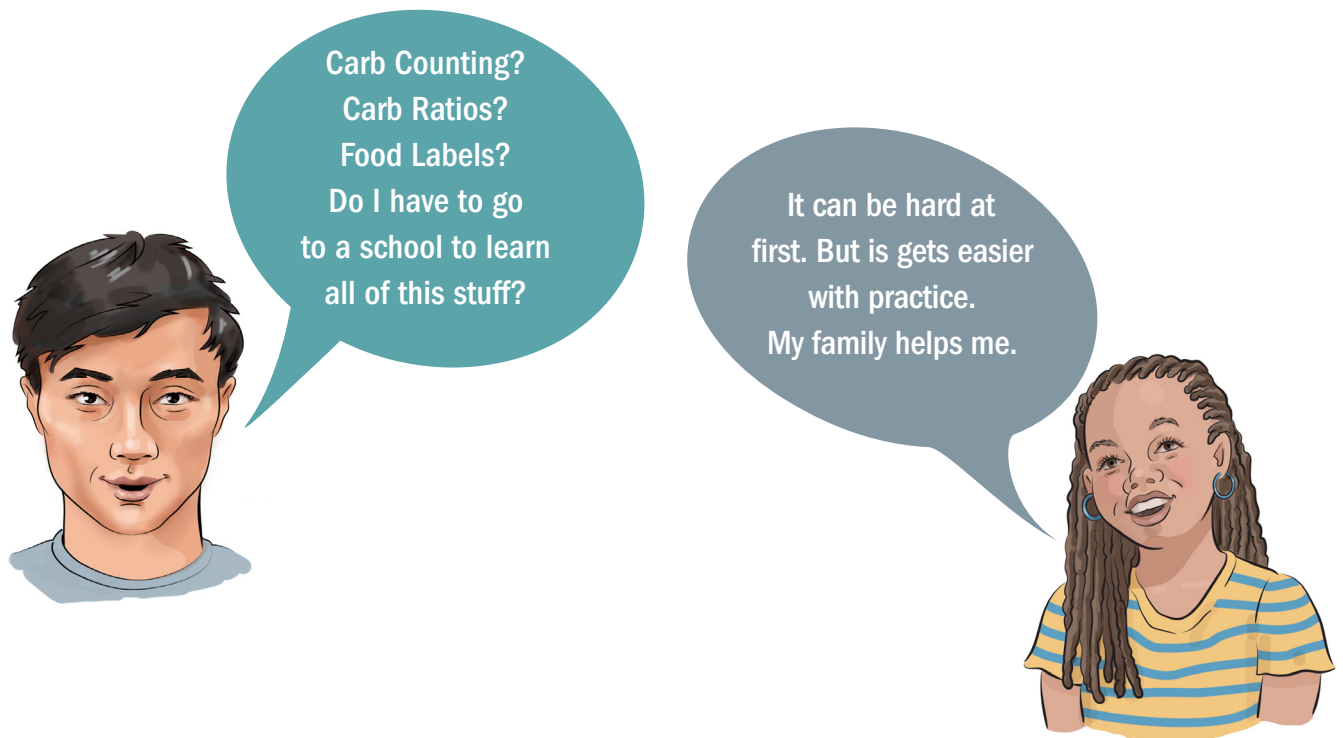


Do carbs raise my blood sugar level?

In most cases, carbs do raise your blood sugar levels. Simple carbs do it more quickly than complex carbs. So, you use simple carbs to treat low blood sugar levels. Complex carbs may make your blood sugar levels go up slowly over time.

Eating carbs along with protein and fat can slow down how quickly you absorb the carbs. It can cause higher blood sugar levels over a number of hours.

What is carb counting? And why does it matter in type 1 diabetes?



Carb counting means learning how many carbs you eat in a meal or snack. This is so you can give just the right amount of insulin for the carbs you are eating.

If you give the right amount of insulin for the carbs you eat, then your blood sugar levels will not go too high. They should also come back down to normal in a few hours.

If you do not give enough insulin for the carbs you eat, your blood sugar levels will go too high. If you give too much insulin, they can go too low.

Many years ago, we used to tell people with diabetes that they needed to eat the same amount and type of carbs at each meal. We had people take the same amount of insulin with each meal. We had them eat the same amount and the same type of food. This made people with diabetes unhappy because they could not eat freely, like other people. Experts came up with the idea of carb counting and giving different amounts of insulin based on the carbs in the meal to fix this problem.

How many carbs does a teen need?

Your diabetes team or a registered dietitian (RD) can help you decide how many carbs to eat or drink. The amount depends on age, gender and how active you are. Each person has different needs. Some people may need more carbs depending on how active they are.

The table below shows basic examples of carb amounts.

CARBS AMOUNTS PER MEAL BY AGE	
Teen Girls	45 to 75 or more grams of carbs at each meal
Teen Boys	60 to 75 or more grams of carbs at each meal
Be sure to check with your diabetes team to find out the right amount of carbs just for you.	

What about snacks?

If needed, snacks are usually 15 to 30 grams of carbs.

How do I count carbs?

To carb count you need to learn how to read food labels. You also need to learn how to find the amount of carbs in the foods you are eating. A carbohydrate is called a carb for short.

Carbs are counted in grams. One serving of carbs is 15 grams. A food that has 15 grams of carbs is “one carb serving”.

One carb serving = 15 grams

To learn about carb counting, it is best to work with a dietitian. She or he can help you with carb counting your basic foods. You can also use a book or an app to figure out how many carbs are in a food. In restaurants, you may be able to get information on the carb content of the foods.

When you start counting carbs, it helps to measure and weigh the food. This works well if you are at home. In time, you will learn how to guess how many grams of carbs are in the foods you eat. After a while, you won't always have to measure or weigh food.

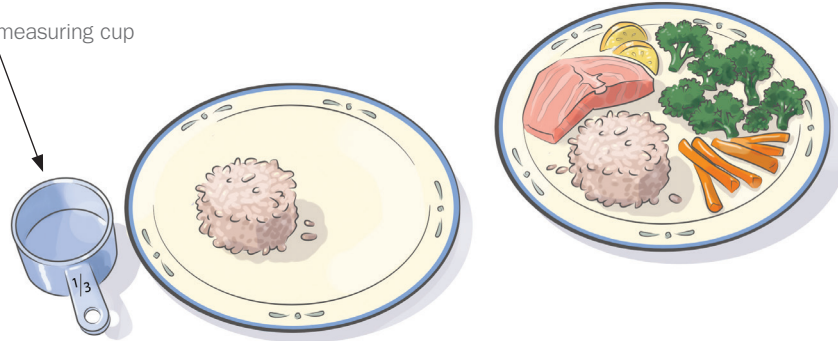
What are some tools for carb counting?

An important part of carb counting is knowing how much of a certain food you are eating. **Measuring cups** and a **scale** are helpful tools for this. When you measure, it helps give you a good visual idea of how different servings look like on a plate, in a bowl, or in a glass.

For instance, measure $\frac{1}{3}$ cup (80 ml) of rice onto your plate when you are eating at home. $\frac{1}{3}$ cup (80 ml) rice is equal to 15 grams of carbs. After you have done this a number of times, you will know what a $\frac{1}{3}$ cup (80 ml) serving looks like on a plate. Then you will be able to estimate a $\frac{1}{3}$ cup (80 ml) serving size without having to measure each time.

$\frac{1}{3}$ cup (80 ml) serving of rice = 15 grams of carbs.

$\frac{1}{3}$ measuring cup



Do you have some tips of how I can carb count with my hands?

Your hands can also help you estimate portion sizes. This is helpful when you are eating away from home. **Remember, this is just an estimate and depends on the size of your hand.** For instance, if your hand is large, your fist may be equal to more than a cup (240 ml). If your hand is small, your fist may be equal to less than a cup (240 ml).

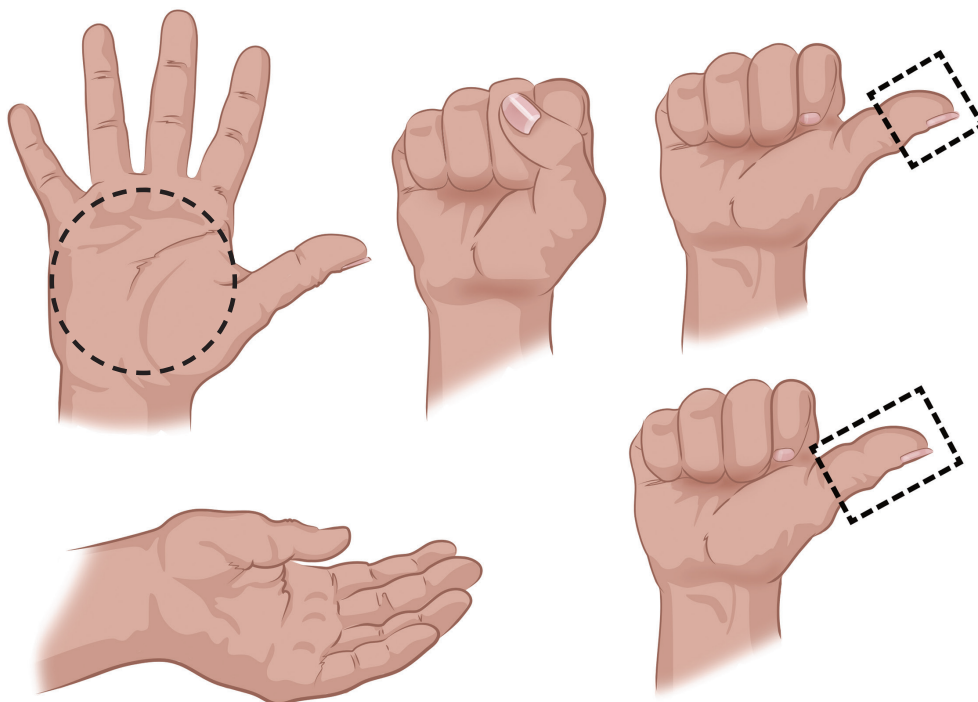
Try it out. Use your hand to measure different foods:

1. Make a fist. Then...
2. Put a scoop of cooked rice on your plate that looks like the size of your fist.
3. Put rice in a 1 cup measuring cup on your plate next to the rice that looks like the size of your fist.
4. Look at the scoops of rice side by side to figure out what your fist measures.
For instance, it may be a $\frac{1}{2}$ cup (120 ml), $\frac{2}{3}$ of a cup (160 ml), or more.
5. Use that information to help you measure the right amount of carbs.

Palm = 3 oz. (85 g)
A cooked serving of meat

Fist = 1 cup (240 ml)
3 servings of cooked pasta or 45 g
carbohydrates

Thumb Tip = 1 tsp. (5 ml)
A serving of low fat mayonnaise
or margarine



Handful = $\frac{1}{2}$ cup (120 ml)
1 oz. snack food like nuts or pretzels

Thumb = 1 oz. (30 g) or 1
Tablespoon like a piece of cheese

What is one serving of carbs?

Remember, 15 grams = one carb serving

What are some examples of 15 grams of carbs in foods?

This is a list of food items you can use for carb choices. Work with a dietitian to help you with your meal planning until you get the hang of it.

Bread	15 grams
Bagel	$\frac{1}{4}$ of a large bagel (30ml) or 1 ounce
Biscuit	2 $\frac{1}{2}$ inches across (30 ml)
Burger or hot dog bun	$\frac{1}{2}$ of a bun or 1 ounce
Corn or flour tortilla	6 inches across
English muffin	$\frac{1}{2}$
Melba toast	4 slices
Pancake or waffle	4 inches across
Saltine or round butter crackers	6
Stuffing	$\frac{1}{3}$ cup (80 ml)
Oyster crackers	20
White, whole wheat, pumpernickel or rye bread	1 slice or 1 ounce

Cereal	15 grams
Bran cereal, flakes	$\frac{1}{2}$ cup (120 ml)
Cold cereal, sugar-coated	$\frac{1}{2}$ cup (120 ml)
Cold cereal, unsweetened	$\frac{3}{4}$ cup (180 ml)
Cooked cereal, oatmeal, grits	$\frac{1}{2}$ cup (120 ml)
Granola	$\frac{1}{4}$ cup (60 ml)
Puffed cereal	1 $\frac{1}{2}$ cups (350 ml)

Cooked grains, rice and pasta	15 grams
Barley	$\frac{1}{3}$ cup (80 ml)
Couscous	$\frac{1}{3}$ cup (80 ml)
Pasta	$\frac{1}{3}$ cup (80 ml)
Quinoa	$\frac{1}{3}$ cup (80 ml)
White or brown rice	$\frac{1}{3}$ cup (80 ml)

Starchy veggies	15 grams
Acorn or butternut squash	1 cup (240 ml)
Baked potato	1 small or ¼large or 3 ounces
Cooked pumpkin	1 cup small cubes (240 ml)
Corn or peas	½ cup (120 ml)
Corn on the cob, large	½ cob (120 ml)
Hominy	¾ cup (180ml)
Mashed potatoes	½ cup (90 ml)
Mixed veggies with corn, peas or pasta	1 cup (240 ml)
Sweet potato	½ cup (120 ml)
Yam	½ cup (120 ml)

Non-starchy veggies	15 grams
Bean sprouts Beets Broccoli Brussel sprouts Cabbage Carrots Cauliflower Celery Cucumber Greens Green or waxed beans Eggplant Lettuce Mushrooms Nopales Okra Onions Pea pods Peppers Radishes Rutabaga Spinach Tomatoes Zucchini	In general, 1 serving = 3 cups raw (700 ml) 1 ½ cup cooked (350 ml)

Cooked beans, peas, and lentils	15 grams
Beans: Black Garbanzo Kidney Lima Navy Pinto White	½ cup (120 ml)
Baked beans	1/3 cup (80 ml)
Black-eyed peas	½ cup (120 ml)
Hummus	⅓ cup (80 ml)
Refried beans	½ cup (120 ml)

Dairy	15 grams
Fat-free plain yogurt	⅔ cup (160 ml)
Fat-free, artificially sweetened flavored yogurt	⅔ cup (160 ml)
Low-fat plain yogurt	¾ cup (180 ml)

*Yogurts varies in carbohydrate content, so check the food label to be sure.

Fruit	15 grams
100% juice	⅓ cup (80 ml)
Apple or orange	(4 ounces) (120 ml)
Apricots	4 fresh
Banana, extra small	1 small banana or 4 ounces (120 ml)
Blueberries	¾ cup (180 ml)
Canned fruit in juice	½ cup (120 ml)
Cantaloupe	1 cup cubes
Cherries	12
Dried fruit	2 tablespoons
Fruit juice blends	⅓ cup (80 ml)
Grapefruit, large	½
Grapes, small	17 (80 ml)
Juice, prune or grape	⅓ cup (80 ml)
Juice, unsweetened	½ cup (120 ml)
Kiwi	½ cup sliced (120 ml)

Fruit	15 grams
Mango	½ small or ½ cup (120 ml)
Orange	1 medium 6 ounces (180 ml)
Papaya	1 cup cubes (240 ml)
Passion fruit	½ cup (120 ml)
Peach	1 medium
Pear	4 ounces (120 ml)
Pineapple	¾ cup (180 ml)
Plum	2 small or 3 dried
Raspberries	1 cup (240 ml)
Strawberries	1 and ¼ cup (300 ml)
Watermelon	1 and ¼ cup (300 ml)

Sweets	15 grams
All fruit bars	1 bar or 3 ounces (90 ml)
Brownie, unfrosted	1 ¼-inch square or 1 ounce (30 ml)
Cake, no frosting	2-inch square or 1 ounce (180 ml)
Cookies, sandwich type	2 small
Cupcake, small, frosted	1 and ¾ ounces (52 ml)
Frozen yogurt, fat –free	1/3 cup (80 ml)
Ice cream	½ cup (120 ml)
Jam or jelly	1 tablespoon
Muffins	¼ of a 4-ounce muffin (30 ml)
Pancake syrup	1 tablespoon
Pudding	¼ cup (60 ml)
Regular gelatin	½ cup (120 ml)
Rice pudding, sweet rice with milk	½ cup (120 ml)
Sherbet	½ cup (120 ml)
Frozen yogurt, fat –free	1/3 cup (80 ml)

Sweets Please note that these items have more carbs	15 grams
Cupcake, small, frosted	1 and $\frac{3}{4}$ ounces (52 ml) is 30 grams of carbs
Doughnut with glaze	2 to 3 ounces (60 to 90 ml) is 30 grams of carbs
Flan	$\frac{1}{2}$ cup (120 ml) is 37.5 grams of carbs
Fruit pie with 2 crusts	$\frac{1}{8}$ of a pie is 45 grams of carbs
Pie, pumpkin	$\frac{1}{8}$ of a pie is 22.5 grams of carbs
Sweet Mexican bread	4 $\frac{1}{2}$ " has 60 grams of carbs

Snack foods	15 grams
Animal crackers	8 crackers
Chips (any kind of snack chips)	approx. 13 chips 1 ounce (30 ml)
Gingersnaps	3 cookies
Graham crackers	3 squares
Popped popcorn	3 cups (700 ml)
Pretzels	$\frac{3}{4}$ ounces (22 ml)
Rice cakes	2 cakes (4 inches or 10.1 cm across)
Vanilla wafers	5 wafers

Drinks	15 Grams
Chocolate or flavored Milk	$\frac{1}{2}$ cup (120 ml)
Energy drink	$\frac{1}{2}$ cup (120 ml)
Fruit netar juice	$\frac{1}{4}$ cup (60 ml)
Iced Tea (sweetened)	$\frac{1}{2}$ cup (120 ml)
Juices (apple, orange, grapefruit, pineapple, pomegranate)	$\frac{1}{2}$ cup (120 ml)
Juices (grape, cranberry, prune, juice blends, 100 % juice)	$\frac{1}{3}$ cup (80 ml)
Lemonade	$\frac{1}{2}$ cup (120 ml)
Milk (Whole, 1%, 2%, Fat-free)	1 cup (240 ml)
Regular soda	$\frac{1}{2}$ cup (120 ml)
Soy Milk	1 cup (240ml)
Sports drinks	1 cup (240 ml)

To learn more about carb amounts, see: Choose Your Foods; Exchange List for Diabetes or Official Guide to Diabetes Exchanges. The Academy of Nutrition and Dietetics and the American Diabetes Association produced it. You can find it at www.eatright.org or www.store.Diabetes.org. There are also many books and phone apps available to carb counting.

Can you tell me the basics about food labels?

All packaged foods and liquids have a **nutrition label**. The label includes:

- How much a **serving size** is
- How many **calories** in a serving size
- How much **fat** is in a serving size and if the fat is a **saturated** or a **trans fat**
- How much **cholesterol** is in a serving size
- How much **sodium** is in a serving size
- How many **grams of carbs** are in a serving size
- How much **fiber** is in a serving size
- How much **sugar** is in a serving size
- How much **protein** is in a serving size
- How much **nutrients** such as vitamin A, vitamin C, calcium, and iron.

Why should I learn how to read food labels?

With diabetes, it is important to learn how to read food labels so you can figure out the **real amount of carbs** in the packaged food or liquid. If you eat a single serving, all you need is the carb grams listed for that serving.

But there is a trick to figure out the real amount of carbs in packaged foods and liquids. It has to do with **Dietary Fiber** on the label.



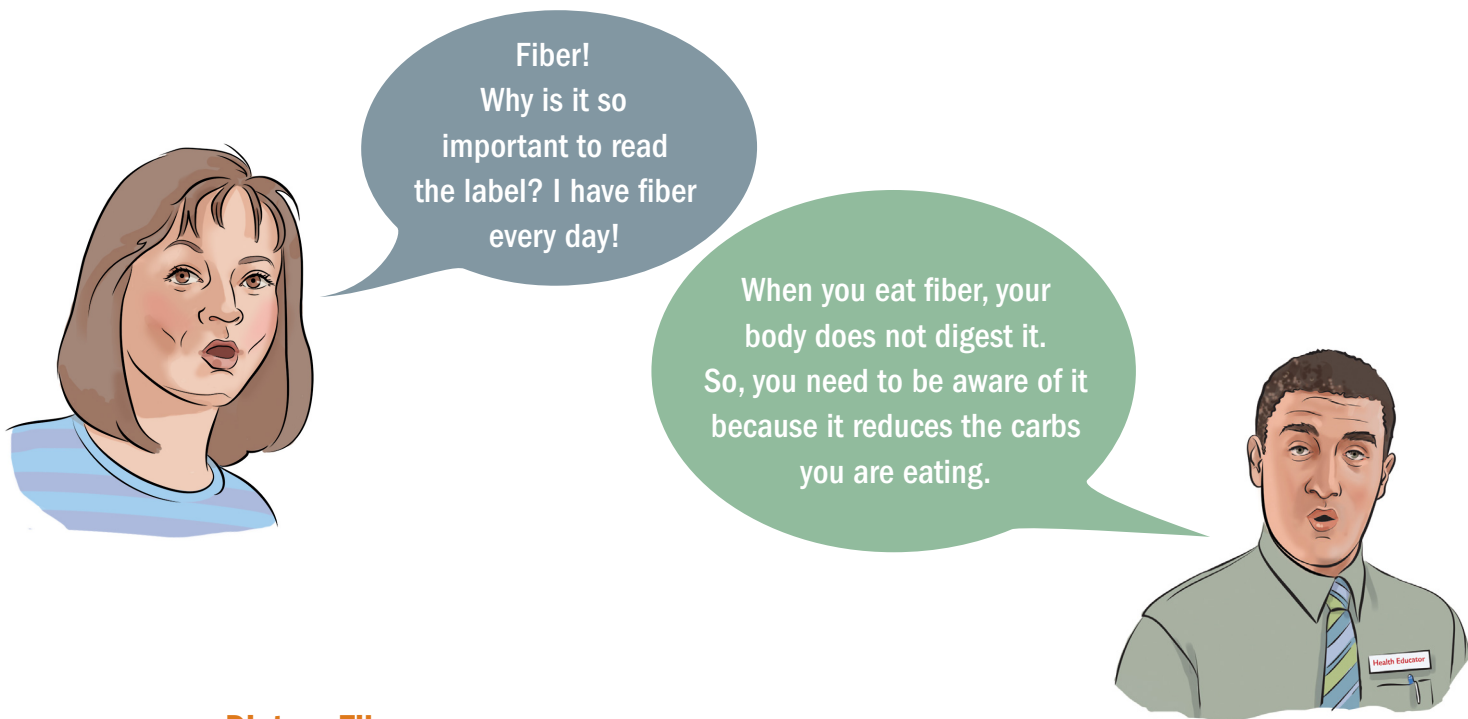
How do I figure out the real amount of carbs in packaged foods or liquids?

The trick to figure out the real amount of carbs in packaged food and liquids has to do with Dietary Fiber on the label. Under Total Carbohydrates, look for Dietary Fiber.

For instance, here is a food label from a pasta package:

Total Carbohydrate		
Dietary Fiber		

Nutrition Facts	
7 servings per container	
Serving size	2 ounces (56g)
Amount Per Serving	
Calories	180
% Daily Value*	
Total Fat 1.5g	2%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 0mg	0%
Total Carbohydrate 39g	14%
Dietary Fiber 6g	21%
Total Sugars 2g	
Includes 0g Added Sugars	0%
Protein 8g	16%
Not a significant source of vitamin D, calcium, iron, and potassium	
*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	



Dietary Fiber:

The body cannot digest dietary fiber. Fiber helps to move food through your body. Fiber can also reduce the amount of carbs you are eating.

This is how you find out the amount of carbs you need to give insulin for:

Subtract half of the dietary fiber from the total carbohydrates listed on the food label.

- **Only** do this if the dietary fiber is 5 grams or more.
- If the dietary fiber is 4 grams or less, **do not** subtract the dietary fiber.

Here is an example.

Let's say you will eat one serving of the pasta for the label on page 16. In that label, the total carbohydrates are 39 grams. The dietary fiber is 6 grams.

The math looks like this:

Total carbs per serving are 39 grams. The total dietary fiber is 6 grams. Dietary fiber needs to be divided in half. So half of 6 grams is 3 grams. Now we subtract 3 grams of dietary fiber from 39 grams of carbs = 36 grams.

$$39 - 3 = 36$$

So, 36 grams is the real amount of carbs you will eat.

Then you would use 36 grams to figure out a carb bolus. A carb bolus is the dose of insulin you give before you eat. You can also use 36 grams to see if you are eating the right amount of carbs for your meal or snack.

What if I am going to have more than one serving of carbohydrates from packaged foods or liquids? How do I figure out the real amount of carbs?

If you are going to have more than one serving, figure out the real amount of carbs based on how many servings you are going to have.

Let's say you are going to have 2 servings of pasta from the label on page 14. In other words, each serving is 2 ounces (60 ml), or oz. And you are going to have 4 ounces (120 ml) because 2 servings times 2 ounces (60 ml) equals 4 ounces (120 ml).

The math to figure out the real carb amount looks like this:

Dietary fiber needs to be divided in half. 12 grams of dietary fiber
 $12 \div 2 = 6$ grams of fiber.

Dietary fiber needs to be divided in half. 12 grams of dietary fiber $\div 2 = 6$ grams of fiber.

So, total carbs are 78 grams minus 6 grams of fiber = 72 grams

Then 72 grams is the real amount of carbs you will eat with 2 servings

What about the other carbs on the labels of packaged foods and liquids?

When you are at ease with your carb counting, you can start to think about other types of carbs listed on the labels. They include sugars, such as sugar alcohols. Sugar alcohols sweeten foods. They do not raise the blood sugar levels as much as natural sugars do.

When you are looking at sugar alcohols, you can use the same type of carb counting as you do for dietary fiber. If something has more than 5 grams of sugar alcohols, you should subtract half of the sugar alcohol grams from the total carbs.

The math to figure out the real carb amount looks like this:

Total carbs are 40 grams.

Total sugar alcohol is 10 grams.

Divide the sugar alcohol in half, 10 grams of sugar alcohol $\div 2 = 5$ grams.

So the total carbs are 40 grams minus 5 grams of sugar alcohol = 35 total grams of carbs.

Talk with your diabetes team members to learn how to count these in your diet. In most cases, they will not raise your blood sugar levels much. But they can have an impact.

What about prepared foods and liquids that do not have labels?

When food does not have a label, carb counting is hard. This can be because you are cooking food at home. Or it can be because you are eating take-out food or food in a restaurant.

At home, have a small scale or measuring cups. This is so you can weigh or measure your food. In time, you will learn to figure out carbs from experience.

When you eat out, it is often harder. Some restaurants can give you nutritional information about the food they serve. So be sure to ask.

One problem with restaurants is that they often give you very big portions. So be sure to count all the carbs you are eating. If you use shots and end up eating more carbs than you plan to, be sure to give another shot of insulin to cover it. This might happen if you add a dessert or a piece of bread. If you are using a pump, you can enter the carbs into the pump and give the carb bolus dose it suggests.

What about breakfast, lunch and snack time at school?

Breakfast, lunch and snack time at school are often used for hanging out instead of eating. It can be hard to know how many carbs you have actually eaten.

There are a few tips to get a better idea of what is going on during school lunch and snack time.

- Ask for school menus. Many schools have nutrition information for their meal programs.
- If you are able to afford it, pack lunch and snacks so it is easier to count carbs.
- Label food items with the number of carbs to help you, teachers, school nurses and other caregivers figure out how many carbs you are eating.
- Do not throw out food that you did not eat. Bring it home to help figure out how many carbs you ate.
- Pack things that you can eat quickly so you can get carbs during the day and still have time to hang out.



What is a carb ratio?
There is so much to learn.

What is a carbohydrate ratio?

A carbohydrate ratio is also known as a carb ratio. A carb ratio is how many carbs one unit of insulin will cover.

Remember that when you eat or drink carbs you will usually need to give yourself insulin. You may not need to give insulin if you are treating a low blood sugar (see Section 2-Low Blood Sugar, page 24). You may not need to give insulin if you are going to exercise (see Section 5- Physical Activity, page 43).

Carb ratios vary from person to person. As a child grows, his or her carb ratio will change. For instance, a teenager may use 1 unit for each 7 to 15 grams of carbs. Weight, activity level and gender are some things that affect what carb ratio a person needs.

Your diabetes team will figure out your carb ratio with you. At first keeping a record of how some foods affect your blood sugar can help. Some carbs cause blood sugar levels to raise more than you think they will. If this happens a number of times for the same food, your diabetes team may recommend a change. They may tell you to give more insulin or eat a smaller serving of that food.

Many people find they need different carb ratios at different times of day. For breakfast, people often need more insulin for their food. At lunch people often need less and at dinner somewhere in between the two.

What is a correction factor?

This is how much 1 unit of rapid acting insulin will lower your blood sugar over 2 to 4 hours. Some people need more insulin to do this and some need less. In most cases, a good starting point is a factor of 1 to 50 (1 to 3.8 mmol/L). This means 1 unit of insulin will bring your blood sugar down by a 50 (3.8) point drop.

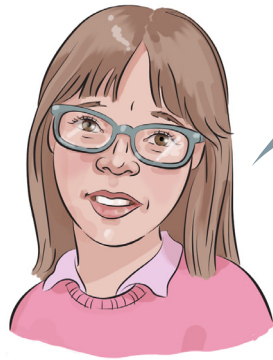
How do I know what my correction factor is?

Your diabetes team sets your correction factor. Your team also changes it as needed.

Your correction factor can be a lower number, such as 10 mg/dl (0.6 mmol/L). A low number means that you are resistant to insulin. This means that you need more insulin to bring your sugar level down.

If your correction factor is a higher number such as 75 mg/dl (4.2 mmol/L) or 100 mg/dl (5.6 mmol/L), it means you are very sensitive to insulin. This means you will need less insulin to bring your blood sugar down.

In most cases the correction factor is in the range of 30 mg/dl (1.7 mmol/L) to 50 mg/dl (2.8 mmol/L).



I use a correction dose
before meals if I need it.
And my blood sugar
is more in range.

What is a correction dose?

This is the dose of insulin you give yourself to bring your blood sugar level back down to normal if you are high.

To figure out how much insulin you will need, you have to do some math using your correction factor. For instance, let's say your blood sugar level is 200 mg/dl (11.1 mmol/L). Let's say you want to have a blood sugar level of 150 mg/dl (8.3 mmol/L). And let's say your correction factor is 1 to 50 (1 to 2.8). You will give one unit of insulin to bring your blood sugar level down by 50 (2.8) to be at the 150 mg/dl (8.3 mmol/L) level.

The mg/dl correction factor math looks like this:

Current sugar level is 200 minus 150, which is your desired sugar level.

$$200 - 150 = 50$$

So, 50 is how much you need to correct your sugar down.

Since the correction factor is 50, that means you divide 50 correction factor by the

50 that you want to bring down by 1 unit of insulin.

$$50 \div 50 = 1$$

Then 1 is the correction dose you would give yourself to bring your sugar level down.

The mmol/l correction factor math looks like this:

Current sugar level is 11.1 minus 8.3, which is your desired sugar level.

$$11.1 - 8.3 = 2.8$$

So, 2.8 is how much you need to correct your sugar down.

Since the correction factor is 2.8 that means you divide 2.8 correction factor by 2.8 that you want to bring down by 1 unit of insulin.

$$2.8 \div 2.8 = 1$$

Then 1 is the correction dose you would give yourself to bring your sugar level down.

You may need different correction doses through the day. Most often people need a different correction dose, more for breakfast and less for lunch.

When do I give a correction dose?

It is important to check your blood sugar before you eat a snack or a meal so you can know if you need to give a correction dose. Only give correction doses 2 hours after your last dose of insulin or after you last ate.

Before a meal after checking your blood sugar:

The best time to give a correction dose is before a meal. This is so your blood sugar does not go too low or too high.

Between meals if you snack or eat something:

If you are giving a correction dose between meals, you will need to consider the insulin that is still in your body from the last shot. This is called “insulin on board”. If you give correction doses too often you can “stack” insulin, which means giving too much insulin within a short period of time. Because insulin can take an hour or two to peak and can last in your body for 6 hours, it is easy to think the dose hasn’t worked. Remember to wait and see what each dose does before adding more.

How do I give a correction dose between meals if I am going to eat something?

With the insulin pump:

You will enter the amount of carbs you plan to eat and your blood sugar. The pump will subtract the dose still in your body from your correction dose.

With insulin shots:

A good rule is to give half a correction if you are correcting between meals or at bedtime. This avoids stacking. Stacking means giving too much insulin too often. That can lead to a low blood sugar reaction. For example, if your correction dose is 1:50, a half correction dose is 1:100. A half dose will help safely reduce your blood glucose level.

What is a pre-meal or bolus dose?

This is the total dose of insulin you give before you eat. It consists of a correction dose if you need one and a dose of insulin to cover the amount of carbs you are about to eat. It can also be called a carb dose or carb bolus.

It is important to check your blood sugar before you eat. If your blood sugar is high, you will need to add a correction dose to the carb dose. This is an example if your correction factor is 1 to 50 and you plan to eat 15 carb grams. This is an example if your correction factor is 1 to 50 (1-2.8 mmol/L) and you plan to eat 15 carb grams.

Your blood sugar is 200 mg/dl (11.1 mmol/L) and should be 150 mg/dl (8.3 mmol/L). You want to eat a small apple that is 15 grams of carbs. Your correction dose is 1 unit of insulin and your carb bolus is 1 unit of insulin. You will need to give yourself 2 units of insulin.

If you are low you may need to subtract insulin from the total dose, in most cases by 1 or 2 units. This is an example if your correction factor is 1 to 50 (1-2.8 mmol/L), your blood sugar is 70 (3.9 mmol/L) and you plan to eat 30 grams of carbs.

You need to eat because you are low. You plan to eat 15 carb grams of cereal and 15 carb grams of milk. That is 30 total carb grams. You would normally give yourself 2 units of insulin. You check your blood sugar. It is at 70 (3.9 mmol/L) and should be 150 mg/dl (8.3 mmol/L). You would subtract 1 unit of insulin from the total carb dose of 2 units. You would only need 1 unit of insulin to cover the food you plan to eat and bring your blood sugar up from the low.

SECTION 2 — Low Blood Sugar

What is low blood sugar?

A low blood sugar level is when your blood sugar falls below 70 mg/dl (3.9 mmol/L).

In most cases, people will have symptoms of low blood sugar when their level drops below 70 mg/dl (3.9 mmol/L). But not always. So, it is important to test your sugar level before meals, before bedtime, before driving and before and after exercise.

No one can totally avoid getting low blood sugar.

Low blood sugar is **hypoglycemia**. There are two kinds: mild and severe.

Mild hypoglycemia is something you feel and treat by yourself by eating carbs. This is common; although the better you dose your insulin the less common it will be.

Severe hypoglycemia means you pass out and someone else has to help treat you so you recover.

Mild Hypoglycemia (low blood sugar):

It can make you:

- Shaky
- Nervous
- Dizzy
- Hungry
- Sweaty
- Have a pale or gray skin color
- Have a pounding or rapid heart beat
- Have numbness or tingling in your mouth or lips

If your sugar falls even lower, you may:

- Have a headache
- Have blurred vision
- Have a change in your personality (not acting like yourself)
- Have trouble concentrating
- Have slow or slurred speech
- Feel irritated
- Feel confused

If you have low blood sugar at night while you are sleeping, you may:

- Cry out
- Have nightmares
- Have night sweats (with damp sheets or pajamas)
- Wake up groggy or with a headache

Severe Hypoglycemia (extremely low blood sugar):

Severe means that you need someone else to treat your low blood sugar reaction because you have:

- Had a seizure or
- Passed out

Why is my blood sugar going low?



What causes low blood sugar?

Low blood sugar happens when there is too much insulin in your body and not enough carbs.

Here are some things that cause low blood sugar:

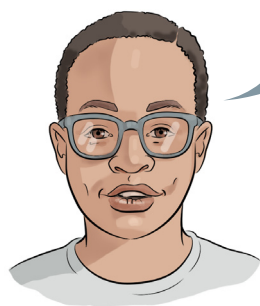
- Skipping meals
- Eating less than normal
- Exercising
- Activity that makes the heart beat faster or the body sweat more than usual
- Taking too much insulin
- Injury, illness, infection, or emotional stress
- Drinking alcohol like beer, wine and hard liquors

How can I treat low blood sugar?

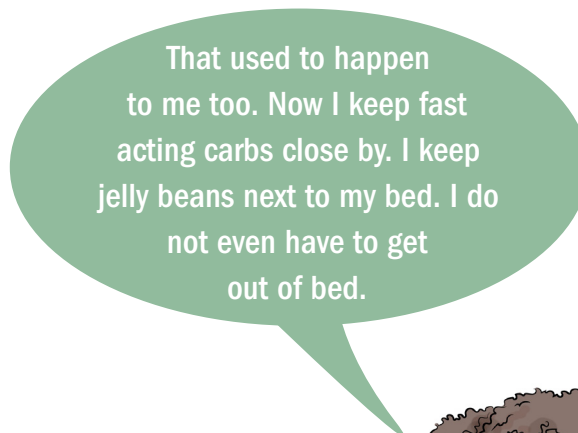
How you treat low blood sugar depends on whether the low is mild or severe.

Mild low blood sugar means you can sometimes feel the signs or discover it from testing your blood sugar. You can treat yourself for low blood sugar. You can eat or drink to correct it.

As soon as you feel you have low blood sugar or your sugar testing tells you that your sugar is low, treat it right away. When you do this, it helps prevent severe low blood sugar.



When I go low, I start to feel shaky and dizzy. Sometimes I panic and eat too much and then go high.



That used to happen to me too. Now I keep fast acting carbs close by. I keep jelly beans next to my bed. I do not even have to get out of bed.

So, how do I treat mild low blood sugar?

To treat mild low blood sugar, **use the 15–15 Rule**: This means eat or drink 15 grams of fast-acting carbs and then check your blood sugar in 15 minutes.

If your blood sugar is 50 to 70 mg/dl (2.8 to 3.9 mmol/L):

1. Eat 15 grams of fast-acting, or simple carbs.
2. Recheck your blood sugar in 15 minutes.
3. If your blood sugar is still below 70 mg/dl (3.9 mmol/L), repeat steps 1 and 2 every 15 minutes until your blood sugar returns to your target range.

If blood sugar is less than 50 mg/dl (2.8 mmol/L):

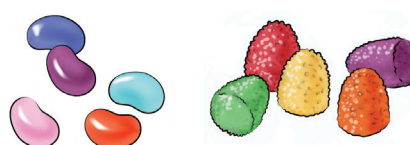
Start treatment with 25 to 30 grams of fast-acting or simple carbs. Sometimes your blood sugar will drop very fast and you will have a severe low blood sugar. We will tell you more about how to deal with that on page 28.

What are some foods and drinks that have 15 grams of fast-acting or simple carbs?

3 to 4 sugar tablets



5 jelly beans or gum drops



1/2 glass (4oz) of juice



1 tablespoon of sugar



4 ounces of soda (not diet)



8 ounces of low fat or non-fat milk



1 tablespoon of honey



What are some tips about how to treat mild low blood sugar?

- Always keep food or drink with you, whether you take insulin with a shot or a pump.
- Do not eat high fat foods.

Some high fat foods are chocolate and chips. They do not work well because they take longer to digest and longer for the sugar to move into the blood.

- Do not eat or drink too much sugar.

Many people eat too much sugar when treating a low. This is because it often takes 10 to 15 minutes for the symptoms of a low to go away. If you treat a low with too much sugar, then you will swing back up again. And treating this high can cause another low.

- Have a glass of water after you have had your 15 to 30 grams of sugar.

This may make you feel better sooner.

- After treating a low blood sugar be sure to eat a snack or a meal that has some protein, carbs and fat in it.

This will help to keep your sugar level stable, so you do not go low again. You may need to give insulin for the carbs in this food, too. Ask your diabetes team for advice on what to do after you have had a low blood sugar level.

Can you tell me more about severe low blood sugar?

Severe low blood sugar is severe hypoglycemia. It is when your blood sugar falls very fast and low and you do not have time to treat it.

Sometimes you may be aware of what is going on but cannot do anything about it. Other times you may not be aware of what is going on and pass out. It can happen when you are awake or when you are asleep.

It is likely that you will have mild low blood sugar reactions from time to time. But severe reactions are not common or likely. You should **do all you can to avoid a severe low blood sugar**.

When you have severe low blood sugar you might:

- Feel confused
- Not be able to move
- Pass out, or faint
- Have a seizure

How can I treat severe low blood sugar?

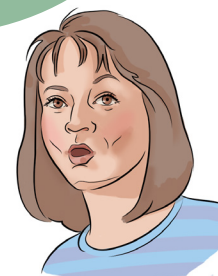
To treat a severe low blood sugar, you will need help from another person. Always have **glucagon** on hand. Glucagon is a shot that will raise your blood sugar level. It comes in a kit for injection or in a nasal spray. Someone needs to know how to use it to give it to you.

- Train the people you live with and a co-worker on how to give a glucagon shot. They can train in the doctor's office or practice with a vial and syringe.



Glucagon helps raise blood sugar levels if you are not able to eat drink or if you have passed out. It raises sugar levels by signaling the liver to release stored sugar.

My blood sugar was so low, I passed out. My mom had to call 911. The paramedics took me to the hospital. If I had glucagon at home, I could have avoided a trip to the hospital.



Tell me more about the glucagon you inject.

It is a kit that has a shot and a vial of emergency medicine in it. When someone with diabetes has passed out or cannot take some form of sugar by mouth, someone else gives the shot.

Glucagon cannot be prepared ahead of time. You have to prepare it right before you give it. It must be given at once.

Teens and adults are given 1cc (the entire shot). Some experts advise using $\frac{1}{2}$ cc to start with. Then they advise giving the other $\frac{1}{2}$ about 20 minutes later if needed. This is done to keep the blood sugars from going very high, which often happens after using of glucagon. The good thing though is there is no danger of overdose. Since the needle is big, the shot is given in a large muscle, such as the buttocks, thigh or arm.

Keep information on how to give glucagon with the glucagon medicine, and review these steps often with your family, friends, school staff and people you work with.

It is important to have this kit on hand whether you get insulin from shots or the pump.

What does the glucagon emergency kit look like for glucagon you inject?

The kit looks like this. Based on the brand you get, it may be a different color or have a different shaped case.



Tell me more about the nasal glucagon.

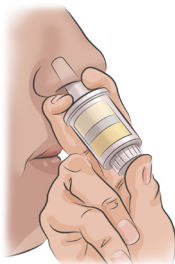
Nasal glucagon is a dry powder. It is in a spray pump that is easy to take anywhere. It is in a single dose form. This means you can't use it again once you have sprayed the glucagon in the nose. You do not have to prepare it. Once you take it out of the container, you simply:

1. Hold the sprayer between your fingers and thumb
2. Insert the tip into one nostril until your fingers touch the bottom of the nose
3. Push the plunger all the way down

What does the nasal glucose emergency kit look like?



The nasal spray looks like this.



Why can't I just treat a severe low with juice, sugar tablets or soda?



Trying to treat a severe low blood sugar the same way you treat mild low blood sugar may not be possible. You may not be able to swallow. Eating or drinking will not bring your blood sugar up fast enough. Glucagon is a hormone that makes your liver produce glucose very fast. This makes your blood sugar go up fast and keep you safe.

Be prepared!

- Train the people you live with and school staff on how to give a glucagon.
- Learning how to give the injection requires some training, often in your doctor's office. You can also use the glucagon app on your phone for directions on how to use and give the glucagon shot.
- Giving the nasal spray is simple and can be learned by looking at the instructions or watching a short video.
- Keep a kit where family members, people you live with and school staff know where to find it so they can give the glucagon, if needed.
- Always make sure the kit is up to date and has not expired.
- It takes about 10 minutes to wake up after the glucagon. You will feel sick to your stomach. Be sure to drink some fluids that have sugar in them to help raise your sugar.
- If someone sees you looking ill and does not know how to give glucagon, then they should call 911. The paramedics can treat your severe low blood sugar level.
- After using glucagon, make sure to call the pharmacy and refill the prescription.

How can I get a glucagon emergency kit?

Ask your diabetes team for a prescription for this kit every year. Make sure you buy a new kit every year when your old one expires.

Do not forget to always make sure a family member, friend or school staff know when and how to give you the glucagon.

SECTION 3 – High Blood Sugar



What is high blood sugar?

High blood sugar means there is too much sugar in the blood and not enough insulin in the body. In other words, high blood sugar happens when there is not enough insulin to cover the amount of sugar that is in your body. High blood sugar is also called **hyperglycemia**.

Most high blood sugar happens when there is some insulin in the body, but not enough to keep sugar levels in your target range.

What should my goals related to high blood sugar be?

The two major goals when you have type 1 diabetes are:

- 1.** To avoid having high blood sugar
- 2.** To treat a high as soon as you notice it

This is because:

- Having high sugar levels over time can cause problems with diabetes. These problems can be eye, kidney, heart, and nerve damage.
- Sometimes, high blood sugar can turn into a serious problem called diabetic ketoacidosis (DKA). See page 34 to learn more about DKA.

What causes high blood sugar?

Sugar levels can get too high for many reasons. Here are the main ones:

Reason for high	Why
Food	<p>If you do not take enough insulin to cover your food, blood sugar levels can get too high. This happens most when:</p> <ul style="list-style-type: none">■ You do not count carb grams right■ You miss a food bolus■ You do not correct for a high sugar before a meal■ You did not give insulin 15-30 minutes before
Illness or infection	<p>This can be a cold, the flu, or a stomach virus. It can be food poisoning or a bacteria in your body. It can make blood sugar levels run higher than usual.</p>
Stress	<p>Emotional or physical stress can make your blood sugar level run high.</p>
Lower activity levels	<p>This makes your body less sensitive to insulin. So, your sugar levels go up.</p>
Medications	<p>There are over 300 medications that can affect your blood sugar. Be prepared and ask your pharmacist how a medication might affect your blood sugar.</p>
Weak insulin	<p>Weak insulin can make blood sugar get too high. Insulin can get weak if:</p> <ul style="list-style-type: none">■ It gets too hot.■ It gets too cold.■ It has expired.
Hormonal changes	<p>Hormones change over the month of a girl's menstrual cycle. They are often higher about a week before a period. When hormones go up, blood sugars can go up. Also, growth hormones in both girls and boys can cause blood sugars to be higher.</p>
Over-treating a low glucose level	<p>This is common. To avoid this you may be told by your health care team to eat a snack and give some insulin after you have recovered from your low glucose level</p>

How can I treat blood sugars that are high?

Most of the time, high blood sugars happen because:

- You have under estimated your food intake.
- You feel stressed.
- You are sick.
- Your activity level is lower than usual.

Never ignore a high blood sugar reading! If you are using shots or the pump, you can often correct these highs just by giving a correction bolus.

To learn more about correction bolus, please see pages 20-21.

What are ketones?

Ketones come from the breakdown of fat in the body. Anyone who goes on a diet makes ketones. People on a diet want to make ketones. This is because it means that they are losing weight.

But the body has a very fine balance between breaking down a little fat and breaking down too much fat. Insulin keeps this balance in check.

If you do not have enough insulin in your body you start to break down too many fat cells too fast. This means that your body is making too many ketones. Ketones are acid. They make it hard for your body to work in a normal way.

What is diabetic ketoacidosis, DKA?

If the body makes too many ketones it causes diabetic ketoacidosis, or DKA.

DKA is a medical emergency! It means you need treatment by your diabetes team or an emergency department doctor.

What are the symptoms of DKA?

DKA symptoms are:

- Headache
- Nausea
- Extreme thirst

- Extreme peeing, or urinating
- Vomiting
- Stomach pain
- Fast, shallow breathing
- Drowsiness
- Lack of coordination
- Having trouble thinking
- Coma

Headache and nausea are the most common symptoms. Coma is rare.

Can testing for ketones help?

Yes. To prevent diabetic ketoacidosis (DKA) an important step is to check for ketones. You should always have ketone test strips at home or with you when you travel.

You can test yourself for ketones. Testing helps because it lets you know if DKA is happening.

When should I test for ketones?

Test for ketones if you have any of the symptoms above and your blood sugar level is high. Sometimes there may be ketones even if your sugar level is not high. So, you may want to test if you feel sick, too.

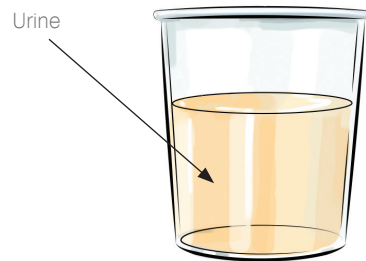
How do I test for ketones?

You can test for ketones with urine (pee) or blood test strips. Ask your diabetes team which is best for you. Most people use urine testing for ketones.

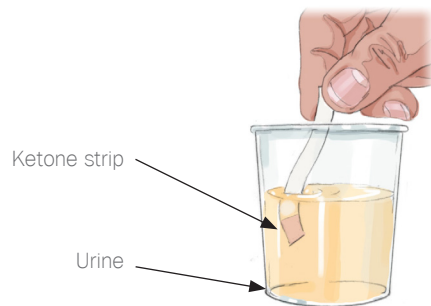
Checking for urine ketones is easy and cheap. You can buy urine ketone strips at the pharmacy. You do not need a prescription.

To test your urine for ketones:

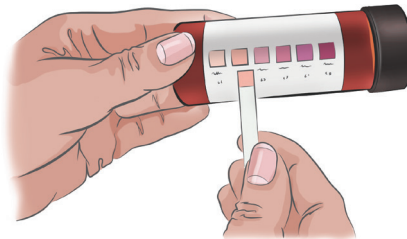
1. You will need some of your urine in a cup.



2. Dip the end of the ketone strip into your urine.



3. Read the results based on the instructions on the ketone strip bottle.



Ketones will most often be “trace”, “small”, “medium” or “large”. Different test strips have different scales.

What should I do if the ketones test shows I have more than “trace”?

If your ketones are more than “trace” you should let your diabetes team know so you can get help.

Insulin and water help to reduce ketones. It is important to drink water when you have more than “trace” ketones.

If you are over 16 years old, drink 8 to 16 ounces of water per hour.

If you are under 16, drink 1 ounce per each year of age. For example, if you are 13 years old, drink 13 ounces of water an hour.

If you are vomiting and are not able to keep down fluids, you should go to an emergency department (ED) for treatment right away.

In most cases, if you can drink fluids your doctor will be able to have you take insulin, fluids and sugar. Your doctor will be able to help you correct the situation at home. But, it is important that you speak with someone from your diabetes team to figure out what is best for you to do. Most clinics have a doctor on call after the clinic has closed, so you can call anytime. When in doubt, go to the ED.

In most cases, you will feel much better quickly once you have gotten some fluids and insulin in your body. Also, there is often a cause for why DKA happened in the first place, such as being sick. That other cause should be treated as well.



How can I prevent DKA?

There are almost always warning signs for DKA. You can almost always prevent DKA if you **pay attention and act when you have warning signs**.

You can almost always prevent DKA when you:

- Check your blood sugar 4 to 6 times each day.
- Check your blood sugar more often when you are sick.
- Recognize and respond to high sugar levels and other warning signs in the right way.

Recognize the main warning signs and symptoms of DKA:

- High blood sugar levels (higher than normal for you)
- Nausea or vomiting
- Headache

Respond:

- Test for ketones as this will tell you if DKA may be happening.
- Call your doctor's office if you have ketones that are more than trace.
- Go to the ED if you are vomiting and are not able to keep down fluids.

SECTION 4 — What Should I Do When I Am Sick?

Should I check in with my diabetes team about what to do when I am sick?

Yes. Check in if your sugars are higher or lower than normal. You may need changes in your insulin doses. You **MUST** be sure to let your diabetes team know as soon as possible if you:

- Are vomiting or
- Cannot keep down fluids.

These symptoms often mean you need to go to the emergency department for IV fluids.



What exactly should I do when I am sick?

- Check your blood sugar at least every 4 hours, except when you are sleeping. You can do this by looking at your CGM or by fingerstick.
 - If they are too high, it means you may need to give extra insulin.
 - If they are too low, it means you need to eat a carb.

Often sugars are high when you are sick due to insulin resistance. This means your body needs more insulin than usual to bring your sugars back down. Your diabetes team can give you advice on how much to give.

- Check your urine for ketones each time you pee if your sugars are unusually high. Let your diabetes team know if they become positive. This is very important if you are on an insulin pump.
- Be sure to eat and drink enough carbs so you can give insulin without going to low.
- You need to go to the ED if you cannot eat or drink fluids that have sugar.
- Drink enough water so you do not get dehydrated. A general rule is 1 ounce of water per year of age every hour. So, if you are 15 years old, you should drink 15 ounces of water per hour. That means a 15 year-old should drink 15 ounces (445 ml) of water per hour. That is almost 2 cups.

- **Do not stop your insulin. You cannot stop your insulin when you have Type 1 Diabetes!** Ask your diabetes team how to change your doses if you are too high or too low.

You need to eat or drink carbs and water and give yourself insulin to keep your body in balance and healthy.

Are there a few things I should keep on hand in case I get sick?

Yes. Keep a few supplies on hand in case you get sick:

You need:

- Urine or blood test strips for testing ketone levels
- Syringes for injecting insulin if you are on a pump (or insulin pens plus pen needles)
- Sometimes your diabetes provider will give you anti-nausea medication to keep on hand to prevent vomiting
- Liquids that are sugar-free and liquids that have sugar.

Some examples are diet and regular drinks, sports drinks, clear juices (like apple juice), bouillon, and chicken broth.

You can use these to replace fluids your body has lost and to prevent getting dehydrated.

- Have liquids with sugar to replace needed calories if you are not able to eat. Popsicles with sugar are also good.



- Have sugar-free cough medicine, decongestants, and cough drops.



What happens if I am in the hospital?

If you are in the hospital, it can be scary for many reasons. Many hospitals have their own rules for taking care of people with diabetes. But most of the people with diabetes that they see in the hospital have Type 2, since that is the most common type. This means there are some things you, your family and friends can do to make sure things go well for you.

These things are:

- 1.** Tell the people in the hospital that you have Type 1 Diabetes, not Type 2 Diabetes.
- 2.** Be sure that they give you food and insulin or IV sugar and insulin if you are not eating. People with Type 1 Diabetes always need to be given sugar and insulin.
- 3.** If you are on an insulin pump, you can ask if you can stay on your pump for treating your diabetes. Many places allow this.
- 4.** If you are on shots you can ask to:
 - Give yourself insulin injections or
 - Ask that they give them to you

Some hospital have rules that they will have to give the shots. Either way, work with the doctors to figure out the best doses for you.

- 5.** If you are on a CGM, you can ask if you can use it to manage your diabetes. Even if they still want you to have finger sticks, you can keep your CGM on unless you are having an MRI. Then you would need to take it off. Sometimes you need to take it off for other tests, such as a CT scan. So, ask your doctors if you need to take off your CGM sensor for certain tests.

6. Make sure you always have juice or glucose tablets near your bed in case you need to treat a low sugar reaction. It can also help to have snacks on hand. If you are not supposed to be eating, you need to contact a nurse or other provider if you are going low so they can give you glucose in your vein.
7. Keep in mind that you know how to manage your diabetes better than anyone. Even so, in the hospital your body may respond in a different way when sick. Work with your doctors to figure out the best insulin doses.
8. Know that when in the hospital, your blood sugars may be higher than when you are home. But if you can keep your sugars in the range of 150 to 180 mg/dl that is considered safe. You do not want to be too low or too high.



SECTION 5 — Physical Activity

Physical activity is important for all people. Regular exercise can help manage diabetes and reduce stress levels. There are many fun ways to stay active.

To stay active

- Play at the park
- Dance
- Swim
- Walk
- Play sports
- Run
- Ride a bike

How can I exercise with diabetes?



If you are going to exercise, it is important to keep check on your blood sugar levels. To do this, check your blood sugar levels before, during, and after physical activity.

Exercising can help make your insulin work better. This means that you may not need as much insulin before you exercise. It is important to know how intense your physical activity will be so that you can manage your blood sugar levels.

Before starting to exercise, check your blood sugar: Depending on the blood sugar you can:

If below 70mg/dl (3.9 mmol/L):

- Treat low blood sugar with 8 to 15 grams fast acting sugar.
- Re-check blood sugar after 15 minutes. If >70mg/dl (3.9 mmol/L) follow with 10 to 15 grams of carbs without giving insulin.

If 70 to 100mg/dl (3.9 to 5.6 mmol/L):

- Treat low blood sugar with ½ dose (4 to 8 grams fast acting sugar), followed by 10 to 15 grams of carbs without giving insulin.

If 100 to 150mg/dl (5.6 to 8.3 mmol/L):

Give 10 to 15 grams of carbs without giving insulin.

If 151 to 250mg/dl (8.4 to 13.9 mmol/L):

- Do not treat blood sugar.
- Re-check blood sugar in 30 minutes.
- If blood sugar is less than 150mg/dl (8.3 mmol/L) and you are going to keep exercising, give 10 to 15 grams of carbs without giving insulin.

If 251 to 350mg/dl (13.9 to 19.4 mmol/L):

- Give ½ dose of insulin correction
- Check blood sugar in 45 to 60 minutes.
- If blood sugar is less than 150mg/dl (8.3 mmol/L) and you are going to keep exercising give 10 to 15 grams of carbs without giving insulin.

If above 351mg/dl (19.5 mmol/L):

- Check your urine for ketones right away.
- If ketones are negative and you do not have symptoms, give ½ dose correction and exercise.
- If ketones are present, do not exercise.
- If you cannot check your ketones, do not exercise.

What if my blood sugar is high after I exercise?

If you have a high blood sugar level after you exercise, only give $\frac{1}{2}$ of a correction dose. Exercise can make your insulin work better so your blood sugar levels may drop 1 to 2 hours later or 12 to 24 hours later.

When doing physical activity, make sure to always have extra supplies with you.

Make sure to have:

- Glucose meter
- Test strips
- Lancets
- Needles and insulin
- Alcohol swabs
- Glucose Tablets
- Juice
- Candy
- Snacks
- Glucagon



You should always have your everyday kit! When you exercise, you should have some extra items too.



SECTION 6 — Preparing for Emergencies

What is an everyday carry kit?

This is a kit that you can take with you when you leave your home. You can take it when you go to school, play sports, go to a friend's house, a party or go to a movie. You can take it when you do any other activity where you may need to check your blood sugar or give yourself insulin to prevent a low or a high blood sugar.

Being prepared is important. You never know when something you do not expect can happen. Having an everyday carry kit and an emergency kit can help.

What should I put in my every day carry kit?

An everyday kit needs to have a way to keep your insulin cool.

Put these in your carry kit even if you use a vial and syringe, pen or pump to manage your diabetes.

- Your glucose meter
- Test Strips
- Lancing device
- Needles and syringe
- Vial of short or rapid acting insulin
- You need to go to the ER if you cannot eat or drink fluids that have sugar.
- Alcohol swabs
- Lancets
- Glucose tablets in the small containers (You can buy the big ones just to refill the smaller one.)
- A breakfast bar, candy bar or easy little snack just in case
- Hand sanitizer in case you bleed

Put these in your carry kit, too, if you use an insulin pump. This is in case you have an issue with your pump and are not carrying another one to change it.

Carry juice boxes when:

- You are in a hurry to leave and know you are going to go low.
- You are not going to be home for most of a day, and are not sure when or what you will be eating for dinner.
- You are going out to do some exercise or play sports.



I know I need an emergency kit, too. What should go in it?

Talk with your diabetes team about what should go in this kit that will work best for you in an emergency. It will need to go in your fridge because of the insulin.

This kit is different from your everyday carry kit. But it does have some of the same things in it and more. An emergency kit should have everything you need to manage your diabetes for several days. Update your kit on a regular basis since supplies can expire. Replace any items you use as soon as you can.

Here is a sample emergency kit list:

- Blood sugar testing supplies:
 - Meter that uses batteries and not electricity
 - Batteries that you keep out of the meter so they do not go bad
 - Strips
 - Control solution
 - Lancets
 - Lancing device

- Fast-acting carb to treat low blood sugar like glucose tablets or hard candy
 - Extra snack like food bars
 - Glucagon emergency kit
 - A vial of short and a vial of long acting insulin and syringes
 - Diabetes identification card or jewelry
 - Emergency contact phone numbers

What if something happens and I cannot get insulin?

Sometimes something can happen where you cannot get insulin the way you usually do. This could happen during a natural disaster. You could have a change in health insurance or lose your insurance. No matter what the reason, you must have insulin!

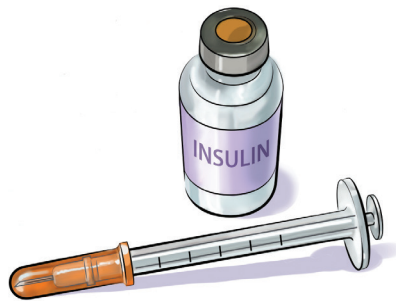
If this happens you need to get emergency insulin. The only type of insulin you will be able to get is Regular Insulin (short acting) and NPH Insulin (intermediate acting insulin). This insulin will come in vials and you will need to give yourself shots with a syringe.

In the event of a natural disaster, do not wait until you run out of insulin. Try to get to an emergency shelter, hospital, pharmacy or talk to emergency service staff. Let them know you have diabetes and need insulin. Being prepared for an emergency is so very important because you never know how long it can take before you can get the insulin you need. In natural disasters, the insulin is usually free of charge.

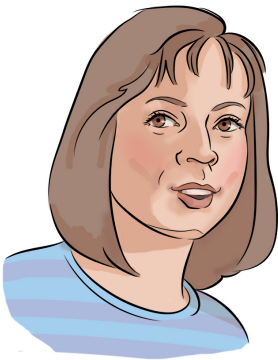
If you do not have insurance, you can buy Regular and NPH insulin at a pharmacy without a prescription. This may not be the best insulin to manage your diabetes long term, but it can keep you alive. The cost of the insulin can be different in each pharmacy. Walmart may be the cheapest pharmacy at \$25 per vial. Also, some clinics offer a medication assistance program. Check to see if your clinic does. If it does, ask for help getting insulin.

SECTION 7 — How Do I Travel with Type 1 Diabetes?

Being prepared is the most important point about travel. Bring at least twice as much as you think you need whether you use a pump, pens or shots.



It is a good idea to take extra supplies on a plane like insulin, syringes and snacks.

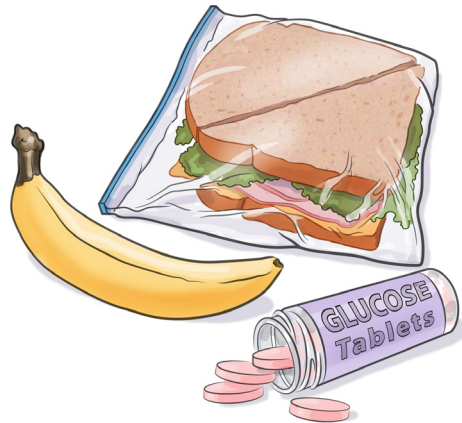


I feel safer having an insulin vial and syringes with me on the plane in case of emergency. One time my pump was not working right and I needed to give myself insulin shots.

What are some key travel tips?

- If you have a pump, always have rapid and long acting insulin with you. You need to be able to manage with or without the pump wherever you go.
- Always wear or carry some form of identification that says you have diabetes.
- Carry all your diabetes supplies and insulin in your carry-on bag, and not checked luggage. In case one bag gets lost, it would be best to carry it in two different bags.

- If you are traveling in the United States and run out of insulin or other supplies, in most cases your doctor can call in a prescription. You would need to give the doctor a local pharmacy phone number. If not, you can bring your diabetes supplies to a pharmacy to show them you have type 1 diabetes. They will sell you a vial of regular insulin without a prescription. This is not ideal, but at least it is insulin.
- Be sure to bring simple sugars to treat lows. Bring food, too. This is in case there are delays or you cannot get meals.



How do I fly on an airline with diabetes?

The TSA (airport security) makes the rules for flying with diabetes supplies. So, you can check their website for details at www.tsa.gov

Most of the time what they want is a prescription for insulin or needles that has your name on it. In most cases the box your insulin came in with a label on it works.

Often people bring a letter from their diabetes team that says they have diabetes and need to carry their diabetes supplies. This can be helpful.

Most of the time an insulin pump will not set off the metal detector. If they ask you about it, you can say that you have diabetes and are wearing a medical device.

What about travel to another country?

In many countries around the world insulin costs much less than in the United States. If you run out of insulin, go to a pharmacy and find out how to get more. You may or may not have to pay a fee to see a local doctor. But you can get insulin in nearly all big and often small cities around the world.

If you are not fluent in the language of the country you will be visiting, make a card or a note in your smart phone that says, “I have diabetes. I need sugar”. So, if you have a low blood sugar reaction and run out of sugar to treat it, you will be able to explain what you need.

If you need to find a hospital or doctor where they speak English, you can ask at the American Embassy.

SECTION 8 — What Laws Are There About Diabetes Care and Schools?

Federal law gives students the right to receive the diabetes care they need to be safe and participate in school activities just like any other child.

Schools are required to:

- Provide trained staff to monitor blood sugar levels as well as give insulin and glucagon
- Provide trained staff to give diabetes care during all school sponsored activities (this includes field trips, sports, dances, and more).
- Allow students who know how to manage their diabetes on their own anytime, anywhere

Schools are not allowed to:

- Make family members go to school to care for a student's diabetes
- Transfer students to a different school to get needed diabetes care
- Prevent students with diabetes from participating in field trips, sports and other school sponsored events

Some states have even stronger laws about diabetes care. The American Diabetes Association has an email and help line available. Call 1-800-DIABETES (1-800-342-2383) or go to askada@diabetes.org.

SECTION 9 – Conclusion

We hope that the information we have shared has helped you learn more about carb counting, treating low and high blood sugars, and how to prepare when you are sick or traveling. All these skills can help you manage your Type 1 diabetes better.

The control of my diabetes is in my hands!

That's right. The control of your diabetes is in your hands. When you control it, you can avoid many of the serious problems that can happen if your sugars stay too high or too low for too long.

How else can I learn to manage my diabetes better?

A great way to learn about diabetes management is from your diabetes team and other people. Your diabetes team may be able to suggest people you can talk to. Or you can look on-line to see what other people write about who have diabetes. Look at our resource section on page 43 for more information on diabetes.

I'm thinking of going to college. Is there support for college students with diabetes?

Yes. Many colleges have student groups that are part of the College Diabetes Network (CDN). The link is <https://collegediabetesnetwork.org>

Either way, I'm committed to taking care of my diabetes!

Congrats for committing to take good care of your diabetes. We know that it is not easy to treat Type 1 diabetes. We know you can do it, and do it well.

Keep up the good work!

APPENDIX 1 — Resources

In this appendix, we offer some resources that may help you. We have the information in this order:

- Organizations
- Carb Counting and Nutrition
- Insulin Pump Companies
- Insulin and Insulin Pens
- Diabetes Supplies and Medications

We have provided internet links. These are US based links so most information is in English. If a site is available in your language, we recommend using that link. To see the information in Spanish or other languages, try Google Translate. It does a pretty good job at changing the information into the language you wish. But, a computer program does this translation so it may not be accurate.

To use Google Translate go to <http://translate.google.com/manager/website/> and follow the step-by-step guide. This is free!

ORGANIZATIONS

AMERICAN ASSOCIATION OF DIABETES EDUCATORS (AADE)

(800) 338-3633

www.aadenet.org

This is a group of diabetes educators. This is their link for patient resources: <https://www.diabeteseducator.org/patient-resources>. Here they offer information for people with diabetes.

AMERICAN DIABETES ASSOCIATION (ADA)

(800) 342-2383

www.diabetes.org

Spanish link: http://www.diabetes.org/es/?loc=util-header_es

This is the biggest group of people with diabetes and diabetes professionals. It helps people with both Type 1 as well as Type 2 Diabetes. There are local chapters that you can contact for help or to volunteer. They also have an online store to buy books, gifts and other helpful items.

ACADEMY OF NUTRITION AND DIETETICS

(800) 877-1600

www.eatright.org

This is a site for information about food and nutrition.

CHILDREN WITH DIABETES

www.childrenwithdiabetes.com

This started as a group having mostly to do with children with diabetes. Now it includes young adults as well as parents of people with Type 1 Diabetes.

It is a good site to learn about many tools and resources for people with Type 1 Diabetes.

CLINICAL RESEARCH STUDIES WEBSITE

clinicaltrials.gov

This site lists all the clinical research studies that are in process in the United States. You can do a search using the key words “Type 1 Diabetes” if you want to find those research studies.

DIABETES MINE

www.healthline.com/diabetesmine

This is a blog about Type 1 Diabetes. It has been around for many years and is very helpful. A woman who has Type 1 Diabetes started it. It shares many people’s experiences and advice.

DIABETES SISTERS

www.diabetessisters.org

This is a group for women with diabetes, mostly Type 1. They share ideas and experiences.

DIABETIC DANICA

www.facebook.com/DiabeticDanica

Danica is a kind young woman with Type 1 Diabetes. She makes YouTube videos about having Type 1 Diabetes and how to use diabetes devices. These videos can be helpful.

DIABTRIBE

www.diatrIBE.org

DiatrIBE is a non-profit organization. It evaluates and comments on new approaches and treatments for diabetes, both Type 1 and Type 2.

GLU

www.myglu.org

GLU is the largest interactive on-line network for people with Type 1 Diabetes as well as their care givers and family members. The nonprofit Helmsley Charitable Trust funds it.

It offers excellent advice and information about Type 1 Diabetes. You can also connect with others who have the same questions and concerns about diabetes as you do.

JDRF

www.jdrf.org

This used to be the Juvenile Diabetes Research Foundation. It was started to help do research on Type 1 Diabetes. Now it helps people living with Type 1 Diabetes as well as funds research. There are local JDRF offices that may be helpful to you.

TRIAL NET

www.diabetestrialnet.org

This is a group of researchers who work on preventing and treating early Type 1 Diabetes. Contact your local Trial Net site for screening risk of new onset Type 1 diabetes for yourself or family members.

TUDIABETES

www.tudiabetes.org

Spanish link: <http://www.estudiabetes.org>

This is a large on-line group of people with both Type 1 and Type 2 Diabetes. They share concerns and ideas in Spanish about living with diabetes.

CARBOHYDRATE (CARB) COUNTING AND NUTRITION RESOURCES

CALORIE KING

www.calorieking.com

This offers information on foods, carbs, calories and more.

CARBS AND CALS

www.carbsandcals.com

This offers books and a \$5 App that gives pictures of foods and their carb count.

THE DIABETES CARBOHYDRATE AND FAT GRAM GUIDE

(The American Diabetes Association)

This guide has quick, easy meal planning using carbohydrate and fat gram counts. You can buy it on many shopping websites like Amazon, Barnes and Noble and the American Diabetes Association online store. www.store.diabetes.org

THE DOCTOR'S POCKET CALORIE, FAT & CARBOHYDRATE COUNTER

(949) 642-1993

Family Health Publications publish this. You can buy it on many shopping websites like Amazon and Barnes and Noble and the calorie king online store at www.calorieking.com.

FIGWEE

www.figwee.com

This is an iPhone App for \$2.99 that gives pictures of many different foods along with their carbohydrate count.

NUTRITION IN THE FAST LANE

(Franklin Publishing)

(800) 643-1993

www.fastfoodfacts.com

This book has nutrition information for 60 of the most common restaurants in the United States.

NUTRITION AND DIABETES

(International Diabetes Center)

(888) 637-2675

www.idcpublishing.com

This web site has books for sale in English and Spanish for \$3 on nutrition and diabetes.

INSULIN PUMP COMPANIES

These websites give you lots of information about their pumps. They also offer on-line lessons about how to use their pumps.

It can be very useful to look at these sites. You can learn about pumps. You can review how to use the pump you have as well.

ACCU-CHECK PUMPS: ROCHE DIAGNOSTICS

(800) 280-7801

www.accu-checkinsulinpumps.com

This site provides information on the Accu-check Spirit pump.

ANIMAS PUMPS: ANIMAS CORPORATION

(877) 937-7867

www.animas.com

These pumps include the Animas Ping and Animas Vibe.

OMNIPOD PUMPS: INSULET CORPORATION

(800) 591-3455

www.myomnipod.com

This site shares about the Omnipod system. It also gives you the option to try a demo Omnipod pump.

MINIMED PUMPS: MEDTRONICS, INC.

(800) 646-4633

www.medtronicdiabetes.com/home

This is the site for all the MiniMed Medtronic devices.

TSLIM PUMPS: TANDEM DIABETES CARE

(858) 366-6900

www.tandemdiabetes.com

This site describes the features of the TSlim pump.

INSULIN AND INSULIN PENS

SHORT ACTING INSULIN (REGULAR INSULIN) AND INTERMEDIATE ACTING INSULIN (NPH)

These are the oldest and lowest cost types of insulin. They are Regular insulin (short acting) and NPH insulin (intermediate acting insulin).

There are different names for these kinds of insulin including Novolin R, Humulin R, and others. Often these insulins come in vials. But sometimes they come in pens.

www.humulin.com/other-humulin-products.aspx

This offers information on Humulin Regular and NPH insulin as well as 70/30.

Novolin Regular and NPH do not have a website in the U.S. but you can buy them here.

www.diabetesselfmanagement.com/blog/relion-insulin-and-other-products-at-walmart

ReliOn Regular and NPH insulin come in vials. They are part of Walmart's low cost selection of diabetes supplies and products.

RAPID ACTING INSULIN

Apidra (Glulisine) made by Sanofi

www.apidra.com

These come in vials and pens.

Humalog (Lispro) made by Lilly Pharmaceuticals

www.humalog.com/index.aspx

These come in both disposable and refillable pens as well as vials.

Novolog (Aspart) made by Novo Nordisk

www.novolog.com

These come in both disposable and refillable pens as well as vials.

LONG ACTING INSULIN

Biosimilar Glargine

www.basaglar.com

This is a copy of the insulin known as glargine (U100 Lantus). It acts in a similar way and costs somewhat less. It is a long acting basal insulin.

U100 Lantus or Glargine insulin

www.lantus.com

This comes in vials and pens. It is a long acting basal insulin.

U300 Lantus or Glargine insulin

www.toujeo.com

This concentrated Lantus (glargine) insulin acts longer than U100 glargine. It only comes in a pen.

Levemir or Detemir insulin

www.levemir.com

Levemir comes in pens and vials. It is a long acting insulin but it is somewhat shorter acting than Lantus, Degludec or Toujeo.

Tresiba or Degludec insulin

www.tresiba.com

This is the very longest lasting basal insulin. It only comes in pens. It comes in two strengths: U100 and U200.

Glucagon Pens

www.lillyglucagon.com

This is the site for the Lilly brand of glucagon.

www.cornerstones4care.com/tracking/what-to-know/glucagen.html

This is the website for the Glucagon Kit which is the Novo-Nordisk brand of glucagon.

DIABETES SUPPLIES AND MEDICATIONS

CASES FOR INSULIN

www.frioinsulincoolingcase.com

These cases keep insulin cool and are easy to carry.

www.myabetic.com

These are carrying cases for insulin and supplies.

GLUCOSE TABLETS

www.dex4.com

These are one type of glucose tablet on the market. Many pharmacies have their own generic brands. You can look for a type of glucose tablet that you think tastes the best. But be warned, these do not taste like candy.

PEN NEEDLES

www.novonordisk.com/patients/diabetes-care/insulin-pens-and-needles.html

These are insulin pens and needles made by Novo-Nordisk.

PEN NEEDLES AND INSULIN SYRINGES

www.bd.com/diabetes

BD makes many diabetes products. They include syringes, pen needles and insulin infusion sets. BD offers very helpful educational information.

WEBSITE FOR COMPARING THE LOCAL COSTS OF MEDICATIONS

www.GoodRX.com

This is a good free App for finding the best prices for your medications. You enter the medication you are looking for and your location. Then it tells you the cost of it at your nearby pharmacies. It also gives you discount coupons.

APPENDIX 2 – Glossary of Diabetes Terms

In this glossary, we list and define key words that have to do with diabetes. You can use this to look up words you want to learn more about.

A1c

This is also:

- HbA1c
- Hemoglobin A1c
- Glycosylated hemoglobin

It is a blood test. The test can be a finger stick or blood taken from your vein. It tells you what your average blood sugar has been over the past three months. It does this by measuring the percentage of red blood cells in your body that have glucose stuck to them.

In most cases, normal A1c levels are 4% to 5.6%. The goal is to have your A1c as close to normal as possible, without having too many low blood sugar reactions. Your diabetes team will help you figure out what is the best target for you.

Be sure to do this test as often as your diabetes team orders it, about every 3 months.

Antibodies

These are proteins the body makes to protect itself from outside threats. These threats can include bacteria or viruses.

People get type 1 diabetes when their antibodies destroy the body's own beta cells that make insulin.

Aspart

This is the generic name of one kind of rapid-acting insulin. The branded (trade) name for aspart is Novolog. See rapid-acting insulin for more information.

Apidra

This is a branded (trade) drug name of one kind of rapid-acting insulin. The generic name for Apidra is glulisine. See rapid-acting insulin for more information.

Autoimmune disease

This is a disease caused by a problem in the body's immune (infection fighting) system that causes an attack on the body itself, rather than an infection. Type 1 diabetes is this kind of disease.

Basaglar

This is a brand drug name of one kind of basal insulin. The generic name for Basaglar is glargine. This long-acting basal insulin drug comes in one strength written as U100. See basal insulin and long-acting insulin for more information.

Basal insulin

You give this insulin with a shot once or twice a day. In most cases this insulin is only for patients on multiple daily shots. Basal insulin comes in different strengths shown as U100, U200 and U300. There are two types of basal insulin, long-acting insulin and intermediate acting insulin. See long-acting insulin and intermediate acting insulin for more information.

Basal insulins are:

Generic name	Brand name
NPH U100	Humulin (N) or Novolin (N) or ReliOn (N)
Degludec U100	Tresiba U100
Degludec U200	Tresiba U200
Detemir U100	Levemir
Glargine U100	Lantus or Basaglar
Glargine U300	Toujeo

Basal rate

Your body needs insulin on an ongoing basis even when you are not eating. The basal rate is the amount of insulin you need to give by shots or with an insulin pump. When the basal rate or basal insulin dose is set just right, the blood sugar does not go high or low when you are not eating.

For those using a pump, basal rates are in units per hour. You may see units per hour written as units/hour or u/hr. Typical rates are between 0.4 u/hr. and 1.6 u/hr. If you are using shots, you give yourself basal insulin doses in daily units, such as 15 units or 20 units. Your diabetes team will tell you what your basal doses should be.

Beta cells or β -cells

Beta cells or β -cells are cells that make insulin.

These cells are in the part of the pancreas called the Islets of Langerhans. See Cells for more information.

Blood glucose (BG) or Blood sugar

Blood glucose is also blood sugar.

This is the main sugar that is in the blood. This sugar is the body's main source of energy.

Bloodstream

The blood flowing through the circulatory system in the living body.

Blood sugar level

This means how much sugar is in the blood.

Blood sugar levels are measured in the U.S. in milligrams per deciliter, or mg/dl. In other countries, in milimoles, or mmol/l.

A normal range (for someone without diabetes) is about 70 to 100 mg/dl (3.9 to 5.6 mmol/L) before breakfast and below 140 mg/dl (7.8 mmol/L) after meals.

Blood sugar meter

This is a small, portable machine. People with diabetes use it to check their blood sugar levels.

After pricking the skin with a lancet, you place a drop of blood on a test strip. The test strip is placed in the machine. Then the meter, or monitor, shows the blood sugar level as a number on the digital display.

Blood sugar monitoring

This means checking your blood sugar level on a regular basis to manage diabetes.

You need a blood sugar meter or blood sugar test strips that change color when a drop of blood touches them. This is so you can check your blood sugar often.

Bolus

This is a burst of short or rapid acting insulin. It acts over a short period.

Most often, a bolus is to offset the blood sugar rise that happens after eating or drinking carbohydrates. It is also a correction dose to bring down a high blood sugar level back to normal.

The insulins for this are:

Generic name	Brand name
Insulin Regular	Humulin (R) or Novolin (R) or ReliOn (R)
Lispro	Humalog
Aspart	NovoLog
Glulisine	Apidra

Cannula

This is a small and flexible tiny piece of tubing. It stays under the skin once you remove the needle from the infusion set of an insulin pump.

Carbohydrate or Carb

Carbohydrates are also called carbs. Carbohydrates are one of the three main parts in foods:

1. Carbs
2. Fats
3. Proteins

They are the most important part of foods to control sugar. Carbohydrates are mainly sugars and starches. They have four calories per gram.

Carb bolus

This is a spurt of insulin that gets sent out quickly in the body to match carbs you are about to eat in a meal or snack. Most people use between 1 unit of rapid acting insulin for each 5 grams of carbs up to 1 unit for each 25 grams of carbs.

Carb counting

This means counting the grams of carbs in any food you eat or liquid you drink. This is a useful way to find out the amount of insulin you need to keep a normal blood sugar.

Carb factor or Carb Ratio or Insulin-to-carb ratio

This is the number of grams of carbs that one unit of insulin covers for a person. This varies from person to person. Your diabetes team will tell you your ratio.

Catheter

This is also pump tubing. Insulin goes through this plastic tube from the pump to the insertion set of a pump.

Cells

Cells are the smallest units of life. They are basic building blocks for all known life forms. Cells make up the parts of your body, like your skin, bones, heart, liver, or lungs. A person has over 10 trillion cells in their body.

Certified diabetes educator (CDE)

This is a health care professional with expertise in diabetes education. Trained and certified.

Continuous subcutaneous insulin infusion (CSII) or Insulin pump

CSII is the formal name for an insulin pump. See Insulin pump for more information.

Coma

This is a sleep-like state where a person is not conscious. Very high or very low blood sugar in people with diabetes can cause a coma.

Continuous glucose monitor (CGM)

A system consisting of a sensor, transmitter and receiver which determines subcutaneous or under the skin glucose levels every 1 to 5 minutes.

Correction bolus

A spurt of short or rapid acting insulin sent out quickly in the body. It is to bring a high blood sugar level back within a person's target range before a meal, after a meal, or at bedtime.

Correction factor or Insulin sensitivity factor

This is the fall in blood sugar level that one unit of insulin will produce. It is set by your diabetes team. It is often in the range of 25 to 75 but can be more or less depending on what your body needs.

A correction factor of 50 is used as a starting point. This means that 1 unit of insulin will lower your blood sugar by 50 mg/dl (2.8 mmol/L). For instance, if your correction factor is 50 and your blood sugar is 200 mg/dl (11.1 mmol/L), you expect that giving 1 unit of insulin will lower your sugar by 50 points. Which means that after 1 unit of insulin, the blood sugar will fall from 200 mg/dl (11.1 mmol/L) to 150 mg/dl (8.3 mmol/L).

Dehydration

This is when a person does not have enough water in their body. This can come from drinking too little fluid. It can also come from losing too much body fluid when a person pees or urinates often, sweats, has diarrhea or vomiting.

Delayed-onset hypoglycemia

A drop in blood sugar levels that can happen many hours after intense exercise.

Diabetes team

A group of people who help you take care of your diabetes. You are the most important member of your team. The other people on your team can be:

- Doctor
- Nurse or nurse practitioner or physician assistant
- Diabetes educator
- Dietitian or diabetes educator
- Social worker
- Psychologist
- Eye doctor

These people are part of your diabetes team. Each one of them can help you take better care of your diabetes.

Diabetic coma

This is when a person with diabetes is not conscious and is in a sleep-like state. Very high or very low blood sugar in people with diabetes can cause this.

Diabetic ketoacidosis (DKA) or Ketoacidosis

This is a very serious condition where the body does not have the insulin it needs. This results in dehydration and the buildup of acids in the blood. This needs to be treated in the hospital. It is life-threatening.

Dietitian

A health care professional who tells people about meal planning, carb counting, weight control and diabetes management. A registered dietitian (RD) has more training. Dietitians can also be diabetes educators.

Degludec

This is a generic drug name of one kind of basal insulin. The brand name for degludec is Tresiba. This long-acting basal insulin drug comes in two strengths written as either U100 or U200. See basal insulin and long-acting insulin for more information.

Detemir

This is a generic drug name of one kind of basal insulin. The brand name for detemir is Levemir. This long-acting basal insulin drug comes in one strength written as U100. See basal insulin and long-acting insulin for more information.

Endocrinologist

A doctor with the title MD or DO trained to treat diseases related to glandular problems. This includes diabetes.

Exchange lists

These lists are one of the ways for people with diabetes can plan meals. The lists have different types of food and show the amount carbs, proteins and fats in a serving size. Knowing this information helps you know how much insulin you will need if you eat that food.

Extended bolus

The insulin pump sends out a bolus over a fixed period set by the patient. For example, the pump could be set to give the bolus dose over 2 or 3 hours instead of right away. In most cases, the pump gives the bolus right away. This is a way to give insulin over a longer period, which is good for foods that the body absorbs more slowly, such as foods with a lot of fat in them.

Fasting

This means not eating food or drinking any fluids except water.

Fasting plasma glucose (FPG) test

A lab test that people take after fasting for 8 to 10 hours. In most cases, people fast overnight and take the FPG test in the morning.

An FPG level of less than 100 mg/dl (5.6 mmol/L) is normal. A level of 100 to 125 mg/dl (5.6 to 6.9 mmol/L) means prediabetes. A level of 126 mg/dl (7.0 mmol/L) or more means a person likely has diabetes. When a level is over 126 mg/dl (7.0 mmol/L), there will be more tests to confirm if the person has diabetes.

Fats

Fats are one of the three main parts of foods along with carbohydrates and protein. Fats occur alone as liquids or solids. This includes oils and margarines. They also can be a part of other foods.

Fats come from animals, veggies, nuts or seeds. Fats have 9 calories per gram.

Fiber

A kind of carb that passes through the digestive system intact. It does not raise blood sugar levels. It comes from plants.

Fiber adds bulk to your diet. It is very important for keeping your intestines healthy.

Food bolus

A dose of insulin that a person with diabetes takes before meals or snacks. This is to cover the expected rise in blood sugar from the food. Often, food boluses match the amount of carbohydrates in the food.

Glargine

This is a generic drug name of one kind of basal insulin. The brand name for glargine is Lantus or Basaglar or Toujeo. This long-acting basal insulin drug comes in two strengths written as either U100 or U300. See basal insulin and long-acting insulin for more information.

Glucagon—the hormone

This is a hormone. The alpha cells make it in the Islet of Langerhans in the pancreas. This hormone raises blood sugar levels. The opposite hormone to insulin that lowers blood sugar levels. In people without diabetes, the glucagon and insulin work together, to keep blood sugars normal. In people with diabetes, not enough glucagon is made to keep the blood sugars normal so they can fall too low.

Glucagon—the medication

Glucagon is given as a shot to help raise your blood sugar level. It is something that another person would give you if you were having a low blood sugar reaction and were not able to eat or drink sugar to bring it back up. The shot raises the blood sugar quickly. It does this by releasing sugar that is stored in the liver.

Glucagon emergency kit

A kit that has glucagon and a syringe. It is used to treat severe low blood sugar. Glucagon is a hormone that quickly increases blood sugar.

You need a prescription to get glucagon. It is a shot that someone else must give you. You should always have a glucagon kit at home, just in case. Be sure the one you have is not expired.

Glucose

A simple sugar that is in the blood. The body uses glucose for energy.

Glucose tablets

These are tablets that you chew and swallow. They are made of pure glucose. People take them to treat low blood sugar.

Glulisine

This is a generic drug name of one kind of rapid-acting insulin. The trade name for glulisine is Aprida. See rapid-acting insulin for more information.

Glycemic index (GI)

This is a method to classify foods, most of all carbs. The Index is based on how much the blood sugar level goes up after eating the certain food.

Glycogen

When you eat, carbohydrates they turn into a form of sugar called glycogen. This is a storage form of glucose in your liver and muscles. The glycogen is stored in your liver and muscles. When you have a low blood sugar, fast, or exercise, the glycogen turns into glucose and is release into the blood stream when you need it.

Gram

This is a small unit of weight in the metric system. People with diabetes use grams to weigh food.

Hormone

This is a chemical substance made by a gland or tissue. The blood carries it to other cells in the body. There, the hormone attaches to cells and causes them to do a certain job. For instance, when insulin attaches to a muscle cell it lets sugar go inside the cell. This is described as a “lock and key” effect. The hormone is the key and the cell is the lock. When the hormone insulin attaches to the cell, it opens the door and let’s sugar inside.

Insulin and glucagon are hormones.

Humulin [N]

This is a brand drug name of one kind of intermediate-acting insulin. The generic name for Humulin [N] is NPH. See intermediate-acting insulin for more information. It is a cloudy insulin.

Humulin [R]

This is a brand drug name of one kind of short-acting insulin. The generic name for Humulin [R] is Insulin Regular. See short-acting insulin for more information.

Humalog

This is a brand drug name of one kind of rapid-acting insulin. The generic name for Humalog is lispro. See rapid-acting insulin for more information.

Hyperglycemia or High blood sugar

This is when a person has a higher than normal level of sugar in the blood. In most cases, this means a blood sugar level of more than 180 mg/dl (10.0 mmol/L).

Hypoglycemia or Low blood sugar or Insulin reaction

This is when a person has a lower than normal sugar level in the blood. In most cases, this means a blood sugar level of less than 70 mg/dl (3.9 mmol/L).

Symptoms can vary. They can include feeling confused, nervous, shaky, drowsy or moody. They can also include sweating, headaches or numbness in the arms and hands.

If it is not treated, severe low blood sugar can cause loss of consciousness, convulsions, or even death.

Infusion set

This is part of an insulin pump. This set transfers insulin from the pump through an infusion line to below the skin. The set includes the tubing, tubing connector, insertion set, cannula and adhesive.

Infusion site or Insertion site

This is the area on the body where someone who uses an insulin pump inserts the cannula or needle.

Injection or Shot

This is when someone inserts liquid medication or nutrients into the body with a syringe. A person with diabetes injects insulin just under the skin, into what is subcutaneous tissue. Subcutaneous means below the skin.

Injection sites

These are places on the body where people most often inject insulin.

Injection site rotation and Infusion site rotation

The place you change on the body where you inject insulin or put the infusion sites. When you rotate, it prevents lipodystrophy. This means an abnormal build-up of fat under the skin.

Insertion set

The part of the infusion set that a person inserts through the skin. It may be a thin or a large metal needle. When the person removes the needle, it leaves a small Teflon catheter or cannula under the skin.

Insulin

This is a hormone made by beta cells in the Islet of Langerhans in the pancreas. The body sends out insulin when blood sugar levels go up, for instance after eating a meal. Its job is to lower blood sugar levels to normal.

Insulin lets sugar go into cells. Sugar gives your cells the energy to live. Without insulin, the sugar stays on the outside of the cells and goes up to very high levels in the blood. Without insulin, you would die because your cells would have no energy to live.

When your body cannot make its own insulin, there are different types for insulin drugs you can take. Your diabetes team will figure out the best insulin for you. The table below explains about the different types of insulin. You can also look up the types and names of insulin in this glossary for more information.

Generic Name (Brand Names)	Onset — Time for insulin to reach blood- stream	Peak — Period when insulin is most effective	Duration — How long the insulin works
RAPID-ACTING INSULIN			
Lispro (Humalog)	About 15 to 30 minutes	About 30 to 90 minutes	About 3 to 5 hours
Aspart (Novolog)	About 15 to 30 minutes	About 30 to 90 minutes	About 3 to 5 hours
Glulisine (Apidra)	About 15 to 30 minutes	About 30 to 90 minutes	About 3 to 5 hours
SHORT-ACTING INSULIN			
Insulin Regular [R] (Humulin [R], Novolin [R] or ReliOn [R])	About 30 minutes to 1 hour	About 2 to 5 hours	About 5 to 8 hours
INTERMEDIATE-ACTING INSULIN AND CALLED A BASAL INSULIN			
NPH [N] (Humulin [N], Novolin [N] or ReliOn [N])	About 1 to 2 hours	About 4 to 12 hours	About 18 to 24 hours
LONG-ACTING INSULIN AND CALLED A BASAL INSULIN			
U100 Glargine (Basaglar or Lantus)	About 1 to 1 and a half hours	Maybe slight peak at 12 hours in some people; no peak time in others	About 20 to 24 hours
U300 glargine (Toujeo)	About 1 to 1 and a half hours	No peak	About 28 to 36 hours
Detemir (Levemir)	About 1 to 2 hours	About 6 to 8 hours	Up to 24 hours
Degludec (Tresiba)	About 30 to 90 minutes	No peak time	About 42 hours
PRE-MIXED INSULIN			
	About 30 minutes	About 2 to 4 hours	About 14 to 24 hours
50% NPH/50% regular insulin Humulin 50/50	About 30 minutes	About 2 to 5 hours	About 8 to 24 hours
70% long acting/30% rapid acting insulin Novolog 70/30	About 10 to 20 minutes	About 1 to 4 hours	Up to 24 hours
75% long acting/25% rapid acting insulin Humalog mix 75/25	About 15 minutes	About 30 minutes to 2 and a half hours	About 16 to 20 hours

Insulin adjustments

A change in the amount of insulin a person with diabetes takes. Based on factors like meal planning, activity levels and blood sugar levels.

Insulin pen

A device that injects insulin. It looks like a pen for writing.

There are two kinds of insulin pens:

1. Prefilled pen with insulin that is disposable
2. Reusable pen that holds replaceable cartridges of insulin

To inject the insulin under the skin, you need to screw on a needle to the top of the pen.

Insulin pump

This is a small machine about the size of a small cellphone. It is computerized. You can program it to deliver a constant amount of basal insulin and give a bolus of insulin for a meal or high blood sugar. It takes the place of insulin shots.

A pump sends out fast-acting insulin through a plastic catheter, or tube. A Teflon infusion set or a small metal needle connects to the tube. You insert the set or small needle through the skin. The body gradually absorbs the insulin into the bloodstream.

Insulin Regular

This is a generic drug name of one kind of short-acting insulin. The brand name for insulin Regular is Humulin [R], Novolin [R], or ReliOn [R]. See short-acting insulin for more information.

Insulin sensitivity

This is a term to describe how the body reacts to insulin. Everyone reacts differently whether your body is making its own insulin or you must get insulin by shots or a pump. If a person is sensitive to insulin, it means that a smaller amount will lower the level of sugar in the blood. If a person is not sensitive to insulin it means she or he will need more insulin to lower the level of sugar in the blood. When a person needs more insulin to lower blood sugar, they are more resistant to insulin.

Insulin-to-carb ratio

A formula you use to match the dose of insulin to the amount of carbs you eat and drink.

Intermediate-acting insulin

This is a type of basal insulin. It controls blood sugar for about half the day or overnight. This insulin starts working in about 1 to 2 hours. It works best in your body at 4 to 12 hours and then starts fading. How it works is different for each person.

NPH is the generic name of the drug. Humulin [N], Novolin [N], or ReliOn [N] are brand names.

This insulin looks cloudy. You can mix it with regular or rapid-acting insulin in a syringe. See basal insulin, regular insulin and rapid-acting insulin for more information.

Islets of Langerhans

Small islands of cells scattered throughout the pancreas that make hormones. They have beta-cells, which make insulin and alpha cells which make glucagon. Other cells include delta cells, PP cells and Epsilon cells which make other hormones.

Ketoacidosis—See Diabetic ketoacidosis

Ketones

The body releases these acids when body fat breaks down.

Ketones can build up to dangerous levels in the absence of insulin. This is because the body is not able to break down sugar as fuel.

A urine or a blood test can measure them. A urine dip stick is usually used.

Lancet

A spring-loaded device that you use to prick the skin with a small needle. You do this to get a drop of blood to check your blood sugar.

Lipodystrophy

This is when the fat tissue below the skin becomes swollen, hard or forms dimples. It also limits the body from absorbing insulin if you inject in that area.

Giving yourself many shots into the same area of skin or putting the pump cannula in the same site time after time often causes this.

Lantus

This is a brand drug name of one kind of basal insulin. The generic name for Lantus is glargine. This long-acting basal insulin drug comes in one strength written as U100. See basal insulin and long-acting insulin for more information.

Levemir

This is a brand drug name of one kind of basal insulin. The generic name for Levemir is detemir. This long-acting basal insulin drug comes in one strength written as U100. See basal insulin and long-acting insulin for more information.

Lispro

This is a generic drug name of one kind of rapid-acting insulin. The brand name for lispro is Humalog. See rapid-acting insulin for more information.

Long-acting insulin

This type of basal insulin controls blood sugar consistently for an entire day or longer. After injecting, it begins working many hours and can stay in the bloodstream up to 42 hours. How long it works can be different for different people. It may start weakening a few hours earlier for some, while it may work a few hours longer for others. It comes in different strengths shown as U100, U200 and U300.

See basal insulin to learn more.

Long-acting insulins are:

Generic name	Brand name
Degludec U100	Tresiba U100
Degludec U200	Tresiba U200
Detemir U100	Levemir
Glargine U100	Lantus or Basaglar
Glargine U300	Toujeo

Medical insurance or health insurance

This is a plan that a person signs up for that pays for some or all the costs of medical and surgical care. These plans differ from state to state. Sometimes people must buy their own insurance. Other times they get it from their job or the government. Government plans include Medicare and Medicaid. In some states, the plan may have its own name. For instance, in California it is Medi-Cal.

Multiple daily injections (MDI)

This is a schedule where you give yourself many insulin shots each day. In most cases, you use a long-acting insulin along with shots of rapid-acting insulin before each meal or snack. Some people also use intermediate-acting insulin. See long-acting, intermediate-acting and rapid-acting insulin for more information.

Novolin [N]

This is a brand drug name of one kind of intermediate-acting insulin. The generic name for Novolin [N] is NPH. See intermediate-acting insulin for more information. It is a cloudy insulin.

Novolin [R]

This is a brand drug name of one kind of short-acting insulin. The generic name for Novolin [R] is Insulin Regular. See short-acting insulin for more information.

NPH

This is a generic drug name of an intermediate-acting insulin. The brand names for NPH are Humulin [N], Novolin [N] or ReliOn [N]. See intermediate-acting insulin for more information.

Occlusion

The infusion set or infusion site clogs or blocks. This can stop or slow insulin delivery.

In most cases, an occlusion happens when the cannula gets pinched, kinked or dislodged. The cannula blocks when insulin crystals form.

An occlusion can be partial. That means it only reduces, but does not stop the flow of insulin. Or it can be complete. That means no insulin gets through the tubing.

Pancreas

This gland is near the stomach. It is deep in the center of the body. It releases insulin and other hormones. It also releases digestive enzymes.

Pharmacist

This health care professional prepares and gives medicine to people. She or he also gives information on medicines.

Pre-mixed insulin

In most cases, people with diabetes take these two or three times a day before a meal. They are insulins where a shorter and longer acting insulin mixed. In most cases, they look cloudy. The numbers after the name describe how much long-acting and short-acting insulin is in the mix. They have many names, including:

- Humulin 70/30 (70% long acting/30% short acting insulin)
- Novolin 70/30 (70% long acting/30% short acting insulin)
- Novolog 70/30 (70% long acting/30% rapid acting insulin)
- Humulin 50/50 (50% long acting/50% short acting insulin)
- Humalog mix 75/25 (75% long acting/25% rapid acting insulin)

Proteins

These are one of the three main parts of foods along with carbohydrates and fats. Proteins are made of amino acids. Foods like milk, meat, fish, and eggs have protein.

The body burns proteins more slowly than fats or carbohydrates. There are four calories per gram of protein.

Rapid-acting insulin

If you give yourself shots, you will give both long-acting insulin and short or rapid-acting insulin. The rapid-acting insulin covers insulin needs for meals. You give yourself a shot at the same time you eat.

If you use a pump, you only use rapid acting insulin. The pump gives out rapid-acting insulin in small amounts on an ongoing basis. You also program your pump to give you a bolus of insulin for meals. See long acting insulin and bolus for more information.

Rapid acting insulins are:

Generic name	Brand name
Lispro	Humalog
Aspart	Novolog
Glulisine	Apidra

Reservoir, syringe, cartridge

This container holds the fast-acting insulin inside a pump.

Self-management

In diabetes, this means the ongoing process of managing diabetes. It includes when you:

- Plan meals
- Plan physical activity
- Check blood sugar
- Take diabetes medicines
- Handle diabetes when you are sick
- Handle low and high blood sugar
- Manage your diabetes on trips

People with diabetes design their own self-management treatment plan. They do this with the support of their diabetes team. This includes doctors, nurses, dietitians, pharmacists and others.

Sensitivity factor

This is the amount that a single unit of insulin lowers the blood sugar level in a person. Often this is first set at 50. But based on how a person reacts to insulin it can change.

A lower number, such as 25, means that the person is less sensitive to insulin. A higher number, such as 75, means that the person is more sensitive to insulin.

Sharps container

This is a container where you get rid of used needles and syringes. It is often made of hard plastic so that needles cannot poke through.

Self-monitoring of blood glucose (SMBG)

This is when you check your blood sugar with a blood sugar meter.

Short-acting insulin

Short-acting insulin covers insulin needs for meals. You give yourself a shot about 30 minutes before you eat. Short-acting insulin brand names are Humulin [R], Novolin [R] or ReliOn [R]. The generic name is regular insulin.

Starch

This is a type of complex carbohydrate. Some examples are bread, pasta and rice.

Sugar

A kind of carbohydrate that most often has a sweet taste. This includes glucose, fructose and sucrose. In the diabetes world, the word sugar is often used instead of glucose. Blood glucose and blood sugar mean the same thing.

Sugar alcohol

This is a sugar substitute. It has simple sugars with an alcohol molecule attached to them. This lowers the calorie content. It also delays the effect on blood sugar levels.

Syringe

This is a device used to inject medication or other liquids into body tissues. The syringe for insulin has a hollow plastic tube with a plunger inside. It also has a needle on the end.

Team management

This is an approach to treat diabetes where a team provides medical care. See Diabetes team for more information.

Total daily dose (TDD)

The total amount of insulin a person uses in a day. It means adding all the insulin doses: faster and slower acting insulin together. You use the TDD to help figure out the basal rate, carb factor and correction factor.

Tresiba

This is a brand drug name of one kind of basal insulin. The generic name for Tresiba is degludec. This long-acting basal insulin drug comes in two strengths written as either U100 or U200. See basal insulin and long-acting insulin for more information.

Toujeo

This is a brand drug name of one kind of basal insulin. The generic name for Toujeo is glargine. This long-acting basal insulin drug comes in one strength written as U300. See basal insulin and long-acting insulin for more information.

Type 1 Diabetes

In Type 1 Diabetes, the pancreas makes little or no insulin. This is because the beta cells in the body that make insulin are destroyed.

It is an autoimmune disease. This is caused by a defect where the body's internal defense system attacks a part of the body itself.

Most often, this type of diabetes appears suddenly. It is more common in people younger than 30. But it can appear at any age.

The ways to treat it are:

- Give daily insulin shots or use an insulin pump
- Count carbohydrates
- Exercise regularly
- Self-monitor blood sugar levels each day through finger sticks or by using a continuous glucose monitoring (CGM).

Units of insulin

This is the basic measure of insulin. U-100 insulin means 100 units of insulin per milliliter (mL) or cubic centimeter (cc) of solution.

It is a way to describe the concentration of insulin. In the United States, there are U100, U200, U300 and U500 insulins.