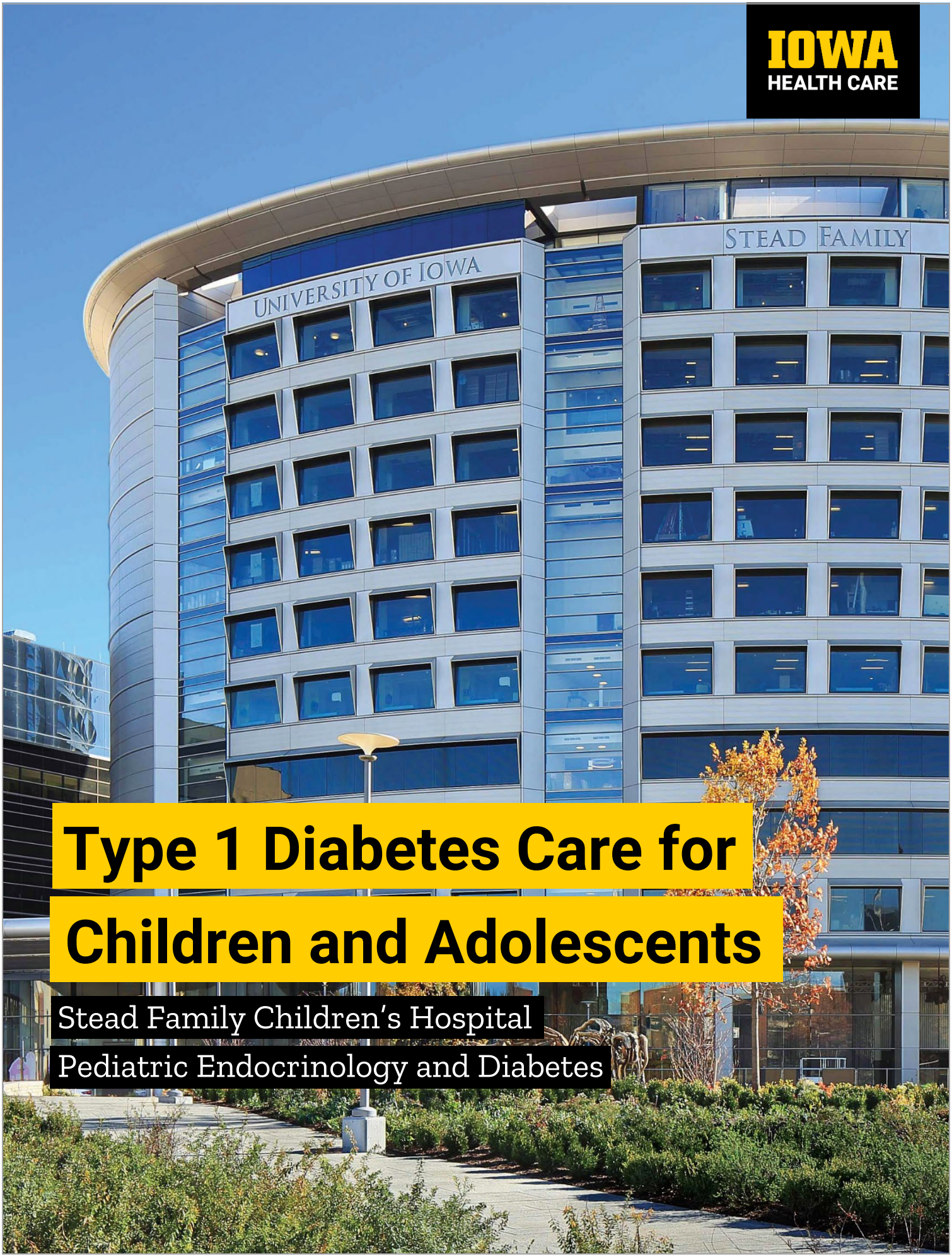

Type 1 Diabetes Care for Children and Adolescents

Stead Family Children's Hospital

Pediatric Endocrinology and Diabetes

Reviewed: 02/2026–Pediatric Diabetes

Approved: 02/2026–Patient Education Program

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Contact Us

Pediatric Endocrinology and Diabetes
University of Iowa Health Care Stead Family Children's Hospital
Pediatric Specialty Clinic
200 Hawkins Drive
Iowa City, IA 52242

Email (for non-urgent needs): peds-diabetes@uiowa.edu

Dietitian: 319-356-0046, for food and carbohydrate questions

Pediatric diabetes fax: 319-356-8170

Website: uichildrens.org/endocrinology

MyChart: uihc.org/mychart

Non-urgent calls

Pediatric Specialty Clinic hours:
8:00 a.m. to 4:30 p.m. Monday through Friday

Pediatric Specialty Clinic phone: 319-356-2229

Option 1: Appointment scheduling
Option 2: Medicine refills
Option 3: Talk to your health care team, such as the pediatric diabetes nurse educator.

Urgent calls

Call us if your child:

- Has ketones
- Is vomiting (throwing up)
- Has several low blood sugars in a row and blood sugar does not get better after treating the lows.
- Has an insulin pump malfunction
- Is running out of insulin that same day

Do not send a MyChart message or email for urgent needs. We may not be at our desks and cannot answer these quickly.

Daytime: 8:00 a.m. to 4:30 p.m. Monday through Friday, call:

- Toll-free: 1-888-573-KIDS (5437) and ask for the pediatric diabetes nurse educator on-call.

After 4:30 p.m., on weekends, or on holidays call:

- Toll-free: 1-888-573-KIDS (5437) and ask for the pediatric endocrinologist on-call.

Emergency calls: 9-1-1

When should I expect a reply?

Type of issue	You will get a response in:
Non-urgent (phone calls, MyChart messages, emails)	2 to 3 business days (if we are very busy, replies may take longer)
Prescription refills	**Urgent:** Same day
	Non-urgent: 3 business days
Paperwork (FMLA, annual school orders, travel letter, surgery letter)	10 to 15 business days
Accommodation letter	15 to 20 business days

When should I call my child's primary care provider?

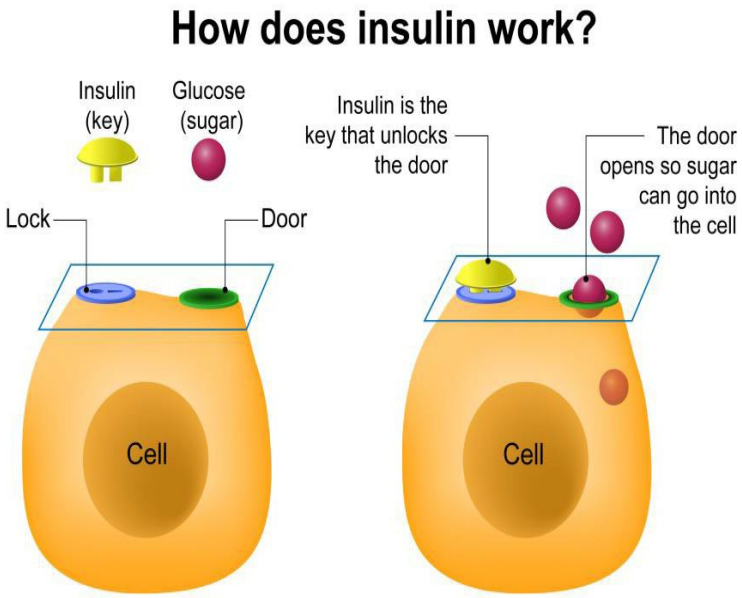
- Your child should have a local primary care provider (PCP), and a well-child visit each year.
- Your child's PCP can give immunizations and school sports physicals.
- Call your child's PCP for normal childhood questions, concerns, and when your child is sick.
- If your child is sick, check their blood sugars and ketones. If they have small, moderate, or large ketones, call 1-888-573-KIDS (5437).

What is Diabetes?

Diabetes is a condition that affects how the body uses sugar. Sugar is the body's main source of fuel. Your body needs sugar for energy. Here is how it should work:

1. You eat food with carbohydrate.
2. Carbohydrate breaks down into sugar and gets into your bloodstream.
3. Your pancreas, inside your belly, makes a hormone called insulin.
4. Insulin helps the sugar get into your body's cells.
5. Your body gets the energy it needs.

Insulin is like a key that opens the doors to the cells of the body. Then sugar can move out of the blood and into the cells.



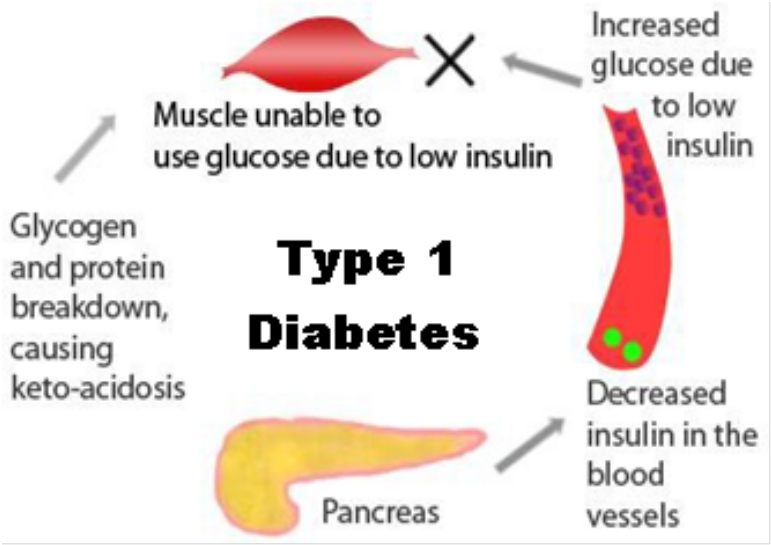
There are two types of diabetes:

- Type 1 diabetes
- Type 2 diabetes

They are different because they make the blood sugar go too high in different ways. The body either can't make insulin or the insulin does not work in the body like it should. Sugar can't get into the cells, so the blood sugar gets too high. Lots of sugar in the blood makes people sick if they don't get treatment.

Type 1 Diabetes

In type 1 diabetes the pancreas **stops making insulin**. There is no insulin to get the sugar from the food you eat into the cells. The sugar stays in the blood and the blood sugar goes too high.



What are the signs of type 1 diabetes?

- Being very thirsty and drinking a lot
- Peeing a lot
- Feeling very hungry
- Losing weight without trying
- Feeling tired a lot of the time

What else should I know about type 1 diabetes?

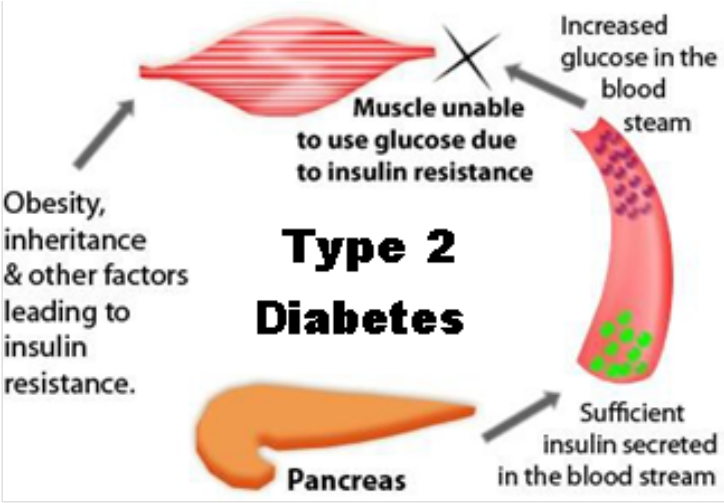
- It usually starts in children, teens, or young adults.
- It is no one's fault if you get it.
- It is not spread from person to person. Nobody can "catch" it from you.
- There is no cure for diabetes. You will have diabetes the rest of your life.
- High blood sugar over a long period of time can hurt your eyes, kidneys, and nerves.

What is a “honeymoon” for people with type 1 diabetes?

- Your pancreas keeps making some insulin for a short time after you start insulin shots. This is called the honeymoon. The honeymoon starts in 1 to 4 weeks. It lasts about 2 months to 2 years.
- You will get low blood sugars when the honeymoon starts. Your diabetes doctors and nurses will help change insulin doses when needed.
- Over time, your pancreas will stop making insulin and the honeymoon will end.
- Often during the honeymoon, people may think they do not have diabetes.
- With type 1 diabetes you will need insulin for the rest of your life.
- The most important thing to do is to take insulin every day.

Type 2 Diabetes

In type 2 diabetes the pancreas **still makes insulin,** but it does not work well in the body. The insulin cannot get the sugar from the food you eat into the body cells. The sugar stays in the blood and the blood sugar goes too high. We call this **insulin resistance.**



Kids and adults can get type 2 diabetes, and most are overweight. Your chance of getting type 2 diabetes is higher if:

- You have family with type 2 diabetes.
- You are overweight and not exercising.

How will a person know if they have type 2 diabetes?

The signs of type 2 diabetes are:

- Feeling tired a lot of the time
- Peeing a lot
- Drinking a lot
- Dark skin that looks like dirty skin in areas like arm pits, around the neck, or inside the elbows
- Blurred vision

There are blood tests that may tell us if you have type 1 or type 2 diabetes. These blood tests are not 100 percent accurate.

We will teach you and your family how to:

1. **Eat healthy.** Healthy foods help keep blood sugar closer to normal. They help you grow normally and lose weight if you need to.
2. **Check your blood sugar.** You will need to check your blood sugar on your fingertips several times each day. Your blood sugar level tells us if we need to change the amount of insulin, medicine, or exercise you do to control your blood sugar.
3. **Take insulin shots each day.** Insulin shots replace the insulin your body cannot make.
4. **Exercise each day.** Being active for at least 60 minutes each day helps you use the food you eat.

Checking and Keeping Track of Blood Sugar Levels

Checking your blood sugar is an important part of taking care of your diabetes. Blood sugar is checked on a small machine called a blood sugar meter.

When should I check my blood sugar?

- Before breakfast
- 2 hours after breakfast
- Before lunch
- 2 to 3 hours after lunch (before afternoon snack)
- Before supper
- 2 to 3 hours after supper (before your bedtime snack)

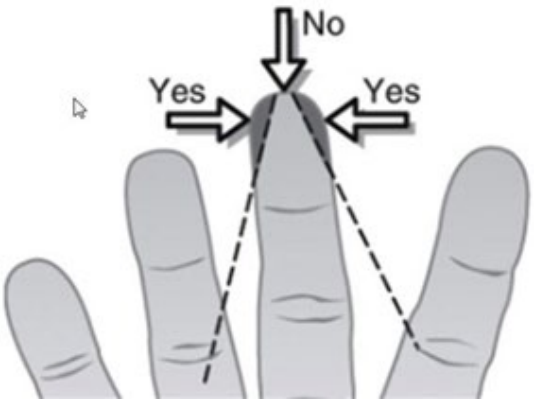
You need to do extra blood sugar checks:

- If you are having signs of low blood sugar
- When you are sick or vomiting (throwing up)
- When you are very active (a lot of exercise or participating in sports)
- Before driving
- Before riding anything with wheels

A diabetes nurse will teach you how to check your blood sugar.

Follow these steps:

1. Wash and dry your hands to be sure to get an accurate reading.
2. Put a test strip into the meter.
3. Use a small needle, called a lancet, to poke your finger. This will get a very tiny drop of blood on your fingertip.
4. Change the lancet at least 1 time each day.

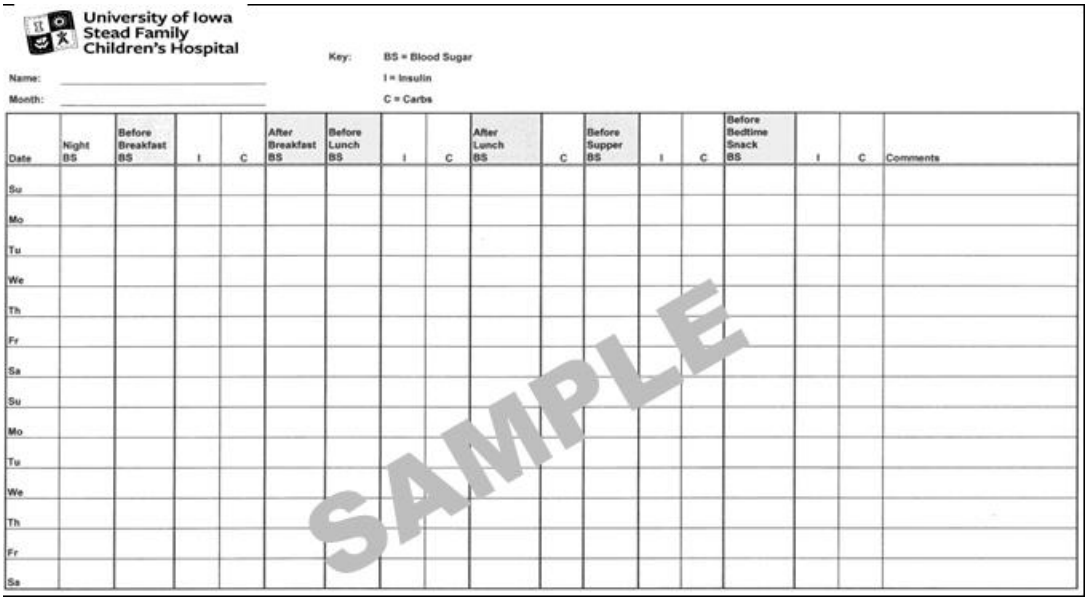


5. Touch the window on the test strip to the drop of blood on your finger. The test strip "sucks" the drop of blood into the strip.
6. In a few seconds, your blood sugar reading will show on the screen on the meter.
7. Keep track of your blood sugars so you, your family, your school, and your diabetes team can help keep your diabetes in control.
8. Write **all** your blood sugar readings on the blood sugar record log.
9. Write them down even if they do not match with the columns. Some people use an app on their smart phone to record their blood sugars.

Keeping track of your blood sugars is important because:

- Your diabetes doctor and nurse will talk to you on the phone or by email about your blood sugar log on a regular basis.
- They will help you change your insulin doses if needed.
- If you do not keep track of your blood sugars by writing them down or entering them into an app in your phone, your doctor or nurse will not be able to help you get good control of your diabetes.

Blood sugar log:



University of Iowa Stead Family Children's Hospital

Key: BS = Blood Sugar
I = Insulin
C = Carbs

Name: _____
Month: _____

Date	Night BS	Before Breakfast BS	I	C	After Breakfast BS	Before Lunch BS	I	C	After Lunch BS	C	Before Supper BS	I	C	Before Bedtime Snack BS	I	C	Comments
Su																	
Mo																	
Tu																	
We																	
Th																	
Fr																	
Sa																	
Su																	
Mo																	
Tu																	
We																	
Th																	
Fr																	
Sa																	

SAMPLE

Target ranges for blood sugars

It is important to work hard to have blood sugars in the target range. The target ranges below are based on facts from clinical studies with children.

Usual blood sugar target ranges for children:

- **Age 6 and older**
  - Before meals: 70 to 150
  - Bedtime and during the night: 90 to 150
- **Ages 1 through 5**
  - Before meals: 80 to 150
  - Bedtime and during the night: 90 to 150

Try to get at least half of your blood sugars in the target range. The rest of your blood sugars may be higher than the target range. If you are using a CGM (Continuous Glucose Monitor) you may be able to get your blood sugars in the target range more than 60-70% of the time.

The more in target your blood sugars are, the better control you have of your diabetes. It is ok to have 2 to 4 low blood sugars in a week.

How do I take care of my diabetes supplies?

- Keep your meter and the strips away from heat and direct sunlight.
- Never leave them in the car.
- Keep the strips in their original container with the lid on tightly.
- Be sure to have spare batteries for your meter.

Notes

Insulin

There are 2 types of insulin:

- Rapid-acting insulin
- Long-acting insulin

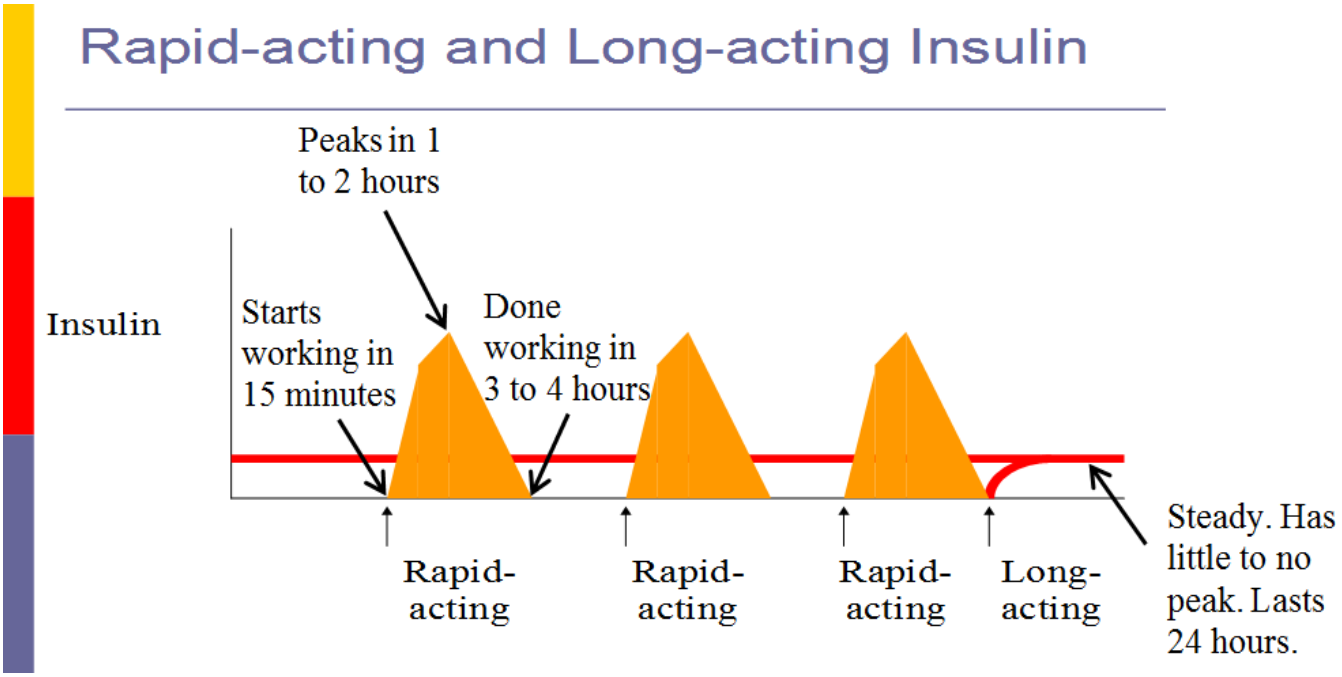
What should I know about rapid-acting insulin?

- The level of sugar in the blood starts going up very fast when carbohydrate breaks down into sugar in the body. Rapid-acting insulin opens the door on the body cell so sugar can get out of the blood and into the cell fast.
- Give yourself rapid-acting insulin **before eating** carbohydrate at mealtimes.
    - **Take rapid-acting insulin 15 minutes before eating.** This will give you better blood sugar control than taking it just before eating.
    - It can work right away, as your blood sugar starts to go up.
- Most people take rapid-acting insulin 3 times a day, because they eat 3 meals a day.
- Brands of rapid-acting insulin are:
    - Humalog®/Lispro
    - Novolog®/Aspart
    - Apidra®
    - Fiasp®
    - Admelog®
    - Lyumjev®

What should I know about long-acting insulin?

- Your body needs a small amount of insulin working all the time. Long-acting insulin does that for you.
- You need to take long-acting insulin 1 time a day.
- Your first blood sugar in the morning when you wake up will be too high without a little bit of insulin working 24 hours a day.
- Brands of long-acting insulin are:
    - Basaglar®/Glargine
    - Lantus®/Glargine
    - Levemir®
    - Semglee®/Glargine-yfgn
    - Toujeo®/Glargine
    - Tresiba®
- All of them give the body a continuous little bit of insulin that lasts for 24 hours or longer.
- **You must take long-acting insulin at the same time each day.** That way you always have a little bit of insulin in your body.
- **Never miss your long-acting insulin.** If you do, determine which kind of long-acting insulin you are taking and follow these directions:
    - **If you miss your Lantus, Basaglar, Toujeo, Levemir, or Semglee** and it is about 12 hours late, **take half of the normal dose**. When your dose is due at the normal time, take the full amount. Also drink a lot of water and check for ketones.
    - **If you miss your Tresiba, take the full dose as soon as you realize you forgot it.** Also drink a lot of water and check for ketones.

Rapid-acting and long-acting insulin chart:



Notes

Insulin storage

Before the first time you use a new insulin bottle, cartridge, or pen:

- Check the expiration date.
- Insulin should look clear.
- Insulin should be stored in the refrigerator at 36° F to 46° F.
- Do **not** let insulin freeze.

After you open an insulin bottle, cartridge, or pen (which means you puncture the top with a needle):

- **Bottles** may be stored in the refrigerator or kept at room temperature.
- **Cartridges and pens** should be stored at room temperature.
- Throw **all** opened insulin away after 28 days, except:
    - Levemir, it lasts 42 days
    - Tresiba, it lasts 56 days
- Store opened insulin at room temperature, between 59° F and 86° F, and away from direct heat and sun.
- Do not let it get hot.
- Do not let it freeze.
- Never store it in your car.

Traveling with insulin

- Take more supplies with you than you will need.
- Protect your insulin from heat and from freezing.
    - Do not store it in the glove compartment.
- Always carry your supplies with you.
    - Do not check it with luggage on an airplane. Keep it in your carry-on bag.
    - Go to tsa.gov to learn more about flying with insulin.

How to Give Insulin Shots

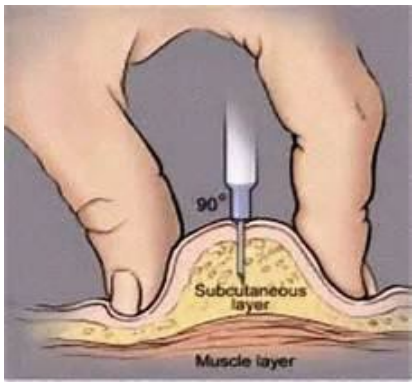
How do I give myself an insulin shot with a syringe?

Your diabetes nurse will teach you how to give yourself insulin and make sure you can do it right.

Follow these steps:

1. Wash your hands.
2. Get all the supplies:
    - Insulin bottle (vial)
    - Insulin syringe
    - Alcohol swab
3. Wipe the top of the insulin bottle with the alcohol swab.
4. Pull back on the plunger of the syringe to the number of units you will take.
    - For example, if your insulin dose is 8 units, you need 8 units of air in the syringe.
5. Put the needle through the rubber on the top of the insulin bottle.
6. Inject all the air into the bottle.
7. Hold the needle in the bottle and turn the bottle upside down.
8. Slowly pull back on the plunger to get insulin into the syringe.
    - You will see some small bubbles inside the syringe. The best way to look for bubbles is to hold the syringe up toward a light or window. Push the plunger to squirt all the insulin and air bubbles back into the bottle to get the bubbles out.

9. Slowly pull back on the plunger again to get the correct amount of insulin in the syringe. Be sure there are no air bubbles. If you still see bubbles, repeat step 8.
10. When you have the correct amount of insulin and no bubbles, you are ready to give the shot. Take the needle out of the bottle.
    a. Do **not** touch the needle to anything. This is how germs get on the needle. If that happens, throw the syringe into a sharps container and start all over.
11. Find the area on your body where you will give the insulin.
12. Gently pinch up the skin and **quickly** stick the needle **straight** into the skin at a **90-degree angle**.



13. Hold the needle in the skin and slowly push down on the plunger until all the insulin is out of the syringe.
14. Keep the needle in the skin and **slowly** count to 10 after all the insulin is in.
15. Take the needle out of the skin after you finish counting.
16. Look at the place where the needle was in the skin. Look for any insulin that might have leaked out onto the skin.
    - If it did leak out, do **not** give yourself more insulin. Giving more insulin could cause a low blood sugar if you give yourself too much.
    - Make a note on your blood sugar record sheet that the insulin leaked.

- If your blood sugar is high at your next check, you will know the reason why.
- Count to 15 or 20 if you are always seeing insulin leak onto the skin.

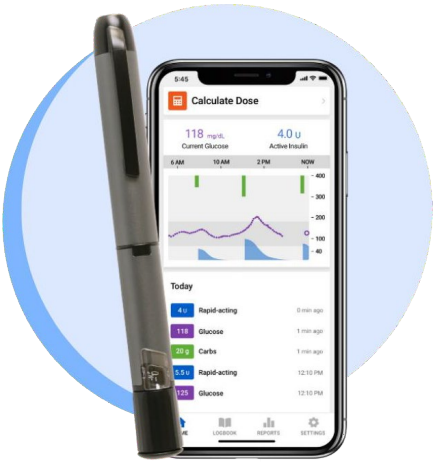
17. Throw the used syringe in a medical sharp or puncture-proof container, like a liquid detergent bottle or empty soda pop bottle.
    - You can buy a medical sharps container at a pharmacy.

How do I give myself a shot with an insulin pen?

Insulin pens are a convenient and accurate way to give insulin safely and easily.

There are 2 types of insulin pens:

- **Disposable pen**, pre-filled with insulin that you discard after empty or expires
  - Some pens dial in whole units and some in half-units.
- **Non-disposable pen device** that holds a cartridge of insulin you load into the pen device. Do not throw away the pen device. Use it over and over.
  - **NovoPen Echo** used with Novolog or Fiasp® penfill cartridges
  - **InPen** -Bluetooth enabled smartpen that works with an app on your phone.
    - Humalog InPen® uses Humalog® penfill cartridges
    - Novolog InPen® uses Novolog® or Fiasp® penfill cartridges



Your diabetes nurse will help you decide which pen is best for you. We will need to determine which pen and which insulin is covered by your insurance.

For disposable pens, the insulin is already in the pen and you will get a new pen when it is empty or it expires.

For pen devices, you will need to load the cartridge into the pen device, and it can stay there until it is empty, or it expires.

Follow these steps for using an insulin pen.

1. **Get the pen ready.**
    a. Wash your hands.
    b. Get out your insulin pen and pen needle.
    c. Pull the paper tab off the pen needle.
    d. Screw the needle onto the end of the pen.
    e. Take off the **outer** needle cover and then the **inside** needle cover.
        - Save the outer cover for later.
        - Discard the smaller inside needle cover.
    f. Do **not** touch the needle to anything. This is how germs get on the needle. If this happens, recap and throw the needle in a sharps container and start over.
2. **Prime the insulin pen.**

    It is important to **get all the air out of the pen needle** so that the correct amount of insulin is given. This is called "priming" the pen or doing an "air shot."

    a. Turn the dial knob on the end of the pen to 1 or 2 units.
    b. Hold the pen with the needle pointing up to the ceiling and push the knob in all the way. You should see at least 3-4 drops of insulin squirt out the end of the pen needle.
    c. Check the dial to be sure the dose window changes back to zero after you prime the pen.

3. Dial up your insulin dose and give the injection.

a. Turn the dial knob to the number of units of your insulin pen.
   - If you go too far you can dial it backwards.

b. Double check your dose with a responsible person.

c. Find the area on your body where you will give the insulin.

d. Gently pinch up the skin and quickly stick the needle straight into the skin at a 90-degree angle.

e. Hold the needle in the skin and use your thumb to push down on the dial knob until it stops.

f. Check to be sure the dose window is at zero.

g. Keep the needle in the skin and slowly count to 10 after all the insulin is in.

h. After you finish counting, take the needle out of the skin.

i. Look at the place where the needle was in the skin. Look for any insulin that might have leaked out onto the skin.
   - If it did leak out, do not give yourself more insulin. That could cause a low blood sugar if you give yourself too much.
   - Make a note on your blood sugar record sheet that the insulin leaked.
   - If your blood sugar is high at your next check, you will know the reason why.
   - Try counting to 15 or 20 if you are always seeing insulin leak onto the skin.

j. Put the outer needle cover over the pen needle and twist it to unscrew the needle.

k. Throw the used pen needle in a medical sharps or puncture-proof container, such as a liquid detergent bottle or empty soda pop bottle. You can buy a medical sharps container at a pharmacy.

l. Put the cover back on the pen to keep it clean.

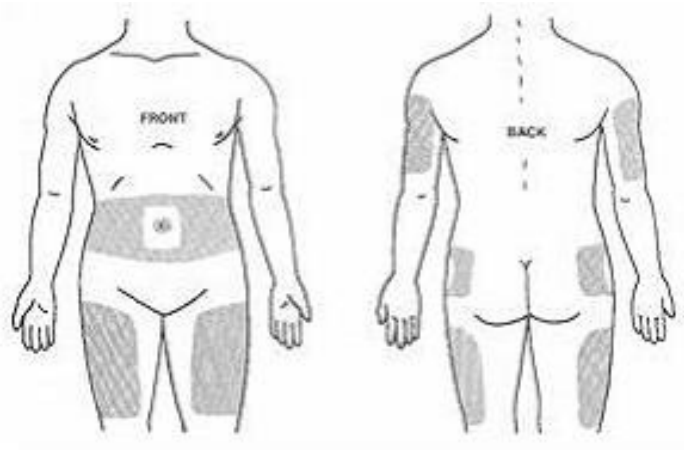
Where do I give myself insulin shots?

Insulin must be given into fat. This will help insulin work well. Fat also has fewer nerve endings, so it will not hurt as much.

The 4 main areas on the body that are **best** to give insulin shots are the:

- Abdomen (belly, stomach, tummy). This is where insulin gets absorbed (soaked up) the fastest. You should be able to gently pinch up at least 1/2 inch of fat. Stay about 1 inch away from the belly button.
- Back side of the upper arm halfway between the elbow and the shoulder
- Top and outer side of the thigh halfway between the hip and the knee

The buttocks (butt). Use the upper outer part of the hip area.



Insulin injection sites

- Outer arm
- Abdomen
- Hip area
- Thigh

Do **not** give yourself insulin in the same spot each time. Use different spots in each area. Giving a shot in the same spot each time causes hard lumps in skin. Insulin will not absorb as well in hard lumps, and blood sugar can go too high. You could start an insulin routine, such as:

- Breakfast shot in the belly (abdomen)
- Lunch shot in an arm
- Supper shot in a leg
- Bedtime shot in the buttocks

Insulin and meal schedules

Try to eat and take your insulin at the same time every day. Having a regular schedule from day to day will help you have more consistent blood sugar levels. Try to stay on schedule, even on days off from school.

Tips to help you eat and take your insulin at the same time every day are:

- Eat meals at least 3 to 4 hours apart. This way you will not overlap rapid-acting insulin doses.
- Do not change your mealtimes by more than 2 hours.
- Check your blood sugar and eat snacks 2 to 3 hours after each meal. This will show you your blood sugar at the time your rapid-acting insulin dose is peaking.
- If you want to sleep in, sleep only 2 hours later than your normal time. Then, get up, check your blood sugar, take your morning insulin, and eat breakfast. Go back to sleep after that if you are still tired.
- **Take your long-acting insulin at the same time each day.** Set an alarm on your phone so you will not forget.

Healthy Eating

The constant carbohydrate meal plan

The constant carbohydrate meal plan will help keep your blood sugar and weight healthy.

- A constant carbohydrate meal plan is made just for you by a registered dietitian (RD).
    - Amount depends on gender, age, and activity level.
- Count all the carbohydrates you eat each day.
- There are 3 meals and 1 to 3 snacks each day.
- You eat the same amount of carbohydrates at each meal every day.
- It has all the foods your body needs to be healthy.
- There are everyday foods and sometimes foods.
- You should not eat between meals or snacks because it may raise your blood sugar and cause weight gain.
- Always eat meals and snacks to help your blood sugars stay in a healthy range and to help you feel full.

Your meal plan:

- **Breakfast**: _____ grams carbohydrate.
- **Morning snack**: _____ grams carbohydrate.
- **Lunch**: _____ grams carbohydrate.
- **Afternoon snack**: _____ grams carbohydrate.
- **Dinner:** _____ grams carbohydrate.
- **Bedtime snack:** _____ grams carbohydrate.

Estimated grams of carbohydrate: _____ per day or _____ per meal.

Limit morning, afternoon, and bedtime snacks to _____ grams carbohydrate.

Tools to help with carbohydrate counting

Here are a few tools that can help with carbohydrate counting.

- Nutrition labels

- Measuring cups, measuring spoons, and digital food scales

- Restaurant nutrition information

- Smart phone apps

Diabetes and health apps

Apple and Android phone apps unless noted.

Blood Sugar Tracking

- T1D1
  - Calculate insulin doses
  - Log blood sugars and insulin doses
  - Track your favorite foods

- mySugr
  - Log your blood sugar
  - Look up carb information
  - Track your insulin doses

- Accu-Chek Connect
  - Log your blood sugar from meter automatically
  - Helps show trends and patterns

- OneTouch Reveal
  - Sync your blood glucose data
  - Track your carbs, insulin, and exercise in a logbook

- Sugarmate
  - Link with CGM to track and share data with other caregivers
  - You can customize alerts
  - Apple app
  - Android through the web

- Dexcom G6
  - Personalized trend alerts to help you learn patterns and better manage your diabetes

- Dexcom G7
  - Personalized trend alerts to help you learn patterns and better manage your diabetes

- Dexcom Clarity
  - Find glucose patterns with data from the Dexcom glucose monitor
  - See graphs, time in range percentages, and more

- Dexcom Follow
  - Allows caregivers to see blood sugar levels and trends from the Dexcom glucose monitor

Carbohydrate tracking

- CalorieKing
  - Look up carb information for restaurant meals and other foods you eat
  - Apple app
  - Android through the web

- MyFitnessPal
  - Look up nutrition info from a very large database of foods
  - Also has restaurant meals

- Cronometer
  - An app and website to search and log carb info
  - Log your exercise, health data and notes

- HappyForks.com
  - A website to analyze recipes (not an app)
  - Search and track carbs

Exercise

- Nike Training Club
  - 185+ free workouts for all fitness levels with guidance from Nike trainers

- Sweat Deck
  - Choose an exercise to match each suit. Do the exercise as cards are drawn from the deck.
  - A way to add different types of activity to your workout
  - Apple app only

- Sworkit Kids
  - Make a custom workout that feels like a game with videos to lead you along the way.

- 7 Minute Workout
  - Make a custom full-body workout by putting together bodyweight exercises
  - Apple app only

- J&J Official 7 Minute Workout
  - Short exercises you can put together for a customized workout

- YouTube
  - Search for your favorite way to move your body
  - Exercise videos that range from Zumba to boxing to strength training

Foods with carbohydrates

Carbohydrates are the main fuel for the body and give you energy. There are 2 kinds of carbohydrates:

1. **Simple carbohydrates**
    - Easy to digest
    - Raise blood sugar very fast
2. **Complex carbohydrates**
    - Have **fiber** and take longer to digest
    - Raise blood sugar slowly
    - Help keep your blood sugar in a healthy range

Fiber is found in plant foods:

- Fruits
- Legumes
- Nuts
- Seeds
- Vegetables
- Whole grains

There are 5 food groups with carbohydrates:

- Fruit
- Milk and yogurt
- Non-starchy vegetables
- Starches (grains, starchy vegetables, beans, legumes)
- Sweets and condiments

There are 2 food groups with no carbohydrates:

- Fats*
- Protein*

*Note: These are not free foods just because they do not have carbohydrates to count. If your child snacks on unlimited cheese sticks or slices of lunchmeat, it may affect their blood sugars.

Starches (15 grams of carbohydrate)

Choose whole grains and starches that are less processed. They are a main source of energy.

- 1/2 cup cooked unsweetened oatmeal
- 3/4 cup unsweetened cereal
- 1/4 cup granola
- 1 slice of bread
- 1/2 hamburger or hot dog bun
- 1/4 bagel
- 1/3 cup cooked pasta or rice
- 1/3 cup baked beans
- 1/2 cup refried beans
- 1/2 cup potatoes, corn, or peas
- 4-inch cob of corn
- 3 ounces baked potato
- 2 ounces French fries
- 1/2 cup pasta sauce
- 3 cups popped popcorn
- 13 chips (1 small bag)
- 6 saltine crackers

Fruits (15 grams of carbohydrate)

Choose fresh or frozen fruits most often. They help with healthy growth.

- 15 small grapes
- 4-inch banana
- 4-ounce apple or pear
- 6-ounce orange
- 1 cup diced melon
- 1 cup berries
- 1/2 cup canned fruit (packed in light syrup or juice)
- 2 tablespoons raisins
- 1/2 cup fruit juice (fresh squeezed or store bought)

Milk and milk substitutes (12 grams of carbohydrate)

Milk and milk substitutes are important for bone health.

- 1 cup milk (non-fat, low fat, whole)
- 1 cup plain rice milk
- 1 and 1/2 cups plain almond milk
- 1 and 1/3 cups plain soy milk
- 2/3 cup plain yogurt
- 2/3 cup plain Greek yogurt

Non-starchy vegetables

(5 grams of carbohydrate for 1 cup raw or 1/2 cup cooked)

Non-starchy vegetables have fiber to keep you full and are low calorie and low carb.

- Artichoke
- Asparagus
- Baby corn
- Beets
- Broccoli
- Brussel sprouts
- Cabbage
- Carrots
- Cauliflower
- Celery
- Collard greens
- Cucumber
- Daikon
- Eggplant
- Green beans
- Green onions/scallions
- Jicama
- Kale (cooked)
- Kohlrabi
- Leeks
- Mushrooms
- Onions
- Pea pods
- Peppers (sweet and spicy)
- Radishes
- Spinach (cooked)
- Sugar snap peas
- Squash (summer, yellow, zucchini)
- Tomato
- Canned tomatoes (no sugar added)
- Water chestnuts

You do not have to measure or count leafy greens, such as:

- Iceberg lettuce
- Romaine lettuce
- Uncooked kale
- Uncooked spinach

Condiments (grams of carbohydrate vary)

Do not forget to count carbohydrates in dips, sauces, and dressings.

- 3 tablespoons barbecue sauce 15 g
- 2 tablespoons chocolate syrup 15 g
- 1 cup canned gravy 15 g
- 2 tablespoons ketchup 10 g
- 1 tablespoon pancake syrup 15 g
- 2 tablespoons ranch dressing 4 g

Sweets (grams of carbohydrate vary)

Sweets can fit into a healthy meal plan but should be eaten in small portions. Limit sweets to special occasions or 2 to 3 times a week. It is best if sweets can fit into a mealtime when insulin is given. Try not to eat sweets as one of your 10-gram or 15-gram carbohydrate snacks.

- 1 1/4-inch brownie, unfrosted 15 g
- 2-ounce angel food cake, unfrosted 30 g
- 2-ounce yellow cake, frosted 30 g
- 1 3/4-ounce frosted cupcake 30 g
- 4-ounce muffin 60 g
- 1/2 cup (3 1/2 ounce) fruit cobbler 45 g
- 1/6 of 8-inch fruit pie with two crusts 45 g
- 1/8 of 8-inch pumpkin or custard pie 22 g
- 1 1/2-ounce plain cake doughnut 22 g
- 2 (1-ounce) doughnut holes 15 g
- 3 3/4-inch (2-ounce) plain yeast doughnut 30 g
- Two 2 1/4-inch chocolate chip cookies 15 g
- One 6-inch (3-ounce) chocolate chip cookie 60 g
- 2 sandwich cookies with cream filling 15 g
- 5 vanilla wafers 15 g
- 1/2 cup pudding (made with low fat milk) 30 g
- 1-ounce milk chocolate or dark chocolate candy 15 g
- 5 chocolate Hershey Kisses 15 g
- 3 pieces of hard candy 15 g
- Popsicle (with sugar not sugar-free) 8 g
- 1/2 cup vanilla ice cream 15 g
- 1/3 cup frozen yogurt 15 g

Foods to limit

It is important to know which foods to limit or avoid to keep your blood sugar in a healthy range.

The usual blood sugar target ranges for children of all ages are:

- Before meals: 70 to 150
- 2 to 3 hours after meals: less than 180
- Bedtime and during the night: 90 to 150

Sugar and processed carbohydrates make blood sugar rise and fall quickly.

Limit your portion and how often you eat foods high in sugar and processed carbohydrate, such as:

- Chips
- Crackers
- Candy
- Cookies
- Ice cream
- Cakes/cupcakes
- Pies

Foods to avoid

Do not choose drinks sweetened with sugar, such as:

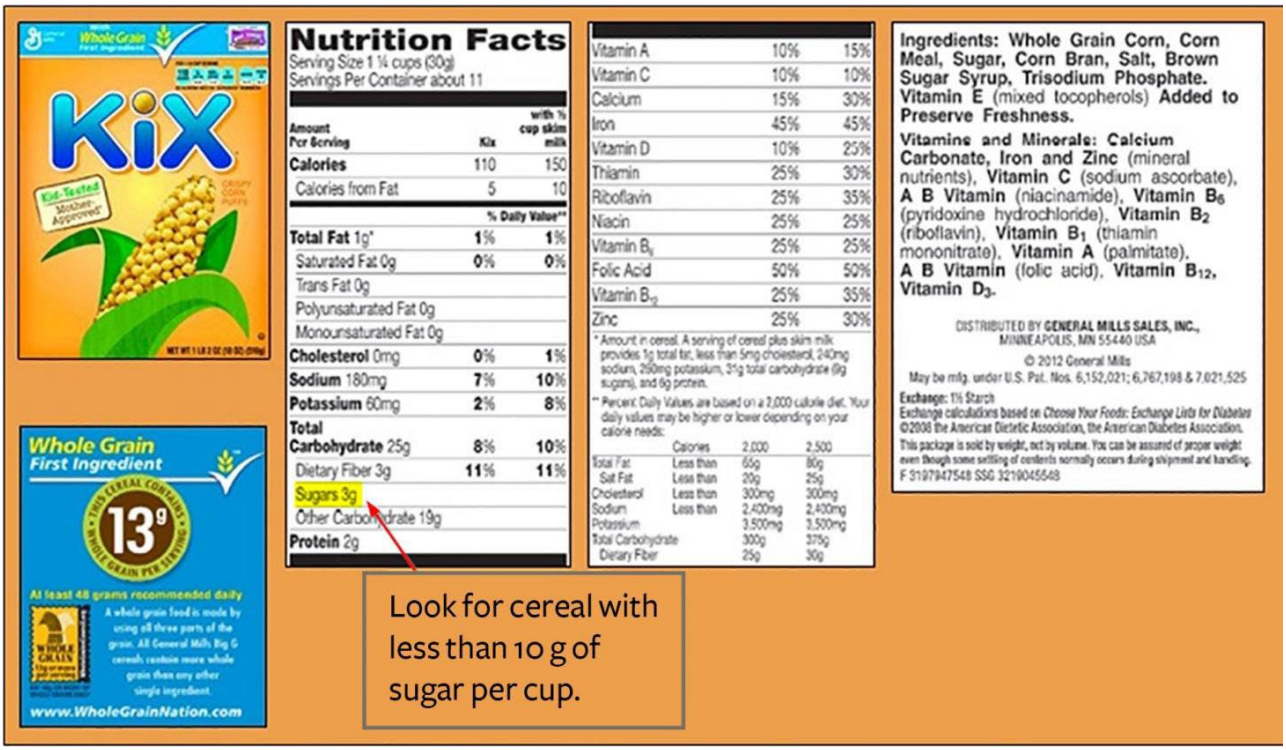
- Energy drinks
- Flavored milk
- Eggnog
- Fruit juice
- Regular soda
- Sports drinks
- Lemonade
- Sweet tea

You can drink these to treat a low blood sugar.
Do not regularly eat breakfast foods with a lot of sugar and simple carbohydrate, like:

- Breakfast pastries
- Doughnuts
- Pop-Tarts
- Toaster pastries

Instead, try:

- Fruit for a sweet treat
- Raw veggies and dip for a crunchy treat
- Drinks sweetened with artificial sweeteners, such as:
  - Crystal Light®
  - MiO®
  - Diet soda
  - Powerade Zero®
- **Water and milk are always the healthiest choices.**
- Breakfast cereal and flavored oatmeal with:
  - Less than 10 grams of sugar per cup
  - 3 or more grams of fiber per serving



Kix® cereal nutritional information courtesy of General Mills

Protein

Choose low fat proteins most often, with less than 5 grams of fat per 1 ounce serving. Protein foods are:

- Meat
- Poultry
- Fish
- Cheese
- Eggs
- Plant-based proteins (beans, soy, nuts, and seeds)

Plant-based proteins

Read the nutrition label on plant-based proteins.

They are not carb-free.

- 2 tablespoons nuts 3 g
- 1 tablespoon peanut butter 3 g
- 1 cup shelled edamame 15 g
- 1/2 cup hummus 18 g
- 1/2 cup refried beans 15 g
- 1/3 cup baked beans 15 g
- 1/2 cup lentils 15 g
- 1/2 cup beans 15 g
    - Beans: black, garbanzo, kidney, lima, navy, pinto, white

Proteins with breading

Read the nutrition label on proteins with breading. **They are not carb-free.**

- Chicken fried steak
- Chicken nuggets
- Fried fish

Healthy cooking tips for proteins are:

- Trim fat off meat before cooking.
- Drain fat off meat after cooking.
- Grill and bake instead of deep or pan fry.
- Use non-stick cooking spray instead of butter.

Fat

You need fat for healthy growth. Some fats we should eat and drink more often and some less often.

Eat and drink monounsaturated and polyunsaturated (Omega-3 and Omega-6 fatty acids) fats each day:

- Avocado
- Fatty fish (salmon, tuna, mackerel, herring, trout, sardines)
- Margarine
- Nuts
- Olives
- Olive oil
- Peanut butter
- Seeds

Limit the saturated fats you eat and drink:

- Butter
- Cheese
- Cream
- Cream cheese
- Fatty beef and pork
- Lard
- Whole milk

Do not eat and drink trans fat. There are 2 types of trans fat:

- **Natural:** dairy and meat products
- **Artificial:** processed foods

Processed foods are the main source of trans fats. Look for trans fats in:

- Baked goods such as cakes, pie crusts, biscuits, or cookies
- Buttered popcorn, chips, and crackers
- Fried fast foods, such as doughnuts, French fries, fried chicken, or fried fish
- Frosting
- Frozen pizza
- Stick margarines, shortening, and other spreads

Look for the words "partially hydrogenated oils" in the ingredients list.

Foods may be labeled with 0 g trans-fat if they have less than 0.5 mg per serving. Often you may eat more than one serving of the food and be eat several grams of trans fat.

Why limit saturated fats and avoid trans fats?

- They make bad (LDL) cholesterol go up and good (HDL) cholesterol go down.
- Eating too much makes your risk of heart disease and stroke goes up.

Sodium (salt)

Salt is found in most processed foods to make them taste better and help them last longer. Most people eat too much salt. Too much makes your risk of high blood pressure, heart disease, and stroke go up.

Limit your salt intake by:

- Eating less processed foods
- Not eating out at restaurants
- Eating fresh or frozen vegetables over canned vegetables
- Looking for "low sodium" or "no added salt" on the label of canned foods
- Draining and rinsing canned beans and vegetables before heating or adding them to a recipe
- Buying spices without salt, such as garlic powder instead of garlic salt
- Getting rid of the saltshaker at home and season with herbs and spices
- Asking for your food to not be salted at restaurants

Foods high in salt are:

- Bread and baked goods
- Breakfast cereals
- Canned soups
- Canned vegetables
- Chips, crackers, and pretzels
- Frozen pizza, breakfast sandwiches, and microwavable meals
- Lunchmeat, hotdogs, and other processed proteins

Artificial sweeteners

Foods and drinks that use artificial sweeteners give you more choices when eating or drinking something sweet.

The artificial sweeteners listed below have been tested and approved by the U.S. Food and Drug Administration (FDA) as "generally regarded as safe" (GRAS).
GRAS means experts have agreed that it is safe for use in moderation.

Many foods with artificial sweeteners may still have carbohydrate. Always check the label.

Non-nutritive sweeteners

Carbohydrate and calorie-free alternatives to sugar are:

- Acesulfame potassium (Acesulfame K)
- Aspartame
- Saccharin
- Stevia
- Sucralose
- Neotame

Be aware of products that may have additional carbohydrates or sugar alcohols.

Always read the nutrition label and count any carbohydrate listed.

- Splenda® brown sugar blend (sugar and molasses)
- Splenda® sugar blend (sugar)
- Stevia® in the raw (dextrose)
- Truvia® baking blend (erythritol and sugar)
- Truvia®/PureVia® (erythritol)

Sweetener name	Brand names found in stores
Acesulfame potassium	Sunett®, Sweet One®
Aspartame	NutraSweet®, Equal®
Neotame	N/A
Saccharin	Sweet 'N Low®, Sweet Twin®, Sugar Twin®
Sucralose	Splenda®
Stevia/ Rebaudioside A	A Sweet Leaf®, Sun Crystals®, Stevia®, Truvia®, PureVia®

Sugar alcohols

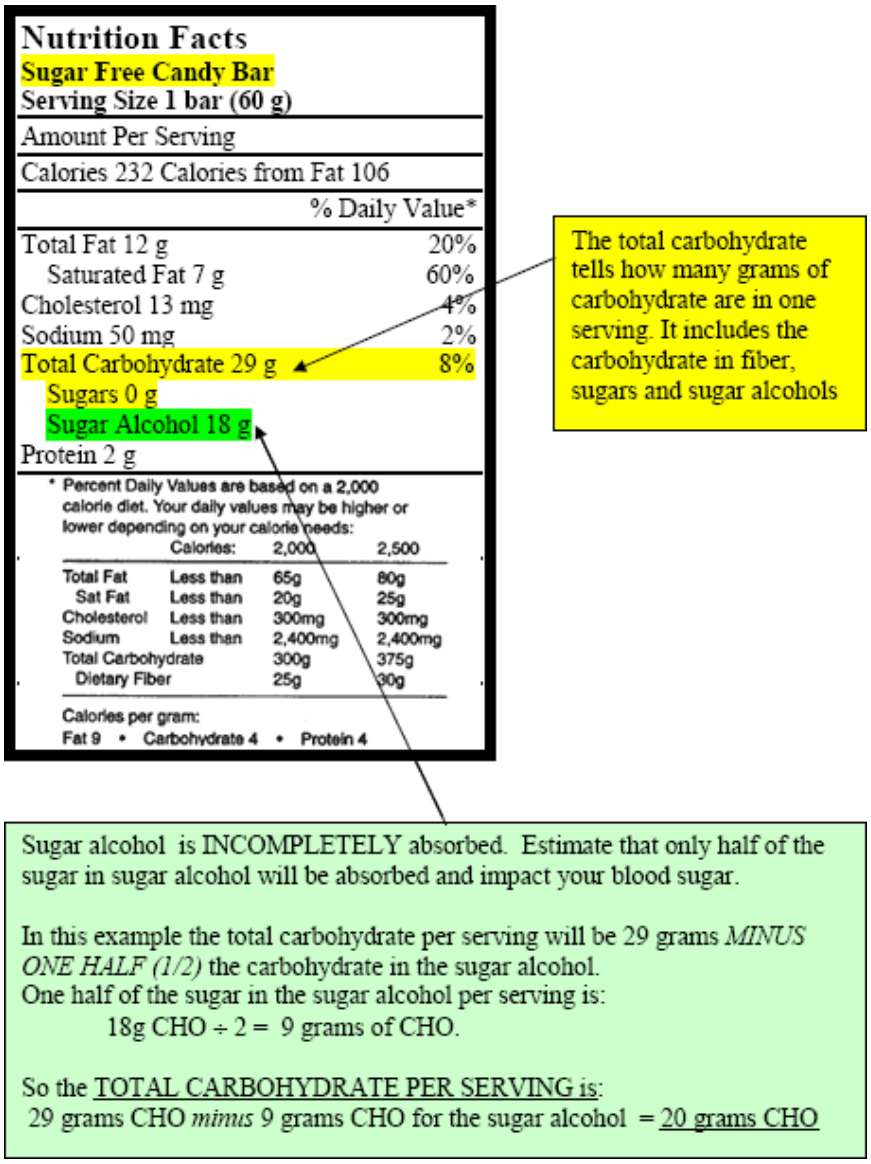
Some sugar alcohols are:

- Erythritol
- Mannitol
- Sorbitol
- Xylitol

Sugar alcohols:

- Have fewer calories and less of an effect on blood sugar than sugar
- Are not completely carbohydrate-free
- May cause gas, cramping, and diarrhea in some people

Counting carbohydrates with sugar alcohols:



Nutrition Facts
Sugar Free Candy Bar
Serving Size 1 bar (60 g)

Amount Per Serving

Calories 232 Calories from Fat 106

	% Daily Value*
Total Fat 12 g	20%
Saturated Fat 7 g	60%
Cholesterol 13 mg	4%
Sodium 50 mg	2%
Total Carbohydrate 29 g	8%
Sugars 0 g	
Sugar Alcohol 18 g	
Protein 2 g	

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

		Calories:	2,000	2,500
Total Fat	Less than		65g	80g
Sat Fat	Less than		20g	25g
Cholesterol	Less than		300mg	300mg
Sodium	Less than		2,400mg	2,400mg
Total Carbohydrate			300g	375g
Dietary Fiber			25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

Meal Planning

Planning can help you to make healthier choices for your meals and snacks.

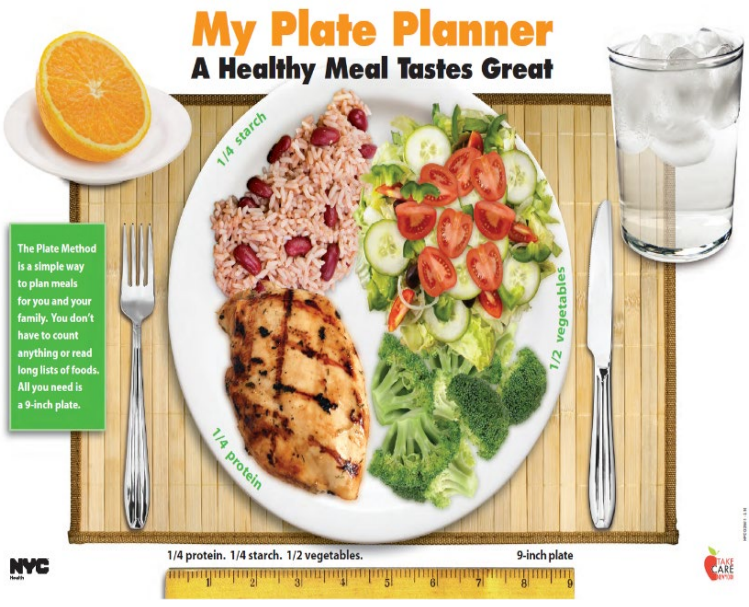
Tips:

- Make a list of meals for the week.
  - Make sure to include all the different food groups.
  - Have fruit for dessert instead of something with added sugars.
- Make a grocery list based on these meals and what you already have.
- Do not go grocery shopping on an empty stomach.
- Shop the outside of the store and limit what you buy in the aisles.
  - Look for canned vegetables with "no added salt."
  - Look for canned fruit with "no sugar added" or "in their own juice."
  - Do not buy chips, sweets, and sweetened drinks.
- When you get home, clean and cut up fruits and vegetables for easy snacks.
- Store healthy snacks at eye level in the pantry and fridge.

Healthy mealtimes

Tips for healthy and successful mealtime:

- Eat dinner together as a family at the dinner table.
- Turn off distractions, such as TV, cell phone, tablet.
- Use 10 inch instead of 12-inch plates to help with portion control.
- Do not eat second helpings.
- Take a sip of your drink between every few bites to slow down your eating.
- Limit meals to 30 minutes.



Sample meal plan

Below is a healthy meal plan for a 10-year-old child with type 1 diabetes. It has 55 to 60 grams of carbohydrate for meals (breakfast, lunch, dinner).

Children 7 years or older should eat 15 grams carbohydrate for afternoon and bedtime snacks.

Children 1 to 6 years old should eat 10 grams of carbohydrate for morning, afternoon, and bedtime snacks.

Breakfast

- Egg sandwich (whole wheat English muffin and 1 egg)
- 1/2 banana
- 1 cup low fat milk

Lunch

- Turkey sandwich (2 slices whole wheat bread, 3 ounces of turkey, 1 tablespoon mustard)
- 1 cup baby carrots with 1 tablespoon ranch
- 10 small grapes
- 1 cup low fat milk

Afternoon snack

- 6 whole wheat crackers
- 1-ounce string cheese

Dinner

- 3 ounces chicken breast
- 1 cup whole wheat pasta
- 1/2 cup green beans
- 1 cup low fat milk

Bedtime snack

- 6 ounces light yogurt

Snack ideas

Choose snacks that pair 10 to 15 grams of carbohydrate with protein and/or healthy
fats to help your blood sugars stay near target range.

10 grams of carbohydrate or less

- 1 cup sugar snap peas with 7 cheese cubes
- ¼ cup shelled pistachios
- 1 cup non-starchy vegetables dipped in 2 ounces guacamole ("mini cup")
- 10 turkey pepperoni rounds with 1 clementine
- 1 oz plain or flavored almonds (ex: cocoa roasted, smoked, etc)
- KIND bar minis or "thins"
- Greek yogurt with 10 grams of carbohydrate or less
- Dannon Light and Fit Zero Sugar Smoothie
- Chobani Zero Sugar Drink
- 2 tablespoons crispy roasted chickpeas
- Flavored tuna pouch paired with 7 Wheat Thins or Triscuit Thins
- 1 small, sliced cucumber dipped in 3 tablespoons hummus
- 2 cups air-popped popcorn with 1 hard-boiled egg
- 1 serving baked cheese ("Moon Cheese" or "Whisps") with 1/3 cup grapes
- ¼ cup strawberries dipped in 2 tablespoons almond butter
- 1/3 medium pear with 1 Babybel cheese
- Laughing Cow breadstick and cheese dippers
- 2 tablespoons pumpkin "pepita" seeds with 4 oz no-sugar-added fruit cup
- ½ cup cottage cheese with ¼ cup berries
- 2/3 cup shelled edamame
- 1 slice toasted low-carbohydrate bread topped with 1 sliced hardboiled egg
- 3 turkey roll-ups (wrap deli turkey around a pickle, tomato slice, and/or avocado slice)

15 grams of carbohydrate or less

- Protein-containing granola bar with 15 grams of carbohydrate or less
- 1½ tablespoons peanut butter with dippers (1/2 sliced apple or 1 cup carrots)
- Kids "Perfect Bar" or RxBar Kids
- 1 package sour raisins with 1 string cheese stick
- 1 chocolate flavored rice cake spread with 1 tablespoon peanut butter
- 7 bean tortilla chips with 2 tablespoons salsa or guacamole
- Outshine Simply Yogurt bars (freezer section)
- 6-inch corn tortilla rolled with 1 oz deli meat and 1 tablespoon salsa
- ¼ cup Oatmeal Squares cereal with 2 tablespoons dry roasted nuts
- Dannon Light and Fit Smoothie

Free foods

There may be times between scheduled meals and snacks that your child is hungry. Free foods have little to no carbohydrate and can be given at these times.

Free foods:

- Are 5 or fewer grams of carbohydrate and fewer than 20 calories
- Must be limited to 3 each day and spread throughout the day

Free food ideas:

- 1 sugar free Jell-O®
- 1 sugar free Popsicle
- 1 large dill pickle
- 1 cup light buttered popcorn
- 1/4 cup blueberries
- 1/2-ounce slice turkey with yellow mustard rolled-up
- 3 strawberries with 1 tablespoon plain Greek yogurt
- 3 sliced radishes with 1 tablespoon fat free cream cheese
- 1 cup non-starchy vegetable with 2 tablespoon Walden Farms® dressing

Portion sizes

Knowing portion sizes with your hand or plate can help with counting carbohydrate if you do not have measuring cups, measuring spoons, or a scale.

Counting carbohydrates in a recipe

Some recipes may not have nutrition information. Here is how to figure it out.

1. Use a food label, the internet, or a book to look up the carbohydrate in each ingredient in the recipe. The amount needed in the recipe may be different than the serving size on the label.
2. Add all the carbohydrate grams together for the recipe to get the total amount of carbohydrates for the whole recipe.
3. Make the recipe.
4. Divide into equal portions by cutting or using measuring cups or a scale.
5. Divide the total grams of carbohydrates (from step 2) by the number of portions you just made (in step 4).
    - This number is the amount of carbohydrates in each serving.
6. You do not need to do the math again the next time you make the recipe. Write down these 3 things:
    - The total number of carbohydrates in the whole recipe.
    - The number and size of the portions you made.
    - The carbs in each serving.

Example: Turkey Chili

1-pound 93 percent fat free ground turkey	_____
1 yellow onion, chopped	_____
1 (28-ounce) can no sodium added diced tomatoes	_____
1 (16-ounce) can no sodium added kidney beans	_____
1 tablespoon garlic, chopped	_____
2 tablespoons chili powder	_____
1/2 teaspoon paprika	_____
1/2 teaspoon dried oregano	_____
1/2 teaspoon ground cayenne pepper	_____
1/2 teaspoon cumin	_____
1/2 teaspoon ground black pepper	_____
2 cups water	_____
Total carbohydrates	_____
Number of portions and portion size	_____
Carbohydrates per serving	_____

Unique situations

Eating larger snacks

For celebrations or birthdays, you may want to eat more than a 10 to 15 g carbohydrate snack. This is okay, but you need to cover it with insulin. The doctor or diabetes nurse can help you find an insulin-to-carbohydrate ratio to cover the snack with insulin. Learn about using insulin-to-carbohydrate ratio from your diabetes nurse.

Not finishing a meal or snack after insulin is given

Children's hunger can vary from day to day. They may ask for a full cup of pasta, and then tell you they are full after only eating a few bites. To meet the carbohydrate count total that you gave insulin for:

- Give them more food that is already part of the meal.
- Offer fruit, milk, or whole grain bread or crackers.
- As a last resort, offer a treat or whatever they will eat to meet the carbohydrate.

Call or email the dietitian if this happens often, if it becomes a game, or if your child thinks if they refuse to eat they will get a treat. We can help you limit this behavior.

Eating school breakfast/lunch

Making a plan for school lunch is an important part of your school diabetes care plan.

- Call your school if carbohydrate information is not already on the menu.
- Any school getting government assistance must give nutritional information on the foods they serve.
- Please let your diabetes care team know if you have a hard time getting nutrition information. They can help.
- Look at the menu as a family to make sure you get all the food groups.
- Take home desserts from class parties.
- Choose 1% or skim (fat free) milk. Drink white milk more than flavored.

Eating at a restaurant

Eating out is one way we spend time with family and friends. The food is often unhealthy and larger portion sizes than we would have at home though. Here are ways to make eating out healthier:

- Look up the nutrition information and menu before you go out to eat.
- Make a plan for what you would like to eat and how it will fit in your meal plan.
- Think about:
    - Sharing a meal or side dish so it may fit in your plan instead of not having any at all.
    - Asking for a lunch or kid size for a smaller portion.
    - Asking for a to-go container when you get your meal and putting half the meal in the to-go container.
    - Asking for sauces on the side and no added salt.
    - Skipping appetizers, bread, and/or tortilla chips on the table.
- Do not skip meals to have more carbohydrate at a later meal. Eating the same amount of carbohydrate at each meal is important to keep your blood sugars near target range.

Eating at parties or potlucks

Many celebrations involve parties and potlucks where you have no idea what is in the food. There may be times when there is no nutrition information, and you have no way to know portion sizes.

- Do the best you can and use what you already know.
- Look for fresh fruits and vegetables, grilled or baked proteins without cheese or sauces, and whole grains.

Notes

High Blood Sugar and Checking Ketones

There are many reasons your blood sugar can go too high. It is important to know what causes high blood sugar and why high blood sugar is dangerous.

Causes of high blood sugar

- Eating too much carbohydrate or too much **quick-acting** carbohydrate
- Not enough activity
- Stress
- Not taking enough insulin
- Forgetting to take insulin
- Illness or infections
- Injury or surgery

Signs of high blood sugar

- Urinating (going pee) a lot
- Thirsty and drinking a lot
- Dry mouth and dry skin
- Blurry vision
- Yeast infections in the groin area

It is normal to have high blood sugar once in a while. Call your diabetes nurses if:

- You have high blood sugar a lot of the time
- You have high blood sugar that keeps happening about the same time each day

The nurses can help figure out the reason for the high blood sugar and suggest changes in insulin, exercise, or eating to help the high blood sugar come down.

What are ketones?

Ketones are an acid that can build up in the body when your body uses fat instead of sugar for energy. Ketones are caused from the breakdown of fat. They harm the body.

Body fat is used for energy when:

- There is not enough insulin in the body to use sugar for energy
- You do not eat carbohydrate for long periods of time, such as skipping meals

When should I check for ketones?

- When your blood sugar is **240 or higher**
- Check ketones even if your blood sugar is not high if you are:
  - Sick, have an infection, or trauma
  - Vomiting (throwing up)
- If you forgot an insulin shot

What should I do when my blood sugar is high?

If your blood sugar is **240 or higher**:

1. **Check ketones**. If you do not check, you will not know if you have them.
2. **If you have small, moderate, or large ketones, take extra rapid-acting insulin right away**. Call your diabetes nurses or doctor for help with this if you are unsure.
   - Follow the instructions for taking extra rapid-acting insulin. You can find these instructions in the **Ketones** section of this book.
3. **For any amount of ketones, including trace, drink a lot of carbohydrate-free drinks** right away.
4. Follow the instructions in the Ketones section of this book.

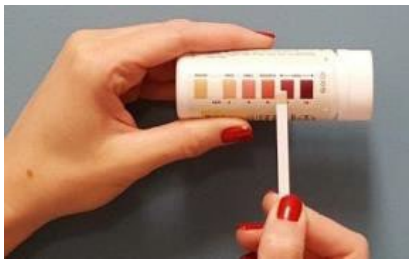
How do I check for ketones?

There are 2 ways to check for ketones:

- Urine ketones
- Blood ketones

Steps to check for urine ketones:

1. Gather the supplies
    - Urine ketone strips (check expiration date)
    - Small paper cup to pee in
    - Timer or watch with a second hand
2. Unscrew the lid and take 1 strip out of the bottle.
3. Screw the lid back on right away to keep them fresh.
4. Do not touch the test end of the strip.
5. Dip the test end of the strip into a cup of **fresh** urine.
6. Take it out right away.
7. Remove extra urine by drawing it along the rim of the cup.
8. **Exactly 15 seconds** after dipping it in the urine, compare the ketone strip with the color chart on the bottle of ketone strips.



9. If you have ketones, follow the instructions in the **Ketones** section.

Ketone strip storage

- Keep ketone strips at room temperature between 59° and 86° F. Keep them out of direct sunlight.
- After opening the first time, write the date on the bottle.
- **Always** put the lid back on right away after opening.
- Do not keep them in the bathroom. The moisture could ruin the strips.
- Throw the strips away 6 months after first opening if they are not gone.
- Do not use them after the expiration date. Call your pharmacy for a refill.

Steps to check for blood ketones:

1. Gather the supplies:
    - Blood ketone meter
    - Blood ketone test strips
    - Lancet device with lancets
2. Wash and dry your hands.
3. Take the blood ketone strip out of the foil wrapper.
4. Put a test strip into meter and it will turn on.
5. Use a small needle, called a lancet, to poke your finger. Get a drop of blood on your fingertip.
6. Touch the window of the test strip to the drop of blood on your finger. The test strip "sucks" the drop of blood into the strip.
7. In a few seconds, your blood ketone reading will show on the screen of the meter.
8. Compare the result to the blood ketone chart below.

Below 0.6 mmol/L Readings below 0.6 mmol/L are in the normal range.	← Negative to trace
0.6 to 1.5 mmol/L Readings between 0.6 and 1.5 mmol/L may indicate the development of a problem that may need medical help. Patient should follow health care provider's instructions.	← Small to moderate
Above 1.5 mmol/L Readings above 1.5 mmol/L indicate the patient may be at risk for developing diabetic ketoacidosis (DKA). Patient should contact a health care provider right away.	← Large

Blood Ketone Levels Chart

What should I do if I have ketones?

If you have small, moderate, or large ketones, take extra rapid-acting insulin and drink lots of carbohydrate-free drinks right away.

Follow the instructions for taking extra insulin. You can find these instructions in the **Sick Days** section of this book.

Call your diabetes doctor or nurse right away if you do not know what to do. We would rather you call than to let the ketones get out of hand which could be life-threatening.

Diabetic ketoacidosis (DKA)

When ketones are **large** and stay large 4 or more hours, the amount of acid in your body is very high. **Very high ketones are dangerous.** It can turn into DKA if it is not treated with extra insulin and carbohydrate-free drinks right away.

DKA is an emergency and can lead to coma or death.

DKA can be prevented by following the instructions on the previous pages for:

- When to check for ketones
- How to check for ketones
- What to do for ketones

If you do not check for ketones, you will not know if you have them.

Warning signs of DKA are ketones in the blood and/or urine, along with:

- Vomiting (throwing up) or stomach pain
- Drowsiness or trouble staying awake
- Fruity odor to your breath
- Fast and deep breathing

Go to an emergency room right away if you have any signs of ketoacidosis.

High blood sugar (overview)

Causes of high blood sugar

- Eating too much carbohydrate or too much quick-acting carbohydrate
- Not enough activity
- Stress
- Not taking enough insulin
- Forgetting to take insulin
- Injury or surgery

Signs of high blood sugar

- Urinating (going pee) a lot
- Thirsty or drinking a lot
- Dry mouth and dry skin
- Blurry vision
- Yeast infections in the groin area

If your blood sugar is **240 or higher**:

1. **Check ketones**. If you do not check, you will not know if you have them.
2. If you have small, moderate, or large ketones, take **extra rapid-acting insulin right away**.
3. **Drink a lot of carbohydrate-free drinks right away**.
    - Follow the instructions for taking extra insulin in the **Sick Days** section of this book.

Call your diabetes doctor or nurse right away if you do not know what to do.

Warning signs of DKA

- Ketones in the blood and/or urine
- Vomiting or stomach pain
- Fruity odor to your breath
- Drowsiness or trouble staying awake
- Rapid and deep breathing

Go to an emergency department right away if you have any signs of DKA.

Notes

Low Blood Sugar

Low blood sugar can happen if you are taking insulin for your diabetes. It is important to know what can cause low blood sugar and how to treat it. You can prevent low blood sugar by knowing what causes it.

Causes of low blood sugar

- Taking too much insulin
- Not eating enough carbohydrate after taking insulin
- Getting more activity than usual
- Drinking alcohol

Signs of low blood sugar

- Sweating
- Shaking
- Pale skin/lips
- Very hungry
- Weakness
- Tired or drowsy
- Headache
- Irritable or grouchy
- Confused
- Seizure
- Fainting or passing out

Stop what you are doing right away and check your blood sugar if you feel any of these signs.

Low blood sugar for children age 6 and older

A blood sugar less than 70 is too low.

1. **Take 10 to 15 grams of quick-acting carbohydrate right away**, such as:
    - Drink 3 to 4 ounces of juice
    - Drink 3 to 4 ounces of soda pop that has sugar (not sugar-free)
    - Chew 3 to 4 glucose tabs
2. Wait **at least 15 to 30 minutes**. If you still feel signs of low blood sugar, then recheck it.

Repeat the cycle if your blood sugar is still less than 70. Take another 10 to 15 grams of quick-acting carbohydrate, then wait 15 to 30 minutes.

Low blood sugar for children ages 1 through 5

For young children, a blood sugar less than 80 is too low.

- Young children may not know when they feel a low blood sugar.
- Adults may notice the child is quiet, sleepy, hungry, or irritable.
- Check a fingerstick blood sugar if your child is acting differently.

If your child's blood sugar is less than 80:

1. **Give your child 5 to 10 grams of quick-acting carbohydrate right away,** such as:
    - Drink 2 to 3 ounces of juice
    - Eat 2 to 3 ounces of applesauce
2. Wait **at least 15 to 30 minutes.** If you still see signs of a low blood sugar, recheck the blood sugar.
3. **If the blood sugar is still less than 80, give your child another 5 to 10 grams of quick-acting carbohydrate.**

For children of all ages

- **Use a quick-acting carbohydrate**. Do **not** just eat a snack if your blood sugar is too low. Food does not bring the blood sugar up quickly.
- If your child's blood sugar is low at bedtime, always recheck it. Make sure it is over 90 before falling asleep.
- Do **not** take too much carbohydrate for a low blood sugar. It can cause the blood sugar will go too high later.

What should I do if my blood sugar is low right before a meal?

1. Take **quick-acting carbohydrate**.
2. **Wait 5 minutes** so your blood sugar starts to come up.
3. If you are feeling better, **take your insulin dose** to cover the carbohydrate you will eat.
    - Do **not** take extra insulin to cover the quick-acting carbohydrate you took for your low blood sugar.
4. **Start eating right away.**

Will I know if my blood sugar is low while I am sleeping?

During the night you may feel different signs of low blood sugar than when you are awake. It is possible you may not feel a low blood sugar when you are sleeping.

Signs of low blood sugar while you are sleeping are:

- Sweating
- Pounding heartbeat
- Feeling anxious, restless, or having trouble falling asleep
- Nightmares
- Hunger

If you feel any signs of low blood sugar during the night, **do not go back to sleep.** Get up and check your blood sugar.

If your blood sugar is:

- **Low:**
    - Less than 70, take 10 to 15 grams of quick-acting carbohydrate.
    - Less than 80 for **children 5 and under**, take 5 to 10 grams of quick-acting carbohydrate.
- **Between 71 to 90:**
    - Have a small snack of 5 to 10 grams of carbohydrate.
    - Smaller children aged 5 and under may only need 5 grams of carbohydrate.

Recheck your blood sugar on Dexcom or by fingerstick 1 hour later to make sure it is above 90.

When should I check my blood sugar during the night?

- **After a day with lots of exercise**, such as swimming or sports
- If your blood sugar was **low before bedtime**
- **When you are sick**, especially if you have vomiting (throwing up) or diarrhea (See Sick Days section.)
- **If you have been waking up high** every morning for 3 or more days
- When you have increased your **long-acting insulin dose.**

If you don't have a continuous glucose monitor (CGM) the best times to check your blood sugar during the night are about 3 to 4 hours after your bedtime snack, then again about 3 to 4 hours after that.

Notes

Low blood sugar (overview)

Ages 6 and older: Low blood sugar is **less than 70**

Ages 1 through 5: Low blood sugar is **less than 80**

Causes of low blood sugar

- Taking too much insulin
- Not eating enough carbohydrate after taking insulin
- Getting more activity than normal
- Drinking alcohol

Signs of low blood sugar

- Sweating
- Shaking
- Pale skin/lips
- Very hungry
- Weakness
- Tired or drowsy
- Headache
- Irritable or grouchy
- Confused
- Seizure
- Fainting or passing out

1. **Age 6 and over:** Take 10 to 15 grams of quick-acting carbohydrate right away, such as:
    - 3 to 4 ounces of juice,
    - 3 to 4 ounces of soda pop that has sugar (not sugar-free), or
    - 3 to 4 glucose tabs

    Age 1 through 5: Give your child 5 to 10 grams of quick-acting carbohydrate right away, such as:
    - 2 to 3 ounces of juice or
    - 2 to 3 ounces of applesauce
2. Wait **at least 15 to 30 minutes.** If you still feel signs of low blood sugar, recheck it.
3. If your blood sugar is still less than 70 or 80 (based on your age), take 5 to 15 grams more of quick-acting carbohydrate.

Taking too much carbohydrate for a low blood sugar will make your blood sugar go too high.

Blood sugar is low right before a meal

1. Take **quick-acting carbohydrate**.
2. **Wait 5 minutes** so your blood sugar starts to come up.
3. If you are feeling better, **take your insulin dose** to cover the carbohydrate you will eat.
    - Do **not** take extra insulin to cover the quick-acting carbohydrate you took for your low blood sugar.
4. **Start eating right away.**

Nighttime low blood sugar signs

- Feeling anxious, restless, or trouble falling asleep
- Sweating
- Pounding heartbeat
- Nightmares
- Hunger

If a blood sugar is low at bedtime, always recheck it and make sure it is over 90 before you fall asleep.

Glucagon

Glucagon for severe low blood sugar

When low blood sugar is not treated quickly it can become severely low. When this happens, you are not able to eat or drink quick-acting carbohydrate or help yourself. You could become unconscious (pass out) or have a seizure (rhythmic muscle twitching).

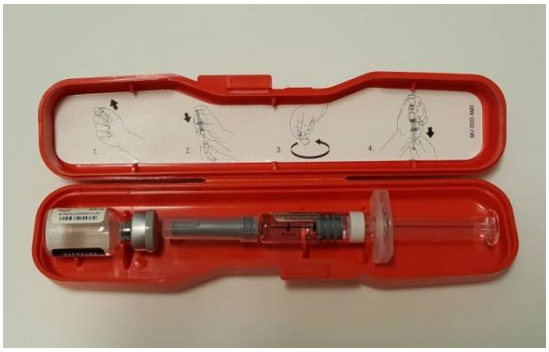
If this happens, you will need glucagon. Glucagon works by telling your liver to release sugar into your bloodstream. This will help bring your blood sugar back up.

It is important to have glucagon with you and know where it is at all times. Your relatives, teachers, coaches, friends and childcare providers need to know how and when to give it.

Glucagon comes in 4 forms:

- **Glucagon ® emergency kit or GlucaGen HypoKit ®:** This is a kit with a syringe that holds water and a small bottle of glucagon powder. It is not stable in liquid form, so it must be mixed just before giving it.
- **Baqsimi ®:** This is an intranasal powder glucagon dispenser (squirted up the nose/nostril).
- **Gvoke HypoPen ®:** This is a pre-mixed auto-injector pen. You put it in fat tissue. You do not see the needle.
- **Auto-injection of Glucagon into Fat:** This is a pre-mixed auto-injector pen. You put it in fat tissue. You do not see the needle.

Glucagon® emergency kit or GlucaGen HypoKit ®



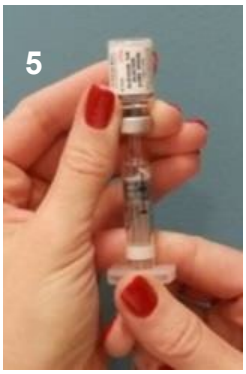
How to give Glucagon ® emergency kit or GlucaGen HypoKit ®: (injection into the muscle)

1. Pop the lid off the top of the bottle with your thumb.
2. Take the cover off the needle on the syringe. Do not remove the plastic clip from the syringe, or the pushrod could come out and the water will come out.

3. Push the needle through the rubber stopper on the bottle and inject all the water into the bottle of glucagon powder.

4. Remove the syringe from the bottle. Swirl the bottle until the liquid inside is clear and looks like water.

5. Push the needle through the rubber stopper and slowly draw out the liquid.



   - **Infants and children less than 20 pounds get 1/4 the liquid**.

     There is not a 1/4 mark on the syringe. Fill it halfway between empty and the 0.5 mg mark. This would equal 0.25 mg (1/4 of the liquid).
   - **Children weighing 21 to 44 pounds get half of the liquid.** There is a mark on the syringe for 0.5 mg (1/2 of the liquid).
   - **Children weighing over 44 pounds get all the liquid.** There is a mark on the syringe for 1.0 mg (all the liquid).

6. Inject the glucagon into the thigh muscle; in the same area where insulin is given.

7. Turn the child on his or her side.

8. Call 911 right after giving glucagon.

9. After the child is awake, alert, and can swallow, give him or her quick-acting carbohydrate, such as juice. Then give the child a carbohydrate snack with protein, such as a peanut butter sandwich.

10. Throw the used syringe and unused glucagon in a medical sharps or a puncture- proof container, such as a liquid detergent bottle or empty soda popbottle.
    - Throw away glucagon if it is not used within 1 hour of mixing it.
    - You can buy a medical sharps container at a pharmacy.

11. Call your diabetes doctor or nurse if your child needed glucagon.

Glucagon kit storage

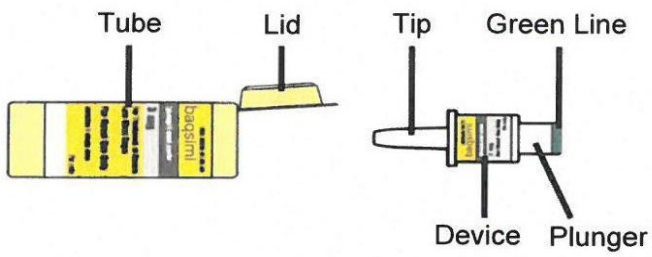
- Keep glucagon at room temperature between 59° and 86° F.
- Do **not** let it get hot.
- Do **not** let it freeze.
- Do **not** keep it in your car.
- Find the expiration date on the back of the kit.
- Get a refill at your pharmacy when it expires.

Notes

How to give BAQSIMI® (nasal spray)

For ages 4 years and older

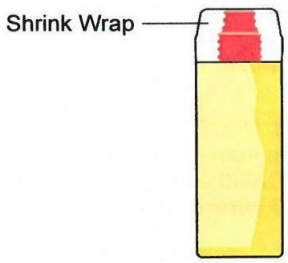
Tube and device parts



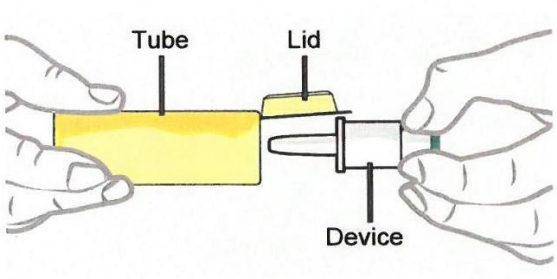
Important information:

- Do not remove the shrink wrap or open the tube until you are ready to use it.
- If the tube has been opened, BAQSIMI could be exposed to moisture. This could cause it to not work as expected.
- Do not push the plunger or test BAQSIMI before you are ready to use it.
- BAQSIMI has 1 dose of glucagon nasal powder and cannot be reused.
- BAQSIMI is for nasal (nose) use only.
- BAQSIMI will work even if you have a cold or are taking cold medicine.

Preparing the dose

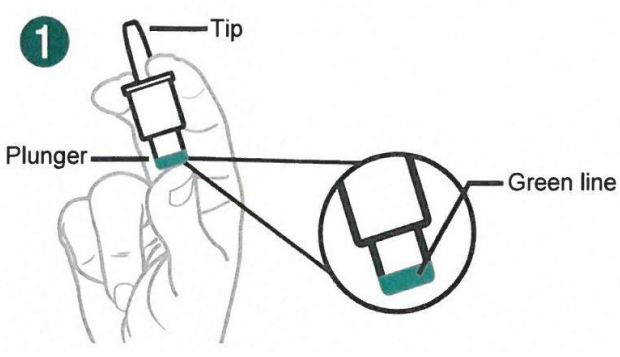


- Remove the shrink wrap by pulling on the red stripe.



- Open the lid and remove the device from the tube.
- **Warning:** Do not press the plunger until ready to give the dose.

Giving the dose



- Hold the device between fingers and thumb.
- Do not push the plunger yet.

- Insert tip gently into 1 nostril until fingers touch the outside of the nose.

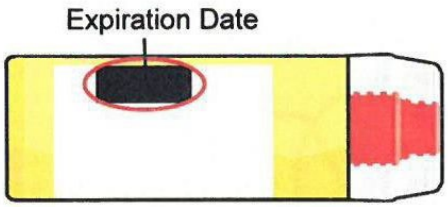
- Push plunger firmly all the way in.
- Dose is complete when the green line disappears.

After giving BASQIMI:

- Call for emergency medical help right away.
- If the person is unconscious, turn them on their side.
- Throw away the used device and tube.
- Encourage the person to eat right away. When they can safely swallow, give them a fast acting source of sugar, like juice. Then encourage them to eat a snack, like crackers with cheese or peanut butter.
- If the person does not respond after 15 minutes, give them another dose if you can.

Storage and handling:

- Do not remove the shrink wrap or open the tube until you are ready to use it.
- Store BAQSIMI in the shrink-wrapped tube at temperatures up to 86 degrees Fahrenheit (30 degrees Celsius).
- Replace BAQSIMI before the expiration date printed on the tube or carton.



Other information

- Replace the used BAQSIMI right away so you will have a new BAQSIMI in case you need it.
- Keep BAQSIMI and all medicines out of reach of children.

For questions or more information about BAQSIMI:

- Call your health care provider.
- Call Lilly at 1-800-545-5979.
- Visit baqsimi.com

Gvoke HypoPen® (auto-injection into fat)

For ages 2 years and older

Use this pre-mixed auto-injector into the fat when you:

- Have tried bringing up the blood sugar with drink or food and it is not working
- Are unable to swallow safely
- Feel like passing out
- Pass out or have a seizure

Anyone can use Gvoke with 2 simple steps[1,2]

GVOKE HypoPen™ (glucagon injection)

Gvoke™ PFS (glucagon injection) PRE-FILLED SYRINGE

1 Pull red

cap off

2 Push yellow

end down on skin and hold 5 seconds. Window will turn red.

Administer into upper arm, stomach, or thigh.

How to give Gvoke®

1. Pull off **red** cap.
2. Push **yellow** end into skin. Do this in the same place you give insulin shots. There is no button-pushing. Just push it in the skin and hold it down on the skin.
3. Listen for the click.
4. Count to 5.
5. Window will turn red.
6. Pull away from skin.
7. Roll person on their side.
8. Call 911.
9. Repeat the dose in 15 minutes if person does not respond.

Dosing for ages 2 years and older:

Weight of person	Dose
Under 100 pounds	0.5 mg per dose
Over 100 pounds	1.0 mg per dose

Storage of Gvoke®

- Store Gvoke® at temperatures between 68° and 77° F
- Do **not** keep in the refrigerator.
- Do **not** let it freeze.
- Keep Gvoke® in the foil pouch until you are ready to use it.

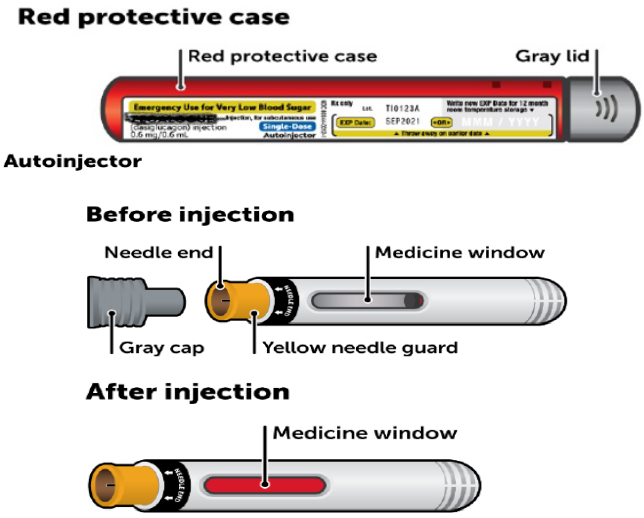
Auto-Injection of Glucagon into Fat

For ages 6 years and older

Use this pre-mixed auto-injector of glucagon into the fat when you:

- Have tried bringing up the blood sugar with drink or food and it is not working
- Are unable to swallow safely
- Feel like passing out
- Pass out or have a seizure

Parts:

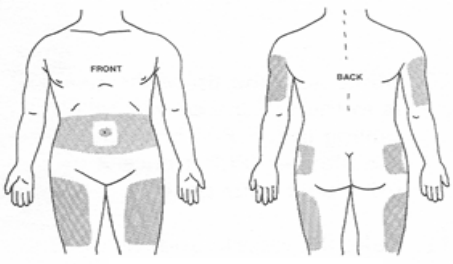


Storage

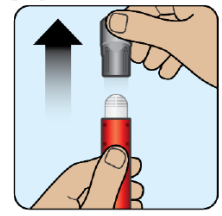
- Store autoinjector in the refrigerator between 36° and 46° F (2° to 8° C).
- Do **not** let it freeze.
- Keep in the **red** case.
- It can be stored at room temperature between 68 to 77 F (20 to 25 C) for up to 12 months.
    - Do not put it in the refrigerator after stored at room temperature.
    - Throw it away if it is at room temperature for more than 12 months.
- Replace it before the expiration date on the **red** case.

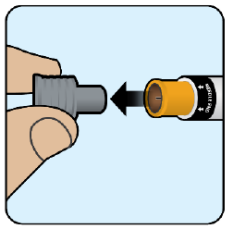
How to give auto-injection of glucagon

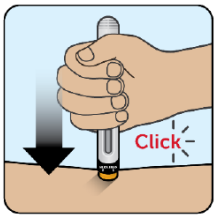
1. Choose an injection site.
2. Roll back clothing. Do **not** inject through clothes.
3. Hold the **red** protective case upright. Pull off the **gray** lid.
4. Take autoinjector out of the **red** case. Do **not** drop it.
5. Pull the **gray** cap straight off the needle.
    - Do **not** put your hand near the **yellow** needle guard. Touching it may cause it to inject.
6. Push **yellow** end straight into the skin. The **yellow** needle guard with be fully down. You may hear a click.
7. Hold it for 10 seconds. The **window will turn red** when the full dose is given.
8. Lift the autoinjector straight out of the skin. The **yellow** needle guard will cover the needle and lock.

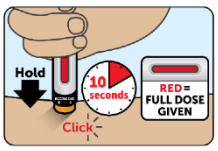


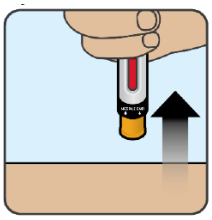
Injection Sites





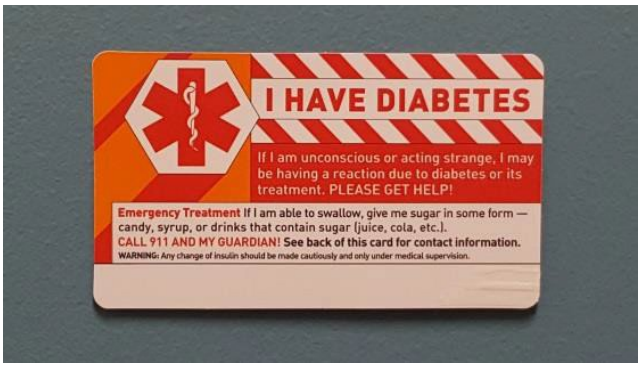






Medical identification

It is important that all people living with diabetes wear or carry medical identification, such as a necklace or bracelet. Your health and safety are important. If you are not able to help yourself then other people would be able to help you if they know you have diabetes.



There are many online companies that sell medical identification. The Safety Store at University of Iowa Stead Family Children's Hospital sells medical identification bracelets. The Safety Store is on Level 1 of the children's hospital.

Diabetes supply management

Be prepared for times when you may not have ready access to your diabetes supplies such as:

- **School lockdown (**unable to access nurse's office). Develop a school care plan with details and keep quick-acting carbohydrate in each classroom.
- **Severe weather (**no access to a pharmacy for up to three days). Always keep a 3-day supply of your medications and supplies on hand.
- **Travel** such as broken or lost luggage. Never store diabetes supplies in a car or in checked airline baggage. Always carry-on supplies and pack more than needed for length of trip.

Try to have a plan for where to keep extra supplies with you or another person should these situations happen.

Remember to check the supply often. Rotate items out so they do not expire.

Exercise and Diabetes

Exercising, or being active, is an important part of taking care of your diabetes and in staying healthy. It helps your insulin work better.

Regular exercise may:

- Help with blood sugar control and keep your body at a healthy weight. Your body likes to use carbohydrate for energy.
- Make your muscles and bones stronger.
- Give you more energy.
- Help with stress and make your mood better.
- Help you sleep better.

If you are not used to being active, it can be hard at first. After you exercise regularly, it gets easier to do each day. All exercise is good for you. Here are some ideas for getting active.

Indoor activities at home

- Climbing stairs
- Dancing
- Videos for aerobics, dancing, Zumba, or yoga
- Jumping rope
- Lifting weights
- Ping pong
- Swimming or water aerobics
- Treadmill, elliptical, or stationary bike
- Vacuuming or putting away laundry
- Wii Fit or Wii Sport
- Yoga

Outdoor activities in summer

- Hula hooping
- Jumping on the trampoline
- Playing basketball
- Riding your bike
- Rollerblading or skating
- Swimming
- Throwing a frisbee or ball
- Walking or jogging
- Water sports, like canoeing, kayaking, or paddle board

Outdoor activities in winter

- Cross country or downhill skiing
- Ice fishing
- Ice skating
- Scooping or snow blowing sidewalk or driveway
- Sledding or playing in the snow
- Walking outside or inside (mall walking)

Sports

- Baseball or softball
- Basketball
- Bowling
- Boxing or kick boxing
- Curling or hockey
- Dance
- Football
- Golf or frisbee golf
- Gymnastics
- Horseback riding
- Martial arts
- Soccer
- Swimming
- Tennis
- Volleyball

How much activity do I need?

Anything is great! Try for 60 minutes each day. It does not have to be all at the same time.

For example:

School PE class:	30 minutes
Walking the dog:	15 minutes
Riding your bike with friends	15 minutes
Total:	60 minutes

How can I keep my blood sugar in a normal range with activity?

Activity can make your blood sugar go down. Check your blood sugar and eat extra carbohydrate when needed to help keep you safe from low blood sugar.

If you have small, moderate, or large ketones, you should not exercise. You may exercise with trace ketones. Drink a lot of carb-free fluids and treat the ketones with rapid-acting insulin and continue to check ketones every 1 1/2 hours.

See **Ketones** section and call your diabetes team for assistance with ketones.

Check your blood sugar before, during, and after activity.

Before activity blood sugar	Treatment
Less than 80	Take 15 grams of quick-acting carbohydrate. This will help you get your blood sugar up quickly before you start. **For younger children, use only 10 grams of quick-acting carbohydrate.**
80 to 150	Take a 10 to 15-gram carbohydrate food snack that has protein. Carbohydrate with protein will help keep your blood sugar in normal range during the activity. **For younger children, use only 5 to 10 grams of quick-acting carbohydrate.**
Over 150	Go to the activity. No extra carbohydrate is needed.

During activity blood sugar This will help you decide if you need more carbohydrate. Check blood sugar each hour during exercise.	Treatment
80 to 150	Take 10 to 15 grams of carbohydrate. Check blood sugar again in 1 hour. **For younger children, use only 5 to 10 grams of quick-acting carbohydrate.**
Over 150	Drink carb-free fluids for hydration. No carb snack is needed. Check blood sugar again in 1 hour.

After activity, check to see if what you did to prevent a low blood sugar worked. Use this information to make a change, if needed, the next time you exercise.

These guidelines may not work for every child or teen but are a safe place to start. They can be different for each type of activity. Make changes when needed.

Activity can lower your blood sugar up to 24 hours after the activity is over. Always keep extra quick-acting carbohydrate and snacks close by.

Sometimes your blood sugar can go high with activity. With "stop and go" sports, such as basketball, the body releases extra sugar. If your blood sugar is high before the activity, it could go higher during and afterward. Check a blood sugar before you start the activity to see if you need a snack. If your blood sugar is over 150, you may not need a snack.

Continuous Glucose Monitoring (CGM)

What is continuous glucose monitoring?

Continuous glucose monitoring is a way to track your blood sugar about every few minutes, day and night. At any moment, you can look at your blood sugar or you can look back at how your blood sugar changes over a few hours or days to see trends. Seeing glucose levels in real time can help you make decisions throughout the day about how to balance your food, exercise and insulin.

With most CGM systems you get most of your blood sugars from the CGM and you no longer have to check your blood sugar with a fingerstick unless your CGM is off or disabled.

How does a continuous glucose monitor (CGM) work?

A CGM works through a tiny sensor inserted under your skin, usually on your belly or arm but can be placed anywhere you have fat. The sensor measures sugar found in the fluid between the cells every few minutes. A transmitter wirelessly sends the information to a receiver.

This receiver could be a smartphone, separate monitor or an insulin pump and displays your current blood sugar. Most models have alarms for lows and highs as well as trend arrows showing the direction your blood sugar is going.

Your diabetes doctor or nurse can help you decide which one is best for you and the pharmacy can help to see if it is covered by your insurance.

You should always keep a fingerstick blood sugar meter with you in case the CGM is not working or you run out of supplies. Your meter is always your back up plan.

Insulin-to-Carb Ratios to Calculate Meal Insulin Doses

Some children and teens want or need options in meal planning. Using an insulin-to- carb ratio is a way for you to get the right amount of insulin for the carbohydrate you eat if you are not sticking to a carbohydrate pattern. Then you can eat different amounts of carbohydrate at each meal.

Use an insulin-to-carb ratio if you:

- Are not sure your very young child will eat all the carbohydrate in the meal
- Are not hungry
- Do not like some foods served with a meal
- Are eating a meal with a lot of carbohydrate
- Are eating a low carbohydrate meal
- Need or want a larger snack
- Like the flexibility it will give you

Calculate an insulin-to-carb ratio by dividing the normal carbohydrate eaten at a meal by the usual amount of insulin needed to cover the carbohydrate. That equals the ratio.

$$\frac{\textbf{Current carbohydrate amount you eat at that meal}}{\textbf{Current dose for that meal}} = \textbf{Ratio}$$

You and your diabetes team will decide if you should use this every day or on occasion. When you use it on occasion, you need to recalculate to see if your ratio has changed since the last time you used it.

It is best to try to eat the amount of carbohydrate your doctor or dietitian suggests. This will help you stay at a healthy weight.

The insulin-to-carb ratio means you will take 1 unit of insulin for a certain amount of carbohydrate.

- If your insulin-to-carb ratio is 1 unit of insulin for every 10 grams of carbohydrate (written 1:10), you will take 1 unit of insulin for every 10 grams of carbohydrate you eat.

To use an insulin-to-carb ratio, you need to:

- Plan ahead and eat all your meal.
- Take your rapid-acting insulin 15 minutes before you eat.
    - The only time it is okay to take the rapid-acting insulin after eating is for very young children who may not eat everything. If a child is taking their insulin after they eat, they must take it as soon as they finish eating, within 30 minutes of their first bite of food.

Taking insulin after eating will always result in a high blood sugar a few hours later.

Taking insulin before eating and then not eating all the planned carbohydrate will result in a low blood sugar when the rapid-acting insulin peaks.

If you will be using an insulin-to-carb ratio to calculate rapid-acting insulin doses, you will need to be accurate at counting carbohydrate and doing math to calculate your dose.

Here is how it works: Divide **Total grams of carbohydrate = Dose of insulin Ratio**

Practice example 1

- Your breakfast ratio using rapid-acting insulin is 1:10.
- You plan to eat a **total** of 55 grams of carbohydrate.

1. Divide your total grams of carbohydrate by your ratio of 10.
   55 ÷ 10 = 5.5
2. Your breakfast dose will be 5.5 units of rapid-acting insulin.

Practice example 2

- Your lunch ratio using rapid-acting insulin is 1:20.
- You plan to eat 55 grams of carbohydrate.

1. Divide your total grams of carbohydrate by your ratio of 20.
   55 ÷ 20 = 2.75
2. Round up to the nearest half unit. 2.75 rounded to the nearest half unit is 3.
3. Your lunch dose will be 3 units of rapid-acting insulin.

Your ratio may be the same or different at each meal.

Remember: using an insulin-to-carb ratio of 1:10 gives you more insulin than if you use a ratio of 1:20. **The lower the ratio number, the higher the insulin dose.**

When deciding whether to round up or down, think about:

- Rounding up if your blood sugar is high
- Rounding down if your blood sugar is low
- What you will be doing in the next few hours, such as being active or sitting around

This can be confusing at first but doing the math can help you better understand.

Things to remember when changing insulin doses:

- If the pattern happens at the blood sugar check **before breakfast**, change the **long-acting insulin** dose by 10 percent.
- If the pattern happens at the blood sugar check **before lunch**, change the **breakfast rapid-acting insulin** dose by 10 percent.
- If the pattern happens at the blood sugar check **3 to 4 hours after lunch**, change the **lunch rapid-acting insulin** dose by 10 percent.
- If the pattern happens at the blood sugar check **3 to 4 hours after supper** (before bedtime snack), change the **supper rapid-acting insulin** dose by 10 percent.
- If your blood sugar is above 180 two to four hours after a meal, ask what caused it. Some reasons for high blood sugar 2 to 4 hours after eating are:
    - Not taking insulin at least 15 minutes before eating
    - Eating too much carbohydrate or too much **quick-acting** carbohydrate
    - Not taking enough insulin to cover the carbohydrate
    - Not eating protein or fat in your meal
    - Eating a very high fat meal

  If you rule out numbers 1 and 2 above, you may need to take more insulin next time.
- If the pattern is **high blood sugar**, you will **increase the insulin dose** that affects that column of blood sugars. That means you'll **lower the ratio number.** This is called **strengthening the ratio.**
- If the pattern is **low blood sugar**, you will **decrease the insulin dose** that affects that column of blood sugars. That means you'll **raise the ratio number.** This is called **weakening the ratio.**

Hyperglycemia Correction Factor (correction factor for high blood sugar)

When can I give more insulin for high blood sugar?

Your blood sugar will sometimes go above your target range and this is considered high blood sugar.

Causes of high blood sugar:

- Eating too much carbohydrate or quick-acting carbohydrate
- Not enough activity
- Stress
- Not taking enough insulin
- Forgetting to take insulin
- Illness or infection
- Injury or surgery

Your diabetes doctor or nurse will help you find the right amount of insulin to bring your blood sugar into target range. This is called a **hyperglycemia correction or correction factor.**

To start, your care team will help you learn how to use a correction factor. You only give extra insulin at mealtime when your blood sugar is high and out of target range. By only using these corrections at mealtimes, you will not give too much insulin too soon. Giving insulin too close together could cause a low blood sugar. **Do not give high blood sugar corrections more than 3 hours.**

Here is an example:

Johnny has a blood sugar at lunch of 297. He checks for ketones and is negative. He drinks a big glass of water because he knows when he has high blood sugar, he urinates (pees) more often and needs to stay hydrated. Now he is getting ready for lunch. He is going to take his usual 9 units for the carbohydrate in his lunch. He knows since his blood sugar is high (out of target range-hyperglycemia) he can give a little extra insulin to help bring that blood sugar down.

His correction factor is: 1 unit per 50 points above 150.
This may be written as: 1/50>150 or 1:50>150

Example correction scale for an older, larger child/adolescent is:

Blood sugar right before a meal	Give this amount as extra rapid-acting insulin
151 to 200	1 unit
201 to 250	2 units
251 to 300	3 units
301 to 350	4 units
351 to 400	5 units
401 to 450	6 units
451 to 500	7 units
501-550	8 units
551-600	9 units
Over 600 or HI on meter	10 units

Therefore, Johnny could take his usual 9 units for the carbs in his lunch **plus** 3 units since his blood sugar before lunch is 297. 9 + 3 = 12 units total.

He should check his blood sugar in 2 hours to see how the correction worked. He should not take another correction for at least 3 hours. Most likely, he will just take it again at the next meal.

Example correction scale for a younger, smaller child is:

Blood sugar right before a meal	Give this amount as extra rapid-acting insulin
151 to 200	0.5 unit
201 to 250	1 unit
251 to 300	1.5 units
301 to 350	2 units
351 to 400	2.5 units
401 to 450	3 units
451 to 500	3.5 units
501-550	4 units
551-600	4.5 units
Over 600 or HI on meter	5 units

This correction factor is: 0.5 unit per 50 points above 150
This may be written as: 0.5/50>150 or 0.5:50>150

This is weaker than the example above for a larger child. The diabetes team will decide which one is best for you. Yours may be weaker or stronger than these examples based on how much insulin your body needs to bring down high blood sugar.

Bedtime Corrections
A high blood sugar correction at bedtime could cause a low blood sugar when you or your family is asleep. If you must do a correction at bedtime, you need to set an alarm and check your blood sugar in 2 hours or wear a CGM and have the alarms set.

School, Daycare, and Diabetes

Many children spend most of their waking hours in the care of adults other than their parents. Parents of children living with diabetes need to make sure their child is safe and not treated differently than other children.

In order to make this happen, parents need to spend time educating school and daycare staff. Parents are the best people to teach others about their child's diabetes and what needs to be done to care for their child. School staff should be educated each school year.

It is very important that teachers, coaches, and all caretakers know the signs of low blood sugar and how to treat it.

The Diabetes Medical Management Plan (DMMP) is a document that your child's diabetes nurses, school health staff, parents, and child should fill out each school year. After the DMMP is filled out, it will have specific information about how to safely care for your child at school and during school activities. A blank DMMP can be found on the ADA website (diabetes.org).

Your parents must sign a release of information form for the diabetes education team members to talk to your school staff about your diabetes. The nurses will give this to you.

Resources

To help parents teach caretakers, there is good, up-to-date information online.

Visit these websites:

- **American Diabetes Association (ADA)** at diabetes.org. Click on "Life with Diabetes," then "Diabetes at School." This section will help with school planning for children ranging in age from daycare through college. Under "Written Care Plans" you can find information on Diabetes Medical Management Plan and Section 504 Plan.
- **Breakthrough T1D -formerly known as Juvenile Diabetes Research Foundation (JDRF)** at breakthrought1d.org. There is information for parents and school staff. Type "school" in the search button and look through the choices or click on T1D Resources Library at the bottom of the home screen.

Talk to your diabetes nurses and doctors. Your diabetes nurse educator will give you all the paperwork needed to inform the school staff about diabetes. They will communicate with school staff throughout the school year, if needed.

The following pages go over the basic diabetes information that all school staff should know.

Low blood sugar

Ages 6 and older: Low blood sugar is **less than 70**

Ages 1 through 5: Low blood sugar is **less than 80**

Causes of low blood sugar

- Taking too much insulin
- Not eating enough carbohydrate after taking insulin
- Getting more activity than usual
- Drinking alcohol

Signs of low blood sugar

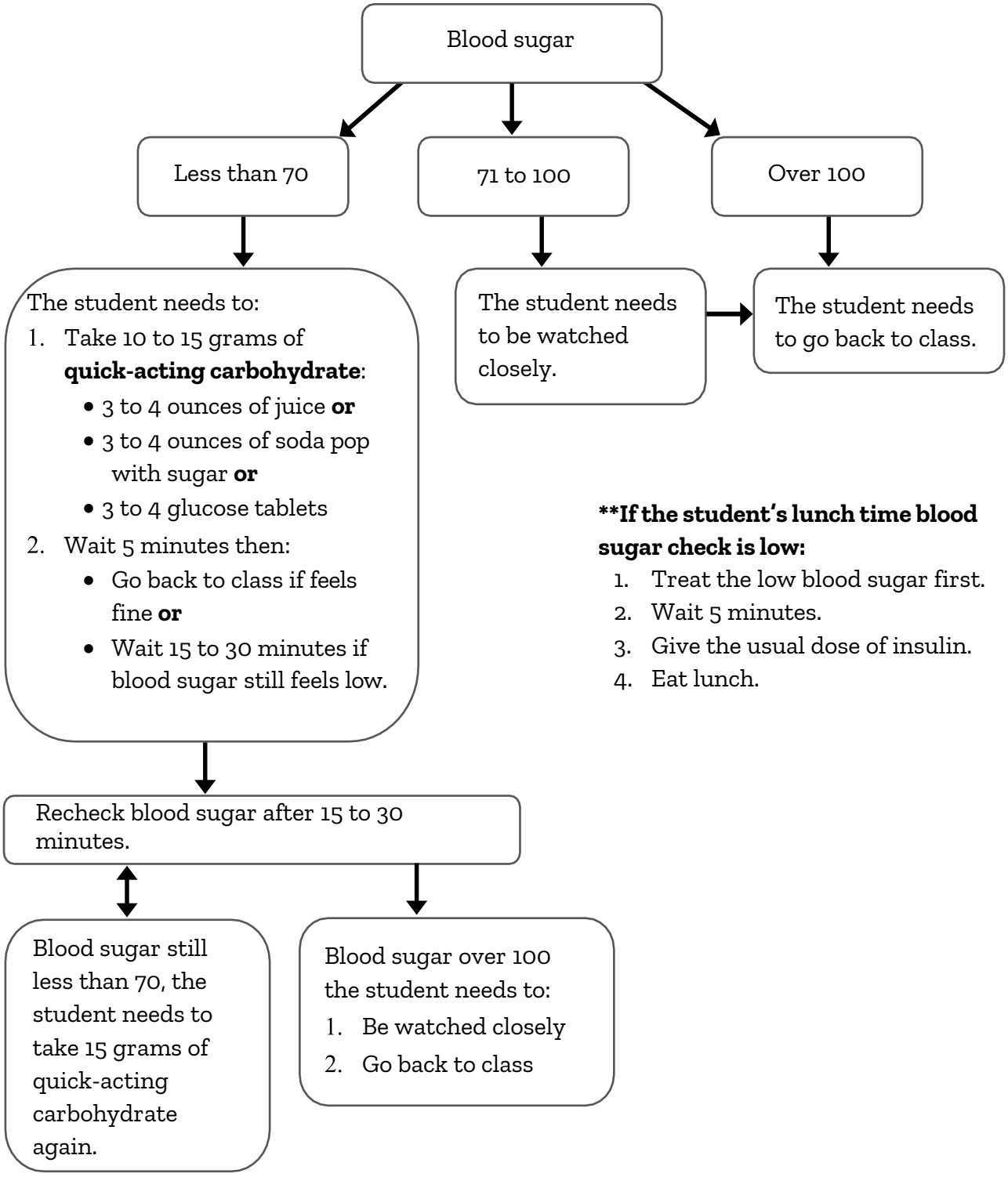
- Sweating
- Shaking
- Pale skin/lips
- Very hungry
- Weakness
- Headache
- Irritable or grouchy
- Confused
- Seizure
- Fainting or passing out

What to do for a low blood sugar

1. **Age 6 and over:** Take 10 to 15 grams of quick-acting carbohydrate right away, such as:
    - 3 to 4 ounces of juice,
    - 3 to 4 ounces of soda pop that has sugar (not sugar-free), or
    - 3 to 4 glucose tabs

    Age 1 through 5: Give your child 5 to 10 grams of quick-acting carbohydrate right away, such as:
    - 2 to 3 ounces of juice or
    - 2 to 3 ounces of applesauce
2. Wait **at least 15 to 30 minutes.** If you still feel signs of low blood sugar, recheck it.
3. If your blood sugar is still less than 70 or 80 (based on your age), take 5 to 15 grams more of quick-acting carbohydrate.

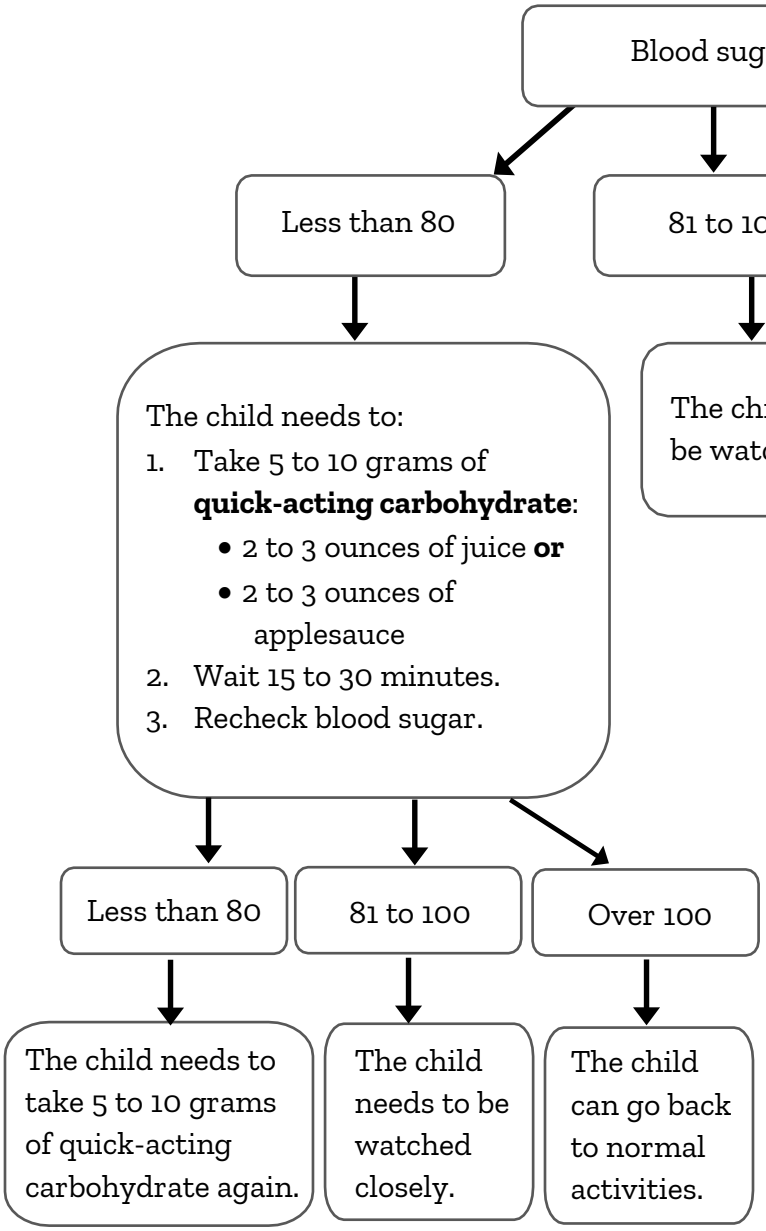
Low blood sugar: Ages 6 and older



****If the student's lunch time blood sugar check is low:**

1. Treat the low blood sugar first.
2. Wait 5 minutes.
3. Give the usual dose of insulin.
4. Eat lunch.

Low blood sugar: Ages 1 through 5

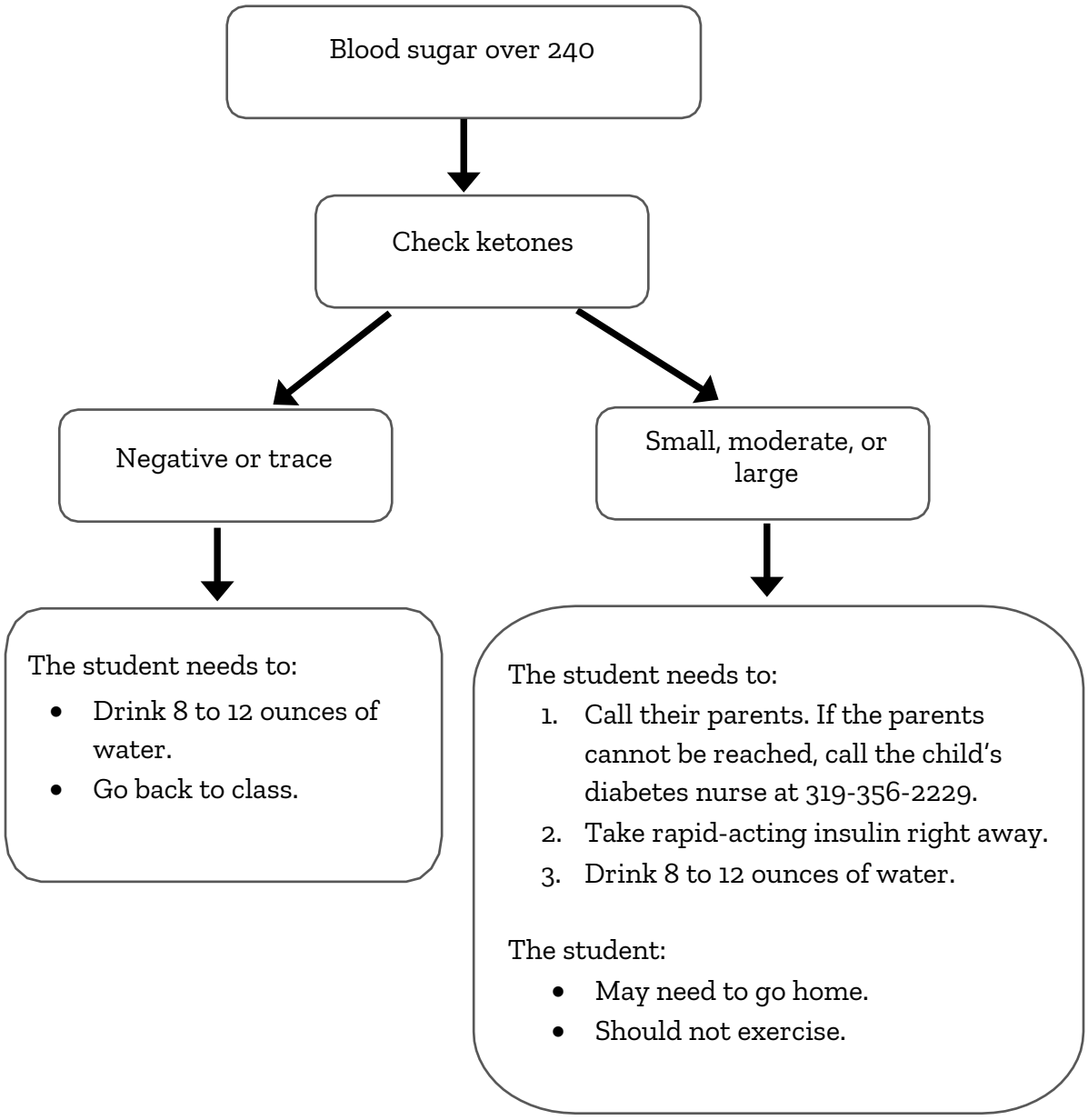


****If the child's lunch time blood sugar check is low:**

1. Treat the low blood sugar first.
2. Wait 5 minutes.
3. Give the usual dose of insulin.
4. Eat lunch right away.

High blood sugar and ketones

There are many reasons blood sugar can go too high. It is normal to have high blood sugar occasionally. Talk with the student's parents if blood sugars are always high at school. A change in insulin may be needed.



Carbohydrate meal plan at school

Children with diabetes follow a carbohydrate meal plan. A doctor's order will be sent to school with the child's carbohydrate needs. Teachers, lunchroom workers, and childcare workers need to know the child's needs.

The child may pick foods from the normal lunch menu or bring their own lunch. It is best if the carbohydrate for all foods is printed on the monthly lunch menu. Then parents and students can plan ahead.

Some children may also need mid-morning or mid-afternoon snacks. Many children take **extra** carbohydrate before an active time to prevent low blood sugars.

For younger children, an adult must make sure the child eats all the carbohydrate. If they do not eat all of it, give them another food with the same amount of carbohydrate.

By planning, children can often join in all school parties that have special treats.

Blood sugar checking

The blood sugar is a guide as to the amount of insulin a child with diabetes needs. A blood sugar is always checked before a meal. A doctor's order will be sent to school with the times a blood sugar should be checked. All blood sugars checked at school should be sent home to the parents each day.

Responsible older students may carry blood sugar checking supplies with them. Then they can check blood sugars in the classroom. The diabetes health care team can help identify which students would benefit from carrying their own supplies.

Keep quick-acting carbohydrate in all classrooms. The school nurse and parents should develop a diabetes school plan. In the event of a fire, tornado or real event, an adult should be assigned to carry quick-acting carbohydrate for the student.

Diabetes Clinic Visits

You will come to the Diabetes Clinic, in the Pediatric Specialty Clinic on Level 2 inside UI Hospitals and Clinics, every 3 to 4 months.

Before your visit

Make sure your blood sugar log is up to date. You can use programs to download your meter at home. Your diabetes nurses can teach you how to do it.

Bring:

- Your blood sugar log if not using continuous glucose monitoring
- All your blood sugar meters
- Your insulin (if you will be eating a meal away from home)
- Quick-acting carbohydrate in case of a low blood sugar
- A list of questions or concerns you may have

During your visit

You **will**:

- Get a finger stick for a blood test called A1c. The A1c test result tells your average blood sugar over the past 3 to 4 months.
- Get a blood pressure check to make sure it is in the normal range.
- Have your height and weight checked. Growing well is an important sign of good diabetes control.

You will see your pediatric endocrinologist or pediatric nurse practitioner. This person is a specialist who cares for children and teens with diabetes. They will:

- Do an exam of your body, including looking at your fingertips and areas where you get shots.
- Look at your blood sugar log and meter download with you. They will talk with you about patterns in your blood sugars.
- Talk with you about your A1c results.
- Give advice on changing insulin doses or other changes that may be needed.
- Listen to your concerns and answer any questions you may have.

You can also schedule an appointment with other diabetes specialists on the same day as your visit with the doctor or nurse practitioner. Please plan ahead when scheduling this appointment so we are sure we have the time reserved to see you.

- A **certified diabetes care and education specialist (CDCES)**. This person is either a registered nurse or registered dietitian who specializes in taking care of children and teens with diabetes.
- Our CDCESs teach according to standards set by the American Diabetes Association (ADA).
- The UI Stead Family Children's Hospital Pediatric Diabetes Education Program is certified by the ADA.
- You may schedule time with the **pediatric diabetes nurse educator** any time you and your family have education needs.
- Once a year, you and your family will be scheduled to meet with a **dietitian** for 30 minutes because your child's nutrition needs change as they grow.
- You can also schedule time with the **pediatric social worker**. This person can help with any insurance, financial, travel, or coping/emotional needs.
- We also have a **pediatric psychologist** that can assist you with any emotional needs or coping issues related to your diabetes.

Lab tests done during your visit are:

- **A1c:** Doing an A1c gives your doctors and nurses a view of what is happening over time, like a movie. A blood sugar check, like you do at home, only gives "1 picture" or a snapshot. You will get a finger poke A1c at each diabetes clinic visit, about every 3 to 4 months.
- **Thyroid function tests**: People with type 1 diabetes have a higher chance of getting hypothyroidism (under-active thyroid gland). Blood is taken from a vein in the arm. The test tells whether your thyroid gland is working normally. This test is drawn every 18 months but may be more often.
- **Lipid panel**: People with diabetes have a higher chance of getting heart disease. Blood is taken from a vein in the arm. The test measures fats in your blood. This test is drawn in the first year after diabetes diagnosis and then every few years after that.
- **Urine microalbumin**: People with diabetes have a higher chance of getting kidney disease. A urine sample is collected. The test measures protein in the urine and may help show early kidney disease. This test will be done 1 time a year after you have had diabetes for 4 years.
- **Celiac disease tests:** People with type 1 diabetes have a higher chance of getting celiac disease. You develop a gluten sensitivity/allergy making it hard to digest food). Blood is taken from a vein in the arm. This test is the first step in helping decide if a person has it. This test is drawn every 18 months.

Any time you need a blood test drawn from a vein you can get numbing cream or spray before the needle poke. This lessens the pain you feel.

After your visit

You will be given paperwork listing the changes or advice talked about during your visit. If you have MyChart, this After Visit Summary can be viewed in there as well.

Please check out with a scheduler and make your next diabetes clinic appointment.

Hemoglobin A1c and Staying Healthy

There are many ways you, your family, and your care team will know if your diabetes is in good control.

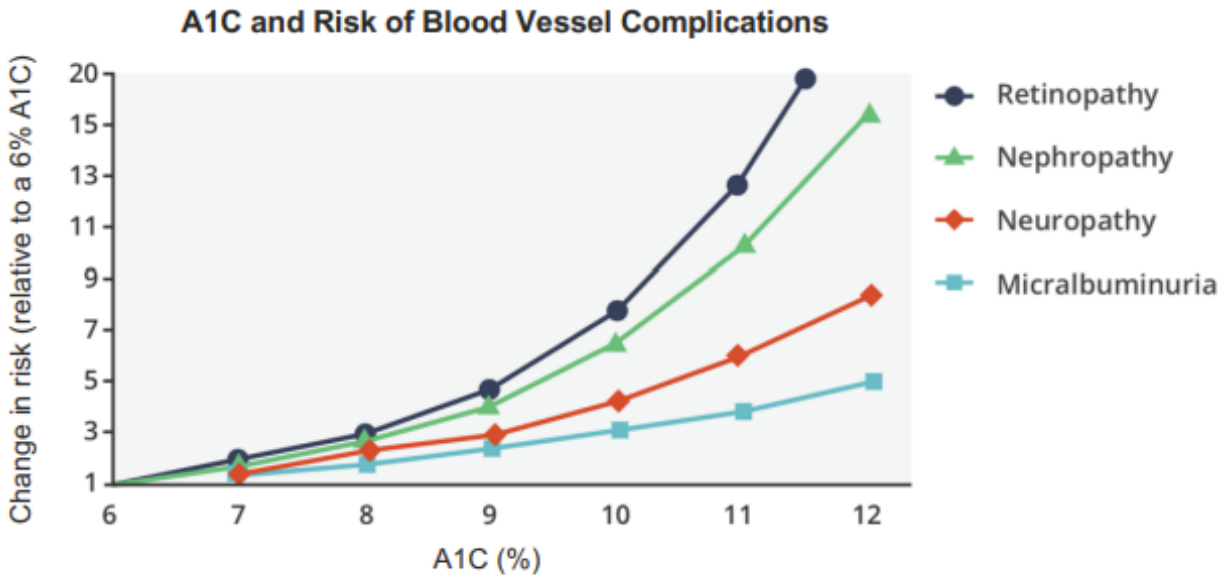
- **Blood sugar records.** The doctors and nurses will:
  - Look at your blood sugar records
  - Download your blood sugar meter readings when you come to visits
  - Look for trends in your blood sugars and can make suggestions for changes you can make to better control your blood sugars
- **Hemoglobin A1c (A1c) results.**
  - Every 3 to 4 months when you come for appointments you will have a test called A1c.
  - The nurse will do a finger stick and get a small drop of blood from your finger. In less than 10 minutes you will get the result.
  - The result is the **average amount of sugar in your blood stream in the past 3 to 4 months.**
  - The higher your blood sugar during the past 3 to 4 months, the higher the A1c will be.
  - Kids under age 18 should try to have an A1c of 7.0 percent or lower. This is the same as an average blood sugar of 170.

A1c (%)	Average blood sugar (MG/DL)
6	135
7	170
8	205
9	240
10	275
11	310
12	345

Hemoglobin A1c level compared to daily blood sugar levels

Keeping your A1c as close to normal as possible, throughout your life, will help your organs stay healthy. This lowers your chance of long-term health problems.

The chart below shows the risk of getting eye (retinopathy), kidney (nephropathy), and nerve (neuropathy) disease compared to the A1c result.



DCCT, Diabetes Control and Complications Trial

1. Adapted from Skyler JS. *Endocrinol Metab Clin North Am.* 1996;25:243-254.
2. DCCT. *N Engl J Med.* 1993;329:977-986
3. DCCT. *Diabetes*. 1995;44:968-983

Your doctors and nurses want to teach you how to take good care of yourself, so these things do not happen to you.

It is important for you to:

- Come to your diabetes appointments and get your A1c checked every 3 to 4 months.
- Keep track of your blood sugars and make changes to your insulin doses when needed.
- Eat healthy and count carbohydrate each time you eat or drink so you can match your insulin dose to the carbohydrate.
- Be active every day to help balance your blood sugar and lower your chance of heart disease.
- Get your blood pressure checked at each diabetes visit every 3 to 4 months.
- Get your urine checked for a protein called microalbumin. This will be done 4 years after you find out you have diabetes and each year after that.
- Get your blood checked for cholesterol and other fats in your blood within the first year after you find out you have diabetes and every few years after that if it is normal.
- See an eye doctor (optometrist or ophthalmologist) at the age of 10 or after you have diabetes for 3 to 5 years. Then see them 1 time a year after that.
- Visit the dentist every 6 months. Brush and floss each day. Be sure to tell your dentist you have diabetes.
- Keep up to date on your scheduled immunizations.
- Get an influenza vaccine each year.

Long-term Problems from High Blood Sugar

High blood sugar over a long period of time, such as months or years, causes damage to body organs. This damage is not usually seen for 10 years or longer.

High blood sugar, over time, leads to:

- Kidney damage and kidney failure
- Blood vessel damage that can cause heart attacks and strokes
- Eye disease that can cause poor vision or blindness
- Nerve damage that can cause pain like pins and needles in the feet
- Sores on the feet or legs that do not heal and could lead to removal of a toe, foot, or leg
- Sexual problems, such as not being able to get an erection

Take care of your diabetes and keep most of your blood sugars near the normal range throughout your life to lower your chance of these long-term problems.

High blood sugar, over time leads to issues with:

Eyes

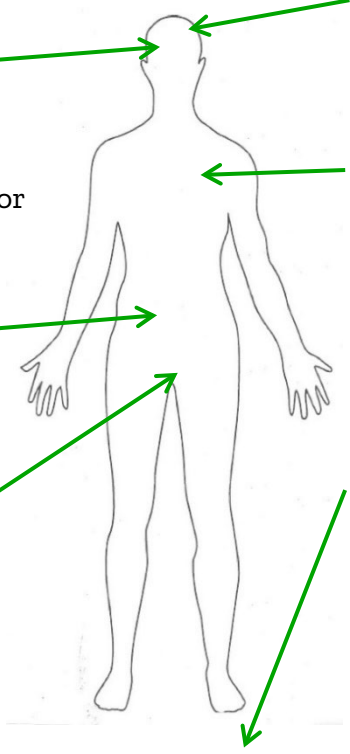
- Retinopathy
- Eye disease that can cause poor vision or blindness
- Glaucoma

Kidneys

- Nephropathy
- Kidney damage
- Kidney failure
- High blood pressure

Autonomic neuropathy

- Sexual problems, such as not being able to get an erection



Brain

- Blood vessel damage that can cause strokes

Heart

- Blood vessel damage that can cause heart attack
- Hardening of the arteries
- Clogged blood vessels
- High blood pressure

Peripheral neuropathy

- Nerve damage that can cause pain like pins and needles in the feet
- Sores on the feet or legs that do not heal and could lead to removal of a toe, foot, or leg

How and When to Change Your Insulin Dose (insulin adjustment)

You need to learn how to change insulin doses on your own. We will help you until you can do it on your own.

Insulin doses need to be raised or lowered:

- Throughout life as you grow
- For different activities
- For foods that may affect your blood sugar differently
- When you are sick

Changing (or adjusting) insulin doses is something you will do throughout your life. You use the blood sugar trends or patterns to make decisions. We usually call this **insulin adjustment.**

The information on the following pages may be hard to learn. Learning to change insulin doses can take time. It is important to learn this because changing insulin doses at home when needed and between diabetes appointments will help to control your blood sugar.

It is better to **prevent** high blood sugar than to **chase** them with extra insulin at the time of the high. It is better to **prevent** low blood sugar than to **chase** them with extra quick-acting carbohydrate. Your diabetes nurse educator will teach you how to change your insulin doses to prevent high or low blood sugar. We will help you by phone or email for several months after you find out you have diabetes. After you learn to change insulin doses without our help, we are still here to help you when you need.

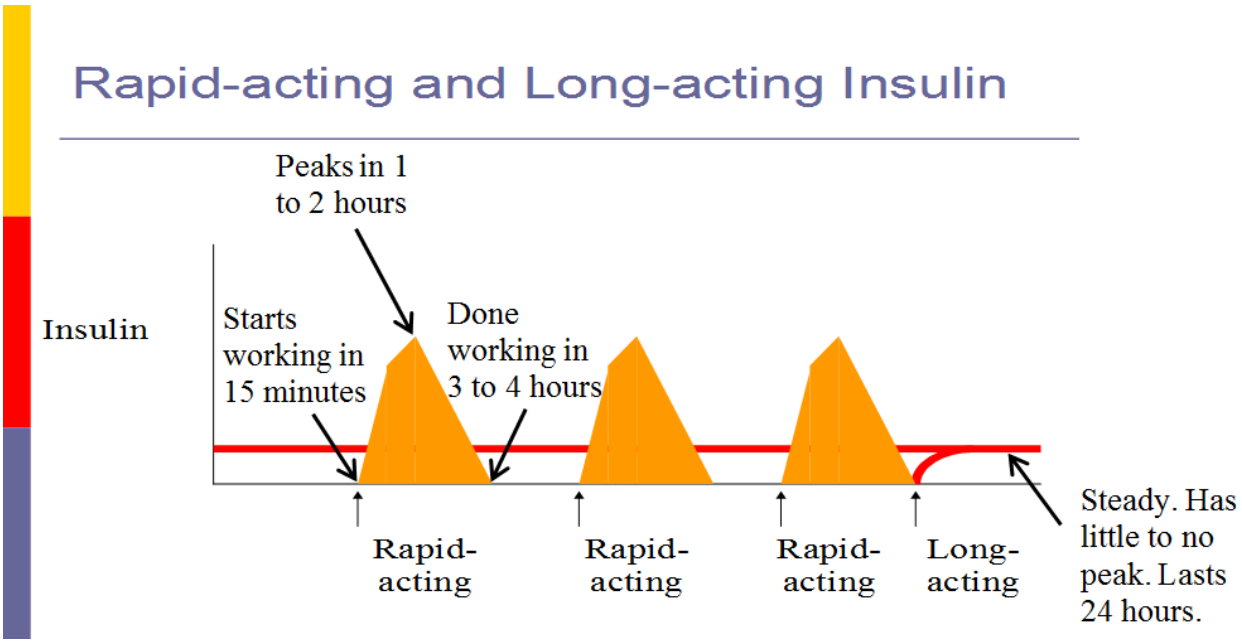
To start, you need to check your blood sugar at least 6 times per day or wear a CGM. If you check your blood sugar with a fingerstick, you need to write down your blood sugars on a log sheet or download your meter onto a computer.

If you have a CGM, you can use the software to review trends in your blood sugar to make insulin adjustments.

Before you learn how to change insulin doses, you will need to know:

1. The action of both your long-acting and rapid-acting insulins:
    - When insulin starts to work
    - When insulin peaks
    - When insulin is done working

Learning when insulin works will help you know which insulin dose to change.



2. Your target ranges for blood sugar based on time of day.

Time	Blood sugar target range
Before meals	70 to 150
Bedtime and during the night	90 to 150

    - Try to get **half** of your blood sugars in the target range.
    - It is okay to have 2 to 4 low blood sugars in a week.
    - The rest of your blood sugars may be higher than the target range.

3. What causes high blood sugar:
    - Eating too much carbohydrate or too much quick-acting carbohydrate
    - Not enough activity
    - Stress
    - Insulin may need to be increased
    - Forgetting to take insulin
    - Illness or infections
    - Injury or surgery
4. What causes low blood sugar:
    - Taking too much insulin
    - Not eating enough carbohydrate after taking insulin
    - Getting more activity than normal
    - Drinking alcohol
5. When you check your blood sugar, the number tells us how well your last dose of insulin worked.
    - For example: Meal rapid-acting insulin peaks in 1 to 2 hours and lasts 3 to 4 hours. Your **blood sugar taken 2 hours after the meal** tells us how well the peak of the insulin covered the peak of the blood sugar from the carbohydrates you ate. Your **blood sugar taken before the next meal** tells us how well the insulin worked during the time your carbohydrate was breaking down.
6. Look down each column on the blood sugar log to see if there is a pattern of high or low blood sugar. There are 6 columns:
    - Before breakfast
    - 2 hours after breakfast
    - Before lunch
    - 2 to 3 hours after lunch
    - Before supper
    - 2 to 3 hours after supper before the bedtime snack
7. A **pattern of high blood sugar** is when blood sugars are **over the target range of 150 for 3 days in a row when you look down the column.**
    - To bring high blood sugars **down** and break the pattern of high blood sugar, your insulin dose that affects that column needs to **increase**.

8. A **pattern of low blood sugar** is when blood sugars are **lower than the target range of 70 or 80 (based on your age) for 1 to 2 days in a row when you look down the column**.
    - To bring low blood sugars **up** and break the pattern of low blood sugar, your insulin dose that affects that column needs to **decrease**.
    - Change your insulin dose if you cannot find another reason for the high or low blood sugars.
9. When you increase or decrease a dose of insulin, your current insulin dose will **change by 10 percent**. See table below.

Your current insulin dose	Column with 1 or 2 low blood sugars in a row and no cause for the lows	Column with 3 high blood sugars in a row and no cause for the highs
0.5 to 5.5 units	Decrease by 0.5 unit	Increase by 0.5 unit
6 to 15 units	Decrease by 1 unit	Increase by 1 unit
16 to 25 units	Decrease by 2 units	Increase by 2 units
26 to 35 units	Decrease by 3 units	Increase by 3 units
36 to 45 units	Decrease by 4 units	Increase by 4 units
46 to 55 units	Decrease by 5 units	Increase by 5 units
56 to 65 units	Decrease by 6 units	Increase by 6 units
66 to 75 units	Decrease by 7 units	Increase by 7 units
76 to 85 units	Decrease by 8 units	Increase by 8 units

Let's practice changing insulin doses

When you practice, it will help you understand which insulin dose was changed and why it was changed. Use the figure below as you read the practice directions.

University of Iowa Stead Family Children's Hospital

Name: _____

Month: _____

Key: BS = Blood Sugar
I = Insulin
C = Carbs

Date	Night BS	Before Breakfast BS	I	C	After Breakfast BS	Before Lunch BS	I	C	After Lunch BS	C	Before Supper BS	I	C	Before Bedtime Snack BS	I	C	Comments
12/ Su 1		148	7		186	121	6		212		136	5.5		96	18		
Mo 2		268	7		201	94	6		246		82	5.5		122	18		
Tu 3		255	7		200	117	6		119		149	5.5		149	18		
We 4		196	7		122	90	6		166		252	5.5		120	20↑		← long-acting insulin
Th 5		114	7		141	89	6		132		112	5.5		192	20		
Fr 6		111	7		199	142	6		190		92	5.5		213	20		
Sa 7		124	7		200	113	6		127		122	5.5		186	20		
Su 8		118	7		197	107	6		155		104	6↑		112	20		
Mo 9		132	7		181	96	6		169		97	6		104	20		
Tu 10		128	7		164	82	6		172		90	6		91	20		
We 11		116	7		149	66	6		195		160	6		132	20		
Th 12		92	7		168	70	6		180		142	6		121	20		
Fr 13		101	6↓		179	110	6		215		112	6		101	20		
Sa 14																	

Sample Blood Sugar Log

Practice example 1

1. **Look down the breakfast column on Dec. 2, 3, and 4.**
   - You will see **3 days in a row** are circled. The circled days show a **pattern of high blood sugars** over the target blood sugar range of 150.
   - This means the **last insulin dose** taken, the long-acting insulin from the night before, **needs to be increased (go up) by 10 percent**.
2. Next, look at the long-acting insulin dose column at bedtime, on Dec. 4.
   - You will see the long-acting insulin was increased from 18 units up to 20 units. This is a 10 percent change.

Practice example 2

1. **Look at the before bedtime column of blood sugars.**
   - **3 days in a row** are circled on Dec. 5, 6, and 7. The circled days show a **pattern of high blood sugar** over the target blood sugar range of 150.
   - This means the **last insulin dose** taken, **before supper**, needs to be **increased by 10 percent**.
2. Next, look at the before supper insulin dose column for the next day, on Dec. 8.
   - You will see the before supper insulin dose was increased from 5.5 units up to 6 units. This is a 10 percent change.

Practice example 3

1. **Look down the before lunch column of blood sugars.**
   - You will see **2 days in a row** are circled on Dec. 11 and 12. The circled days show a **pattern of low blood sugar** less than the target range of 70 or 80 (based on your age).
   - This means the **last insulin dose** taken, **before breakfast**, needs to be decreased by 10 percent.
2. Next, look at the before breakfast insulin dose for the next day, on Dec. 13.

The before breakfast insulin dose is decreased from 7 units down to 6 units. This is a 10 percent change.

Sick Days and Surgery

What should I do when I get sick?

Having diabetes does not mean you will get sick more often than before you had it. Being sick is stressful for your body. Stress causes blood sugar to go high in a person with diabetes.

It is important that you pay attention to and check your blood sugar more often than usual when you are sick.

It is important to check ketones each time you are sick, **even if your blood sugar is not high. You will probably get ketones every time you are sick.**

The information on the following pages will help you care for your diabetes when you are sick. **If you don't know what to do, call your diabetes doctor or nurse for help right away.**

- They can give advice about how to care for diabetes during an illness.
- Remember, they specialize in diabetes and do not know the most current advice to give for a general illness, such as fever, rash, or sore throat.
    - Call your primary care doctor if you have questions about your illness.
    - Call your diabetes specialist to help with blood sugars and ketones that happen during the illness.

What medicines can I take?

- You and everyone who lives with you need to get an Influenza vaccination (a flu shot) each fall. Influenza causes fever, chills, congestion, and body aches. It does not cause nausea and vomiting. Influenza is very serious. It will cause ketones and can cause diabetic ketoacidosis (DKA), which is a very serious and life-threatening problem.

- Tylenol, ibuprofen, allergy medicine, or antibiotics are okay to take. If you need them and they help you feel better, take them. They do not affect blood sugar.
    - Do not give children under the age of 4 years cough or cold medicines per The American Academy of Pediatrics recommendation. They do not help young children much and can have serious side effects.
- **Steroids** taken by mouth, such as prednisone, will raise your blood sugar very high and **cause ketones**.
- Call the diabetes nurses or doctor as soon as you take your first dose of steroid. They will help you raise your insulin doses during this time.

What do I do if I need surgery?

Your surgery should be scheduled first thing in the morning since you will need to go without food and drink when having sedation (sleeping medicine).

Call your diabetes doctor or nurse right after you schedule your surgery. We will tell you what to do with your insulin doses before and after surgery.

School or work excuse

We will give a:

- School excuse if you have an illness that affects your diabetes and we helped you with it
    - If the illness did not affect your diabetes and we did not talk to you the day you were sick, we will not give a school excuse. You will need to get the school excuse from your primary care doctor.
- School excuse for missed school on days you had a diabetes appointment
- Work excuse for parents on days your child is sick, and we helped with blood sugars and ketones
- Work excuse for days a parent brought their child to diabetes appointments

Ketones

Do not exercise when you have ketones. Ketones can get worse with exercise.

Table 1: What to do for ketones when you have not vomited (thrown up)

Urine	Blood	What to do
Negative	0.0 to 0.5	Drink extra water or carbohydrate-free drinks.
Trace	0.0 to 0.5	Drink extra water or carbohydrate-free drinks. Check ketones each time you pee for that day.

Small or Moderate	0.6 to 1.5	Your **blood sugar must be over 240** (if not, see next page):
		• Calculate your total daily insulin dose.
		• Take **10 percent** of your total daily insulin dose of extra rapid-acting insulin (Humalog®, Novolog®, Apidra®, Fiasp®, Admelog®, Lyumjev®). Round to the nearest half-unit.
		  ○ Give the extra insulin dose right away if it is not close to a mealtime.
		  ○ Give the extra insulin with the mealtime dose of insulin if it is close to a mealtime.
		  ○ **Do not add a high blood sugar correction** on top of this or it may cause a low blood sugar.
		• Drink extra water or carbohydrate-free drinks.
		• Check ketones each time you pee or at least every 1 1/2 to 2 hours
		• Do not exercise. Ketones can get worse with exercise.

Large	1.6 to 3.0	Your **blood sugar must be over 240** (if not, see next page):
		• Calculate your total daily insulin dose.
		• Take **20 percent** of your total daily insulin dose of extra rapid-acting insulin (Humalog®, Novolog®, Apidra®, Fiasp®, Admelog®, Lyumjev®). Round to the nearest half-unit.
		  ○ Give the extra insulin dose right away if it is not close to a mealtime.
		  ○ Give the extra insulin with the mealtime dose of insulin if it is close to a mealtime.
		  ○ **Do not add a high blood sugar correction** on top of this or it may cause a low blood sugar.
		• Drink extra water or carbohydrate-free drinks.
		• Check ketones each time you pee or at least every 1 1/2 to 2 hours.
		• Do not exercise. Ketones can get worse with exercise.

	Over 3.0	Call the pediatric diabetes nurses or doctor on-call or go to the closest emergency room.

- Go to Table 2 if you vomit (throw up) and have ketones.
- If your blood sugar is not over 240 and you have ketones, try to get your blood sugar up by drinking a drink with carbohydrate in it. When your blood sugar is over 240, check ketones. If you still have ketones, treat with insulin as shown above.
    - Call your diabetes doctor or nurses right away if you have tried to get your blood sugar over 240 for more than 1 hour without success and you still have ketones.

Notes

How to find your total daily dose:

1. Add up all your rapid-acting insulin mealtime doses plus your long-acting insulin dose that you usually take in 1 day (24 hours).

   For example:

Breakfast dose:	8 units
Lunch dose:	5 units
Supper dose:	7 units
Long-acting dose:	20 units
Total daily dose:	40 units

2. For small or moderate ketones:
   Total daily dose × 0.1 = number of units of rapid-acting insulin
   For example:
   40 units × 0.1 = 4 units of rapid-acting insulin Round the number of units to the nearest 0.5 unit. Take this dose right away.

3. For large ketones:
   Total daily dose × 0.2 = number of units of rapid-acting insulin

   For example:
   40 units × 0.2 = 8 units of rapid acting insulin Round the number of units to the nearest 0.5 unit. Take this dose right away.

What to do after you treat the ketones with insulin:

1. 1 1/2 hours after you take your rapid-acting insulin for ketones:
   - Check your blood sugar.
     - Check for ketones but do not take more insulin if you still have ketones.
   - Keep drinking water or carbohydrate-free drinks.
2. 3 hours after you take your rapid-acting insulin for ketones:
   - Check your blood sugar.
   - Check for ketones.
3. Call your diabetes doctor or nurse right away if you still have small, moderate, or large ketones after 3 hours.

Table 2: What to do for ketones when vomiting or cannot keep fluids down

- **Check your blood sugar** every hour**. Check ketones** at least every 1 1/2 to 2 hours.
- **Call your diabetes team right away** if you do not know what to do.

Blood Sugar	Nausea or vomiting	Ketones	Insulin	What to do
Less than 55	Yes	None/Trace	None	See section called Glucagon for Low Blood Sugar and Vomiting.
55 to 150	Yes	None/Trace	None	Try taking some form of sugar.
Over 150	Yes	None/Trace	None	• Wait 2 hours with nothing to eat or drink (no ice chips, water, juice, food) • After 2 hours, if you have not vomited again, drink small sips (less than 1 ounce) of water or **diet** soda every 10 to 15 minutes. • If you vomit again and your blood sugar is over 150, wait 2 hours then try sips again. • If you do not vomit again, slowly start drinking more, and then start eating food.
Over 200	Yes	Small or moderate	Rapid-acting insulin is needed right away.	Give **10 percent** of the usual total daily dose of rapid-acting insulin right away. **Do not add a hyperglycemia correction** or it may cause low blood sugar. Keep checking every 1.5 hours. Do not give more insulin for 3 hours.
Over 200	Yes	Large	Rapid-acting insulin is needed right away.	Give **20 percent** of the usual total daily dose of rapid-acting insulin right away. **Do not add a hyperglycemia correction** or it may cause a low blood sugar. Keep checking every 1.5 hours. Do not give more insulin for 3 hours.
Less than 200	Yes	Small, moderate, or large	No insulin can be given until your blood sugar is above 200. Take sips of sugar-drinks until your blood sugar is above 200. Then treat.	Try to get your blood sugar above 200 for 1 hour. Call your diabetes doctor or nurses right away if it does not go above 200 and you still have ketones.

If vomiting more than 3 to 4 hours and ketones will not clear, you should go to the nearest emergency department.

Do not take extra rapid-acting insulin to treat ketones more often than every 3 hours.

Never skip your long-acting insulin dose, even if you are sick, vomiting, or have surgery.

Call your Diabetes Care Team if you are not sure how to care for the vomiting and ketones.

When you call:

- Give your child's name and date of birth.
- Know your child's current blood sugar.
- Know your child's current level of ketones.
- Be ready to talk about what is happening with your child's illness.

Urgent calls

Daytime: 8:00 a.m. to 4:30 p.m. Monday through Friday, call:

- Toll-free: 1-888-573-KIDS (5437) and ask for the pediatric diabetes nurse educator on-call.

After 4:30 p.m., on weekends, or on holidays call:

- Toll-free: 1-888-573-KIDS (5437) and ask for the pediatric endocrinologist on-call.

Glucagon for Low Blood Sugar and Vomiting

What do I do if I vomit, and my blood sugar is low?

If you vomit (throw up) and your blood sugar is low (55 to 80), try taking in some form of sugar such as:

- Soda (not diet)
- Juice
- Frosting
- Honey
- Syrup
- Sucking on hard candies
- Sugar Jell-O® cup

If you have tried taking in sugar by mouth but you continue to vomit with low blood sugar below 55, or the blood sugar has been between 55-65 for over 45 minutes, you can try some form of glucagon to help bring up your blood sugar. If you only have **Gvoke**®, **Baqsimi**®, or an **autoinjector** into the fat, give it now. May repeat in 15 minutes. If blood sugar is still under 70 and vomiting continues, go to the local emergency department.

or

If you have a **red or orange Glucagon emergency kit** available, give yourself low-dose glucagon **with an insulin syringe** to get your blood sugar up. (See below for instructions.)

Low-Dose Glucagon (for use with red or orange Glucagon emergency kit)

Draw up low-dose Glucagon for low blood sugar and vomiting:

1. Gather supplies:
   - Glucagon kit (red or orange kit, **not** Gvoke®, Baqsimi®, or an autoinjector into the fat)
   - Insulin syringe
2. Mix the water in the syringe from the glucagon kit with the glucagon powder in the bottle until the fluid is clear.
3. Draw out the glucagon with the **insulin syringe** according to this dosing scale.

Age	Glucagon dose
2 years old and younger	2 units
3 years old	3 units
4 years old	4 units
5 years old	5 units
6 years old	6 units
7 years old	7 units
8 years old	8 units
9 years old	9 units
10 years old	10 units
11 years old	11 units
12 years old	12 units
13 years old	13 units
14 years old	14 units
15 years old and older	15 units

4. Inject the glucagon into the fat, in the same place insulin is given.
5. Wait 20 minutes.

6. Check your blood sugar. If is it still less than 70, **double the original dose** and give another low-dose glucagon injection.
7. Wait 20 minutes.
8. Check your blood sugar. Call your diabetes doctor or nurse if it is still **less than 70** at **1-888-574-5437 (KIDS)**
    - Monday through Friday between 8 a.m. to 4:30 p.m., ask for a **pediatric diabetes nurse educator on-call**.
    - After 4:30 PM, on weekends, or on holidays, ask for the **pediatric endocrinologist on-call**.
9. Throw away unused glucagon 1 hour after mixing.
10. Get a refill.

Living with Diabetes

Living with diabetes is hard. You may feel it is not fair. You may not want to do the things in this book, such as watching what you eat, staying active, checking your blood sugar, and taking insulin. You may be scared or mad or sad.

Some kids ignore it or pretend they do not have diabetes. Teens may feel different from their friends and want to be the same. Some kids don't want to be seen in public doing their blood sugar checks or taking insulin shots. A lot of kids feel it is too much responsibility, too hard, and get overwhelmed with all the things they are supposed to do. **All these feelings are normal.**

When you have diabetes, it is a change for everyone in your household. Your parents need to help you with everything no matter how old you are.

Your diabetes health care team wants to help you and your family learn how to take care of your diabetes. They are here to support you and help you learn how to accept your diabetes and learn how to cope with it.
Parents are the most important people to help you with your diabetes.

- When your parents help, you will not feel alone with all you need to do to take care of yourself.
- Parents need to give encouragement.
- Parents can make sure you eat healthy, get activity, and help you take insulin.
- Parents should help you check your blood sugar and keep the blood sugar log up to date.
- It is not your responsibility to do all your diabetes care by yourself, even if you are a teen.

Paying attention to your blood sugar levels so changes can be made when needed can help you to feel better about yourself. You will find that living with diabetes can become part of your everyday life. It should not hold you back from doing all the things other kids do.

Breakthrough T1D, formerly known as JDRF, is active in eastern Iowa. Members of Breakthrough T1D offer support and fun activities for families living with type 1 diabetes. The Iowa-Nebraska region has a chapter in Des Moines and Cedar Rapids. Your diabetes nurses can help put you in touch with them, or you can call the Breakthrough T1D office at 319-393-3850.

Diabetes Camp in the summertime is a great way to meet other kids and families living with type 1 diabetes. The 1-week summer camp safely offers fun activities and positive learning about how to care for diabetes.

- **Camp Hertko Hollow** is in central Iowa, near Boone, Iowa
  camphertkohollow.com
- **Camp Tanager** is east of Cedar Rapids, Iowa
  camptanager.org

With help from parents and others, and believing in yourself, you can grow into a healthy, happy adult!

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IOWA HEALTH CARE

Type 1 Diabetes Care for Children and Adolescents

→ uihc.org/childrens/services/diabetes-care