

# Diabetes Patient Education

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## A Guide for Newly Diagnosed Patients

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**Boston Children's Hospital**  
Until every child is well™



Dear Patient and Family,

Welcome to the Boston Children's Hospital Diabetes Program.

Discovering that you have diabetes, or that your child has diabetes, can be upsetting and stressful. Feeling confused and overwhelmed right now is normal. Please know that we are here to support you and your family as you start to learn about this condition and how to adjust to it.

Gaining the knowledge and skills you need in order to manage diabetes is very important. We will help you learn about the basics of diabetes, including how to use diabetes devices and diabetes medications and approach healthy eating for diabetes. A team of diabetes educators will work with you to help you understand everything you need to know. This education will start here in the hospital over the next couple of days. Once you are home, you will have an outpatient diabetes team that will teach, coach and guide you on a regular basis.

This packet has information sheets that will give you an overview. Do not worry if it seems like too much to take in all at once. We will go over this information with you step by step as you learn.

We understand that diabetes is a disease that affects the whole family. We are here to support you, answer questions and address your concerns. It may not feel like it now, but families tell us that they do slowly get comfortable managing diabetes. Over time, life with diabetes truly does start to feel normal.

***You've got this!***

The Boston Children's Diabetes Team



This My Ticket Home checklist lists the topics you will learn about to prepare you to return home safely. Your care team will partner with you to teach you how to manage diabetes at home. Please use this checklist to measure your progress toward going home.

### Education goals

#### **Goal 1: Patient/caregiver shows that they've learned these skills before going home:**

- Blood glucose monitoring
- Ketone monitoring
- Carbohydrate counting with meal ticket
- Insulin dose calculations (other: \_\_\_\_\_)
  - For a meal
  - For a snack, with or without carbohydrates
  - At times with no meal or snack
- Giving insulin

#### **Goal 2: Patient/caregiver understands "red-flag" situations and how to respond:**

- Signs/symptoms of low blood glucose (hypoglycemia) and response
- When and how to use glucagon
- Signs/symptoms of high blood glucose (hyperglycemia) and response

#### **Goal 3: Patient/caregiver understands basic diabetes management concepts:**

- Insulin action in the body
- Sources of carbohydrate and carbohydrate-protein pairings for meals/snacks
  - Using a food label
  - Foods without a label
  - Following a recipe
  - Restaurant food
- Key points for physical activity
- Key points for "sick days"
- When to call the outpatient Diabetes Team

# Diabetes Patient Education

## A Guide for Newly Diagnosed Patients

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While your child is in the hospital, we will teach you how to manage your child's diabetes at home.

- This Family Education Sheet will help you understand what to expect during your stay with us.
- Your outpatient Diabetes Team will keep teaching you after you leave the hospital, but we want to help you get the most out of your learning opportunities while you are here.

### Who will teach me about diabetes?

- **Child Life specialists** will help your child with coping during their hospital stay and treatment.
- **Diabetes nurse educators (DNEs)** will help you understand diabetes.
- **Dietitians** will help you understand how food and diet affect your child's blood glucose.
- **Doctors** will make rounds daily and are available to answer your questions.
- **Social workers** will assist you with any emotional, financial or behavioral concerns, and provide you with information about additional community resources.
- **Staff nurses** will teach you about diabetes and help you learn how to give your child insulin injections.

### What can I do to learn the most I can?

- Read the educational and teaching materials given to you.
- Please stay with your child while they are in the hospital so you can practice giving insulin injections and checking blood glucose levels.
- If you have a young child who cannot be left alone, it may help to ask a friend or family member to stay with your child while you are learning. We find that it is often very hard for parents and caregivers to concentrate on learning new information and skills while they are watching their child.

{DIABETES AND INSULIN}



### What is type 1 diabetes?

- Type 1 diabetes is an autoimmune disease that affects the way the body regulates blood sugar, also called glucose.
- The body's immune system does not recognize the cells (beta cells) in the pancreas that make insulin as belonging to the body. The immune system attacks and destroys these beta cells.
- Without enough beta cells, the body cannot make enough insulin. Insulin is a hormone that the body needs to get glucose into the cells of the body.

### What causes type 1 diabetes?

- We do not know the exact cause of type 1 diabetes. Infections or environmental factors may trigger the immune system to destroy beta cells. Family history may be a risk factor.
- There is nothing that you did to cause type 1 diabetes, and there is nothing you can do to prevent type 1 diabetes.

### How is type 1 diabetes treated?

- People with type 1 diabetes need insulin treatment for their entire lives.
- There is no cure for type 1 diabetes. People with type 1 diabetes manage it by balancing insulin, food and exercise. Your diabetes team will teach you how to do this.

### What is type 2 diabetes?

- Insulin resistance causes type 2 diabetes. This means that the cells in the pancreas that make insulin (beta cells) work but the body does not respond normally to insulin.
- When people have insulin resistance, the pancreas makes more insulin to try to keep the blood sugar normal at first. However, after some time, the pancreas cannot keep up and the person gets abnormal blood sugar levels, which is type 2 diabetes.

### What causes type 2 diabetes?

- There are often factors in someone's family history or personal medical history that put them at risk, particularly having a family history of type 2 diabetes.

### How is type 2 diabetes treated?

- Type 2 diabetes can sometimes be managed with medication taken by mouth, diet and exercise. Some people may need to start out with insulin injections.
- For people who use insulin, it is important to balance insulin, food and exercise. Your diabetes team will teach you how to do this.

### High blood glucose (blood sugar level that is greater than 300 mg/dL)

#### Symptoms of Diabetic Ketoacidosis (DKA)



Usually starts with nausea and/or belly ache



Vomiting



Deep and rapid breathing



Drowsiness

#### Check ketones

- Always check when blood glucose is greater than 300 mg/dL and when you are sick.
- Call the Endocrine Team if you have ketones.
- To clear ketones within 12 hours, you need more insulin fluid and rest.

#### Symptoms of high blood glucose



Thirsty



Increased urination



Feeling weak or tired



Weight loss



Blurred vision

300 mg/dL

\_\_\_\_\_mg/dL

### Your child's blood glucose goal range

#### What causes blood glucose to go up?

- Food
- Illness
- Stress
- Hormones

#### What causes blood glucose to go down?

- Insulin
- Exercise

\_\_\_\_\_mg/dL

### Low blood glucose (blood sugar level that is lower than 70 mg/dL)

#### Symptoms of low blood glucose



Confusion, feeling dazed or unfocused



Dizzy



Sweaty



Shaky



Irritable



Paler skin than usual



Clingy or more quiet than usual

70 mg/dL

#### If child is unresponsive or has a seizure

- Use the Glucagon Emergency Kit



## Glucagon

\_\_\_\_\_ 's emergency dose is \_\_\_\_\_ Date \_\_\_\_\_

### What is glucagon?

Glucagon is a hormone that the pancreas makes to raise the body's blood glucose (sugar) level. The pancreas is a gland near the stomach that helps process food.

The synthetic (human-made) version of glucagon comes in a powdered form that you mix with a solution before injecting it into one of your child's muscles. It tells the liver to release stored glucose into the blood.

### How do I store glucagon?

- **Unopened glucagon kit (powder form):** Glucagon should be stored at room temperature when it is still in its powdered form.

- **Opened glucagon kit (mixed form):** Once you mix the glucagon powder with the solution, you can keep it in the refrigerator for 24 hours. Throw it out after 24 hours.

### When do I use glucagon?

Glucagon should be used in an emergency when your child has a serious low blood glucose reaction (called hypoglycemia) and is unresponsive or having a seizure.

### How much glucagon do I give?

Your child's emergency dose is listed above. The dose is based on your child's weight and may change as your child grows. Your diabetes team will prescribe the dose that's right for your child.

## How to give a glucagon injection

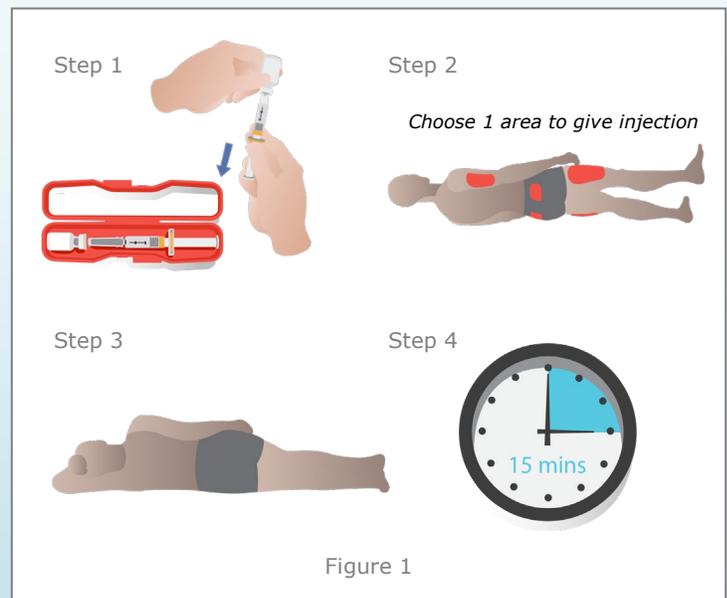
### As emergency medication

**If your child is unresponsive or having a seizure,** call 911 or your local emergency services number.

Then, use the glucagon kit to raise blood glucose.

Figure 1 to the right shows you how to give the injection:

- 1 Mix glucagon as instructed and draw up your child's prescribed dose using the syringe in the kit.
- 2 Give the injection into your child's arm, buttock or thigh muscle. Do not pinch the skin.
- 3 After giving the injection, turn your child on their side. Glucagon may cause vomiting (throwing up).
- 4 Your child should wake up within 10-15 minutes. You can give your child another glucagon injection if your child does not wake up after 15 minutes.



### As non-emergency medication

**If your child cannot eat or drink anything and has low blood glucose,** call your diabetes team to learn how to use glucagon for non-emergency treatment.

- The non-emergency dose is smaller than the emergency dose and is based on your child's age (not weight).



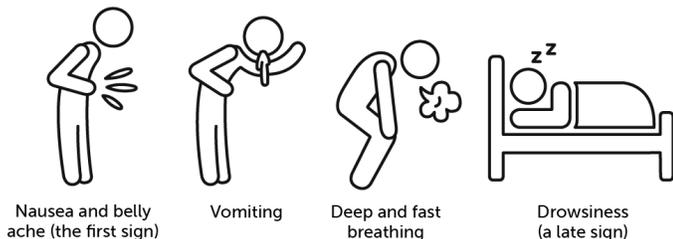
### What are ketones?

- Without enough insulin, the body cannot use glucose in the blood for energy. Instead, the body breaks down its own fat to use for energy.
- Ketones (or ketoacids) form during the process of breaking down fat. Ketones show up in the blood before they show up in the urine (pee).
- It is important to discover ketones right away and get rid of them quickly.

### What is diabetic ketoacidosis (DKA)?

- High level of ketones in the blood makes the blood more acidic. This is called **diabetic ketoacidosis (DKA)**, and it requires immediate treatment. DKA is life-threatening.

### What are life-threatening signs and symptoms of diabetic ketoacidosis (DKA)?



### When do ketones develop?

- If you do not get enough insulin
- If you do not take your insulin
- If you are sick, which causes high blood glucose levels and the need for more insulin

### When do I check for ketones?

- If you are sick with any illness
- When blood glucose is greater than 300 mg/dL

### What do I do if there are ketones in my blood or urine?

**Call your diabetes team.** They may make the following recommendations:

- **Take more rapid-acting insulin.** The amount depends on the blood glucose reading and amount of ketones. Your diabetes team will tell you how much insulin to take.
- **Drink extra fluids** to help flush out ketones from the body.
- **Get more rest.**
- **Continue to check for blood and/or urine ketones.**
  - Check for urine ketones every time you pee until the urine ketone test reads negative, trace, or small.
  - Check for blood ketones as instructed by your diabetes team until the blood ketones are in a normal range (less than 1.0 mmol/L).



### How do I store vials of standard U-100 insulin?

These instructions cover all U-100 vials: Humalog (Lispro), Novolog (Aspart), Regular, NPH, Lantus/Semglee (Glargine), Tresiba (Degludec), Levemir (Detemir) and 70/30 and 75/25 combination insulin.

#### Unopened vials of insulin

- Store them in the refrigerator.
- They are good **unopened** until the expiration date on the bottle.

#### Opened vials of insulin

- You can store **opened** vials in the refrigerator or at room temperature.
- Keep them away from heat (above 85°F/29.4°C) and light.
- **Never freeze insulin** or use frozen insulin.
- **Open vials are good for 4 weeks (28 days)** from the date opened. **Exception:** Tresiba is good for up to 8 weeks (56 days) after opening. Levemir is good for 42 days after opening.
- Write the date you open the insulin on the bottle as a reminder.

### How do I store diluted U-10 insulin?

- All diluted insulin is **opened** insulin.
- Store diluted insulin vials in the refrigerator or at room temperature.
- Diluted insulin is good for **4 weeks (28 days)** from the date you mix it **if refrigerated**.
- Diluted insulin is only good for **2 weeks (14 days)** if stored at **room temperature** after mixing.

If you're going home with 2 vials of diluted insulin, you have a 28-day supply if stored in the refrigerator.

### How do I store insulin pens and cartridges?

#### Unopened pens and cartridges

- Store them in the refrigerator.
- They are good until the expiration date.

#### Opened pens and cartridges

- Store these **only** at room temperature.
- They are good for:
  - Humalog pen – 28 days
  - Novolog pen – 28 days
  - Lantus pen – 28 days
  - Semglee pen – 28 days
  - Levemir pen – 42 days
  - Basaglar pen – 28 days
  - Tresiba pen – up to 8 weeks
  - NPH pen – 14 days
  - 70/30 pen – 10 days
  - 75/25 pen – 10 days



### What should I know about long-acting insulin (basal insulin)?

- Lantus/Semglee/Levemir/Tresiba is a long-acting insulin that can last up to 24 hours. It starts to act in 1–2 hours.
- The insulin is clear and colorless.
- **Do NOT mix the long-acting insulin with any other insulin.**
- Long-acting insulin is usually taken at dinner or in the morning. Your child can take it any time in a 24-hour period, but your child should take it at the same time every day.
- Store **the long-acting insulin** in the refrigerator if unopened.
  - You can use it until the expiration date on the vial if it is unopened and refrigerated.
  - Only use it for 28 days if it is open and stored at room temperature or refrigerated. **Exceptions:** Levemir can be used for 42 days after opening, and Tresiba can be used up to 8 weeks (56 days) after opening.
  - If you're using an insulin pen, refer to your insulin pen family education sheet for storage.

### What should I know about rapid-acting insulin (bolus insulin)?

- Humalog/Novolog insulin is a rapid-acting insulin that starts to act in 10–15 minutes. It peaks in 30 – 90 minutes. It lasts 2–4 hours.
- The insulin is clear and colorless.
- You can mix Humalog/Novolog insulin with other insulin, such as Regular or NPH.
- **Do NOT mix Humalog/Novolog insulin with the long-acting insulin.**
- Give your child rapid-acting insulin 10–15 minutes before eating.
- The dose you give your child is based on the blood glucose reading taken just before eating and the number of carbohydrates to be eaten.
- Store Humalog/Novolog in the refrigerator if unopened.
  - You can use it until the expiration date on the vial if it is unopened and refrigerated.
  - Only use it for 28 days if it is open and stored at room temperature or refrigerated.
  - If you're using an insulin pen, refer to your insulin pen family education sheet for storage.

Never freeze insulin or put it in an area hotter than 85°F/29.4°C. Do not put it in direct sunlight.

# Family Education Sheet

## Basal-Bolus Calculation Worksheet



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[www.bostonchildrens.org/familyeducation](http://www.bostonchildrens.org/familyeducation)

**My target blood glucose (BG) is:** \_\_\_\_\_

**My correction factor is:** \_\_\_\_\_ (1 unit of rapid-acting insulin will lower blood glucose \_\_\_\_\_ mg/dL)

**My insulin to carbohydrate ratio is:** \_\_\_\_\_ (1 unit of rapid-acting insulin will cover \_\_\_\_\_ g carbohydrate)

### Calculate the insulin needed to correct blood glucose levels

Step	Equation	Example	Your Numbers
<b>Step 1:</b> Find out how much blood glucose (BG) is above your target.	$\begin{array}{r} \text{current BG} \\ - \text{target BG} \\ \hline \text{\# above target} \end{array}$	$\begin{array}{r} 225 \\ - 150 \\ \hline 75 \end{array}$	$\begin{array}{r} \text{---} \\ \text{---} \\ \hline \text{---} \end{array}$
<b>Step 2:</b> Find the dose of insulin you need to correct your BG.	$\begin{array}{r} \text{\# above target} \\ \div \text{correction factor} \\ \hline \text{insulin to correct BG} \end{array}$	$\begin{array}{r} 75 \\ \div 45 \\ \hline 1.6 \text{ units} \end{array}$	$\begin{array}{r} \text{---} \\ \text{---} \\ \hline \text{---} \end{array}$

### Calculate the insulin needed to cover the carbohydrate content of the food you are eating

Step	Equation	Example	Your Numbers
<b>Step 1:</b> Find out the total carbohydrate content of the foods you are eating.	$\begin{array}{r} \text{Sum of carbohydrate content for each} \\ \text{food item} \\ \hline \text{Total carbohydrate} \end{array}$	$\begin{array}{r} 20 \\ + 20 \\ \hline 40 \end{array}$	$\begin{array}{r} \text{---} \\ \text{---} \\ \hline \text{---} \end{array}$
<b>Step 2:</b> Find the dose of insulin you need to cover the total carbohydrate content.	$\begin{array}{r} \text{Total carbohydrate} \\ \div \text{insulin to carbohydrate ratio} \\ \hline \text{insulin to cover carbohydrates} \end{array}$	$\begin{array}{r} 40 \\ \div 15 \\ \hline 2.6 \text{ units} \end{array}$	$\begin{array}{r} \text{---} \\ \text{---} \\ \hline \text{---} \end{array}$

### Calculating the total mealtime rapid-acting insulin dose

Step	Equation	Example	Your Numbers
<b>Step 1:</b> Calculate the mealtime dose of rapid-acting insulin by adding together both circled numbers from the above.	$\begin{array}{r} \text{Units to correct BG} \\ + \text{units to cover carbohydrate} \\ \hline \text{total calculated insulin dose} \end{array}$	$\begin{array}{r} 1.6 \\ + 2.6 \\ \hline 4.2 \text{ units} \end{array}$	$\begin{array}{r} \text{---} \\ \text{---} \\ \hline \text{---} \end{array}$
<b>Step 2:</b> For insulin syringes or half unit insulin pens, round the dose to the nearest 1/2 unit.  For whole unit insulin pens, round the dose to the nearest whole unit.	<p><i>Insulin syringes and 1/2 unit insulin pens:</i></p> <p>x.1-x.3 = round down                      x.4-x.7 = round to 1/2 unit                      x.8-x.9 = round up</p> <p><i>Whole unit insulin pens:</i></p> <p>x.1-x.5 = round down                      x.6-x.9 = round up</p>	<p>Round down to 4 units</p>	<div style="border: 1px solid gray; width: 100px; height: 20px; display: flex; justify-content: space-between; align-items: center;"> <span>units</span> </div>



\_\_\_\_\_ 's Daily Schedule

**Basal Insulin:** Give \_\_\_\_\_ insulin \_\_\_\_\_ units at \_\_\_\_\_ every day.

- \_\_\_\_\_ Get up.
- \_\_\_\_\_ Check blood glucose and log results.
- \_\_\_\_\_ Calculate insulin dose based on correction factor and carbohydrate intake:  
Take \_\_\_\_\_ insulin.
- \_\_\_\_\_ Eat breakfast.
- \_\_\_\_\_ Eat snack—**optional**.  
(cover for carbohydrates with \_\_\_\_\_ insulin).
- \_\_\_\_\_ Check blood glucose before lunch and log results.
- \_\_\_\_\_ Calculate insulin dose based on correction factor and carbohydrate intake:  
Take \_\_\_\_\_ insulin.
- \_\_\_\_\_ Eat lunch.
- \_\_\_\_\_ Eat snack— **optional**.  
(cover for carbohydrates with \_\_\_\_\_ insulin).
- \_\_\_\_\_ Check blood glucose before dinner and log results.
- \_\_\_\_\_ Calculate insulin dose based on correction factor and carbohydrate intake:  
Take \_\_\_\_\_ insulin.
- \_\_\_\_\_ Eat dinner.
- \_\_\_\_\_ Check blood glucose before bedtime and log results.
- \_\_\_\_\_ Calculate insulin dose based on bedtime correction factor and carbohydrate intake (snack is optional).  
Take \_\_\_\_\_ insulin.
- \_\_\_\_\_ Go to bed.
- \_\_\_\_\_ Check blood glucose overnight and log results.
- \_\_\_\_\_ Calculate insulin dose based on overnight correction factor.  
Take \_\_\_\_\_ insulin.

### When do I check blood glucose overnight?

- For the first 2 nights after you go home from the hospital
- For 2 nights any time the long-acting insulin dose is changed
- If you/your child had been ill or did not get enough food/drink during the day
- If you give correction dose before bedtime
- As a random check once a week

### What should I do in the middle of the night if blood glucose is low?

If blood glucose is low (less than 80 for ages 5 and younger and less than 70 for ages 6 and older), give fast-acting carbohydrate:

- 5–10 grams for ages 5 and younger
- 15 grams for ages 6 and older

Wait 15 minutes. Re-check the blood glucose.

If the blood glucose is still low, repeat these steps.

Once the blood glucose is within the goal range, eat a snack with 15 grams of carbohydrate and 7 grams of protein. Do not cover carbohydrates with insulin for treatment of overnight low blood glucose.

### Your Insulin Plan

- **Blood glucose targets**

\_\_\_\_\_ mg/dL:  Before meals  
 Other at \_\_\_\_\_

\_\_\_\_\_ mg/dL:  Bedtime at \_\_\_\_\_

Overnight at \_\_\_\_\_

- **Correction factor**

1 unit of rapid-acting insulin lowers blood glucose by \_\_\_\_\_ mg/dL

- **Carbohydrate ratio:**

1 unit of rapid-acting insulin for every \_\_\_\_\_ grams of carbohydrate.

{NUTRITION AND EXERCISE}



Carbohydrate counting is a very important part of diabetes management. Carbohydrate counting or “carb counting” is when you identify the portion or serving size of food your child is eating and then determine how many carbohydrates are in that portion.

This handout walks you through the steps to successfully do this.

### What do I need to count carbs?



- Measuring cups (both liquid and dry)
- Calculator



- Measuring spoons
- Carb counting written or electronic resources (books, websites or apps listing carb amounts in foods)



- Food scale

### How do I read the nutrition label to figure out the total carbs?

Most packaged foods have a nutrition label that identifies *both* the portion/serving size of the food and the amount of carbohydrates in that portion size. Follow these steps to figure out the total grams of carbohydrates in the food.

**Don't forget measuring cups or a food scale to figure out correct portion sizes!**

#### Step 1:

Find the amount that the manufacturer calls the serving size.

- Answer: 1 cup or 30 grams
- Note: In this example, 30 g is the weight of the serving size of food if measured on a scale. 30 g is NOT the amount of carbohydrate in the food

#### Step 2:

Find total grams of carbohydrates for the serving size listed. You do not count the sugars!

- Answer: 23 grams

Cereal	
Serving Size: 1 cup, 30g	
Servings Per Container 10	
Amount Per Serving	
Calories	110 Cal from Fat 16
% Daily Value	
Total Fat	2 g 3%
Saturated Fat	0 g 2%
Trans Fat	0 g
Cholesterol	0 mg 0%
Sodium	210 mg 9%
Total Carbohydrate	23 g 8%
Dietary Fiber	3 g 11%
Total Sugars	10 g
Includes 7 g Added Sugars 20%	
Protein	3 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.	

#### Step 3:

Use a measuring cup or a food scale to measure how much your child will be eating. If they plan to have 2 servings (2 cups), what would be the total grams of carbohydrates?

- Answer: 2 servings x 23 grams of carbohydrates per serving = 46 grams of total carbohydrates

#### A note on “Net Carbs”

Some packaged foods advertise “net carbs.” The term “net carbs” typically refers to the amount of carbohydrate in a food once you subtract the fiber and sugar alcohols. The type and amount of carbohydrate, fiber, and sugar alcohols in a food impacts everyone differently. We suggest using the grams of “Total Carbohydrate” when dosing insulin. Monitoring blood glucose levels after eating will help determine how different foods impact blood glucose and if adjustments to carb counting or insulin dosing needs to be made.

### How can I tell the carb count of foods without nutrition labels?

There will be many times when your child will want to eat something that does not have a nutrition label. This might be a fresh fruit or vegetable, food from a restaurant, or foods prepared by someone not familiar with carb counting.

There are both written and electronic resources to help you estimate the carbohydrates in these foods. Please see the Diabetes Management Resources family education sheet for a list of these resources.

When estimating carbohydrates in foods without labels it's still important to identify the serving size first. For example, weighing an apple on a food scale helps you know the amount of apple your child plans to eat. Then, using an electronic or written resource, you can see how many carbs are in that amount of apple.

## How can I estimate portions?

Carb counting is most accurate when you can use a measuring cup, measuring spoons or food scale to measure the portion of food your child plans on eating. But when that's not possible (like when you're eating at a restaurant), these tips can help make estimating portion sizes easier. These are based on the hand size of an adult woman.

- Thumb tip = 1 teaspoon (from tip of thumb to first knuckle)
- Thumb = 1 Tablespoon (from tip of thumb to second knuckle)
- Open palm of hand = 3 ounces
- Tight fist = ½ cup - 1 cup based on size of hand

## What should I keep in mind about insulin when carb counting?

A basal/bolus insulin plan can make the timing and size of meals and snacks more flexible.

Here are some key points to keep in mind:

- **"Basal"** insulin (Lantus, Levemir, Tresiba, Basaglar):
  - Long-acting insulin
  - Given 1 time a day
  - Lasts for ~24 hours
- **"Bolus"** insulin (Humalog or Novolog):
  - Rapid acting insulin
  - Given before meals and snacks containing carbohydrates. This dose is given to "cover" the carbohydrates in the meal.
  - Given to lower a high blood glucose level. This dose is given to "correct" high blood glucose values.
  - Before meals you might be determining how much insulin your child needs to "cover" the carbohydrates they plan to eat AND how much insulin they need to "correct" their blood glucose if they are high.
- It's best to give "bolus" / rapid acting insulin 15 minutes before your child eats.
- Having consistent meals throughout the day often leads to steadier blood glucose values. "Grazing" or snacking throughout the day may make it hard to interpret blood glucose levels.
- Skipping meals or eating only foods without carbohydrates in order to have fewer shots during the day is not necessarily healthy. It may lead to not getting the nutrients your child needs for growth and development.

## What are some healthy eating tips?

- When choosing carbohydrates, go for whole grains, beans, non-starchy vegetables, fruits and unsweetened dairy most of the time. It may take 15-20 times to try a kind of food before your child knows if they like it. Don't give up!
- **Go for fiber:** Fiber is an important part of food that helps keep a healthy digestive tract. It helps add bulk to our meals, slows down digestion, and doesn't impact blood glucose values as much as foods without fiber. This means that it helps us feel full. It can also slow down how quickly sugar goes into the blood. Fruits, veggies, beans/lentils, and whole grains have fiber.
- **Load up on fruits and vegetables:** Fruits and vegetables are full of vitamins and minerals, which are important for the body. They are also full of fiber. Try serving non-starchy veggies as snacks to increase the amount your child eats in a day. Aim to include 5 servings of fruits and vegetables each day.
- **Pre-portion snacks:** You don't need to buy everything in individual packages. Buy a regular or large sized package and pre-portion servings (using the nutrition label) in a plastic bag or reusable container. Then place a label on the front with how many grams of carbohydrates are in that serving of food.
- **Plan meals and snacks ahead of time:** Knowing when and what your child is going to eat will help lower pressure during meal or snack time. You and your child can even work together to brainstorm which food to have from each food group at each meal!
- **Think balance:** Lean proteins and healthy fats can help your child feel full while also keeping blood glucose values more steady. By giving your child meals and snacks that are balanced with protein, fat, and high fiber carbohydrates you can help your child feel full and help blood glucose values stay steady.

## Foods with carbohydrates

Carbohydrates are the part of food that causes the biggest rise in blood glucose. It's important to count the grams of carbohydrates in meals and snacks based on the portion size of food being eaten. Whole grain choices are best. This list gives average amount of carbohydrates per food and serving. Always be sure to read the nutrition label as carbohydrates will vary by product and brand.

Breads and grains	Grams of carbohydrates
Bagel (small, 2 oz.)	30 g
(large, 4-5", 4 oz.)	60-70 g
Bread, white or wheat, 1 slice	14 g
Bread crumbs, 3 Tbsp	15 g
Cereal, bars	15-35 g
cooked, unsweetened, ½ cup	11-19 g
instant cooked, sweetened, 1 pkt	26-36 g
dry, unsweetened, ¾ cup	15-18 g
dry, sweetened, ½ cup	14-19 g
Cornbread or biscuit, 2" square	12-17 g
English muffin	25 g
French toast, 1 slice	16 g
Muffin, small, 2"	25-35 g
Pancake/waffle, frozen, 4" across	14 g
Pasta, cooked, ½ cup	21 g
Rice, brown or white, cooked, ½ cup	22 g
Rolls	
- Dinner (1 oz.)	15 g
- Bulkie, hamburger, hotdog (1.5-2 oz.)	21-30 g
Pita bread (6")	30 g
Flour tortilla/wrap (8")	24 g
Corn tortilla (6")	12 g
Lavash (1.5 oz)	23 g

Milk	Grams of carbohydrates
Milk, white, 1 cup	12 g*
Milk, chocolate, 1 cup	26 g*
Yogurt, unsweetened or plain, ~¾ cup	5- 10 g*
Yogurt, sweetened, ~¾ cup	15-25 g*
Non-dairy milk alternatives, 1 cup	1-14 g*

\*Yogurt and non-dairy milks vary a lot in their carbohydrate content. Read the nutrition label on your specific product. Try to use unsweetened varieties.

Fruits	Grams of carbohydrates
Apple, medium (4.9 oz.)	19 g
Applesauce, unsweetened, ½ cup	14 g
Banana, medium, 7 – 7.5"	27 g
Berries - blueberries, 1 cup	21 g
- raspberries, strawberries, 1 cup	11-14 g
Fruit, canned in light syrup or juice, ½ cup	10-18 g
Grapes, 15	13 g
Kiwi, 1 whole fruit	10 g
Mango, 1 cup	25 g
Melon: cantaloupe, honeydew, watermelon, 1 cup	12-16 g
Orange, medium (4.6 oz.)	15 g
Peach, medium (3.5 oz.)	10 g
Pear, 1 small (4.9 oz.)	22 g
Pineapple, ¾ cup	15 g

Starchy vegetables and beans	Grams of carbohydrates
Corn, ½ cup or 6" cob	15-20 g
Peas, green, ½ cup	30 g
Yellow plantain, 1 medium fruit	57 g
Yellow plantain, mashed, ½ cup	30 g
Green plantain, fried, ½ cup	30 g
Potato, white, baked or boiled, med, 4"	36 g
Potatoes, mashed, ½ cup	17 g
Sweet potato, baked or mashed, ½ cup	20-30 g
French fries, regular or crinkle cut, 10-15	15-20 g
Baked beans, ½ cup	27-30 g
Beans (kidney, navy, pinto, lima) and lentils, ½ cup	20 g
Pigeon peas, ½ cup	15 g

Snacks and sweets	Grams of carbohydrates
Animal crackers, 6-7	17 g
Brownie, unfrosted, 2" square	15 g
Cake, frosted, 2" square (2.3 oz.)	35 g
Chips, potato or tortilla, 10-15 chips	17 g
Cookie, 2 ½"	13-20 g
Cookie, sandwich, small, 2	15 g
Goldfish crackers, ½ cup	19 g
Graham crackers, 3 squares	16 g
Crackers, sandwich, peanut butter or cheese, 4	12-15 g
Frozen yogurt, ½ cup	17-23 g
Ice cream, ½ cup	16 g
Popcorn, 3 cups	12-15 g
Pretzel, tiny twists, 17 (1 oz.)	23 g
Pudding, sugar-free, ½ cup	13 g

**Sweeteners and spreads**                      **Grams of carbohydrates**

Agave nectar, 1 Tbsp	12 g
Honey or table sugar, 1 Tbsp	12-17 g
Jam or jelly, regular, 1 Tbsp	13-15 g
Jam or jelly, sugar-free, 1 Tbsp	5 g
Peanut butter, natural, 1 Tbsp	3-4 g
Syrup, regular, 2 Tbsp	24-27 g
- Light, 2 Tbsp	13 g
- Sugar-free, 2 Tbsp	0 g

**Combination foods**                      **Grams of carbohydrates**

Casserole or hot dish, 1 cup	34-38 g
Chicken nuggets, 5 pieces	15 g
Fish sticks, breaded, 3 pieces	10-18 g
Hamburger with bun	25-35 g
Lasagna, 3" x 4" piece	26 g
Macaroni and cheese, 1 cup	48 g
Pizza, take-out, thick crust, large, 1/8th	35-47 g
Pizza, take-out, thin crust, large, 1/8th	26-33 g
Sandwich, cheese or meat	24-32 g
Sandwich, chicken or fish, breaded	39-60 g
Sandwich, peanut butter and jelly	43-50 g
Soup, (with noodle, rice, potato), 1 cup	10-20 g
Soup (cream based), 1 cup	15-30 g
Taco, 5" across hard shell	10 g
Taco, 8" soft tortilla	25 g

**Low-carb snacks**  
**(less than 5g carb but more than 20 calories)**

Beef jerky, 1 oz	Hard-boiled egg, 1
Celery with 1 Tbsp peanut butter	Cottage cheese, ½ cup
Sunflower seeds in shells, ½ cup	Nuts, 2 Tbsp
String cheese, 1 piece	Olives
Vegetables, raw, with 2 Tbsp dip	Salsa, ¼ cup

**Low-carb / low-calorie foods**  
**(less than 5g carb and less than 20 calories)**

Bouillon or broth	Lemon/lime juice
Coffee or tea	Mustard
Drink mixes, sugar-free	Popsicles, sugar-free, 1*
Garlic	Soft drinks, diet
Herbs and spices	Soy sauce
Jello, sugar-free	Steak sauce, 1 Tbsp*
Dill pickle, 1 large	Sugar substitutes
Ketchup, 1 Tbsp*	Whipped topping, 2 Tbsp*

\* These foods contain carbohydrates.

Please use carbohydrate counting resources to identify the carbohydrates in your product and portion size.

**Vegetables**

Non-starchy vegetables are full of vitamins, minerals and fiber. They are also low in carbohydrates! Of the vegetables listed below, each portion is ½ cup cooked or 1 cup raw. On average we estimate each portion has ~5 g of carbs.

Asparagus	Okra
Beans, green/wax	Onions
Bean sprouts	Pea pods (all kinds)
Beets	Peppers (all kinds)
Broccoli	Radishes
Brussels sprouts	Rutabaga
Cabbage (all kinds)	Salad greens
Carrots	Sauerkraut
Cauliflower	Spinach
Celery	Summer squash
Cucumber	Tomatoes
Eggplant	Tomato/Vegetable juice
Green onions/scallions	Turnips
Leafy greens (all kinds)	Zucchini
Mushrooms	

**Protein**

Protein plays a big role in growth and building strong muscles. These foods have little to no carbohydrates but are not considered "free foods" because they still have calories and fat, and can still impact blood glucose values. Choose lean or low-fat sources when possible.

Beef	Cottage cheese	Salmon
Cheese	Deli meats	Sausage
Chicken	Pork or ham	Tuna
		Turkey

## Fats

Fats are a major energy source and help to absorb some vitamins. They are important for growth and development. Choose unsaturated fats when possible.

Unsaturated fats	Saturated fats
Avocado, ½ cup, 6 g	Butter
Margarine (soft tub, low-fat)	Bacon
Mayonnaise (reduced calorie)	Coconut*
Nuts, mixed, ¼ cup, 9 g	Cream (heavy, light)
Peanuts, ¼ cup, 6 g	Cream cheese (light)
Walnuts, ¼ cup, 4 g	Gravy*
Almonds, ¼ cup, 7 g	Shortening
Cashews, ¼ cup, 9 g	Sour cream (light)
Sunflower seeds, ¼ cup, 7 g	
Pumpkin seeds, ¼ cup, 4 g	
Oil	
Olives	
Peanut butter, 1 Tbsp, 3-4 g	
Salad dressing*	

*\* These foods contain carbohydrates. Please use carbohydrate counting resources to identify the carbohydrates in your product and portion size*

## Contact us

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- For additional questions or concerns, speak with your registered dietitian or a member of your child's diabetes team.

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### What are carbohydrates

Carbohydrates are one of the main nutrients found in food. They are broken down into sugar or glucose in the bloodstream (also known as blood glucose) and provide the body with a source of energy. Carbohydrates are found in a variety of foods such as grains, legumes, vegetables, fruits and dairy. They are also found in treats like candies, cookies, cakes and other sweets. Some carbohydrates break down more easily in the body and raise blood glucose quickly. Other types of carbohydrates break down more slowly. The **kind** of carbohydrate and the **amount** of carbohydrate you eat both affect your blood glucose level.

### What is glycemic index?

Glycemic index (GI) is a measurement of how quickly carbohydrates break down to glucose in the bloodstream.

- When you eat food with a high GI it raises your blood glucose level quickly.
- When you eat food with a low GI it raises your blood glucose level more slowly.

### What is glycemic load?

Glycemic load takes into account not only how quickly the food breaks down to glucose (glycemic index) but also how much of the food is being eaten. What this means is that a large amount of a low GI food may raise the blood glucose just as much as a small amount of a high GI food. Glycemic load is categorized as high, medium, or low glycemic load. When you choose lower glycemic load foods (based on age-appropriate portions), you can avoid big changes in your blood glucose level after eating. Below is a table of the glycemic load categories that can be useful in planning low-glycemic meals in day-to-day life.

Glycemic load table			
	Low	Medium	High
<b>Vegetables</b>	<p><b>Non-starchy</b></p> <ul style="list-style-type: none"> <li>• Artichokes</li> <li>• Asparagus</li> <li>• Bok choy</li> <li>• Broccoli</li> <li>• Cabbage</li> <li>• Carrots</li> <li>• Cauliflower</li> <li>• Celery</li> <li>• Collards</li> <li>• Cucumber</li> <li>• Eggplant</li> <li>• Green beans</li> <li>• Lettuce</li> <li>• Mushrooms</li> <li>• Onions</li> <li>• Peppers</li> <li>• Radishes</li> <li>• Salsa</li> <li>• Snap peas</li> <li>• Spinach</li> <li>• Summer squash</li> <li>• Tomatoes</li> <li>• Turnips</li> <li>• Wax beans</li> <li>• Zucchini</li> </ul>	<ul style="list-style-type: none"> <li>• Acorn squash</li> <li>• Beets</li> <li>• Butternut squash</li> <li>• Green peas</li> <li>• Parsnips</li> <li>• Pumpkin</li> <li>• Sweet potato</li> <li>• Unripe plantains</li> <li>• Yam</li> <li>• Yuca</li> </ul>	<p><b>Starchy</b></p> <ul style="list-style-type: none"> <li>• Corn</li> <li>• French fries</li> <li>• Mashed potatoes</li> <li>• White potatoes</li> <li>• Ripe plantains</li> </ul>
<b>Fruits</b>	<ul style="list-style-type: none"> <li>• Apples</li> <li>• Apricots</li> <li>• Berries</li> <li>• Cantaloupe</li> <li>• Cherries</li> <li>• Clementines</li> <li>• Grapefruit</li> <li>• Grapes</li> <li>• Honeydew melons</li> <li>• Kiwis</li> <li>• Lemons</li> <li>• Limes</li> <li>• Nectarines</li> <li>• Oranges</li> <li>• Peaches</li> <li>• Pears</li> <li>• Plums</li> <li>• Tangerines</li> <li>• Watermelon</li> </ul>	<ul style="list-style-type: none"> <li>• Apple sauce</li> <li>• Fruit cups or canned</li> <li>• Fruit in 100% juice</li> <li>• Dried fruit</li> <li>• Banana</li> <li>• Mango</li> <li>• Papaya</li> <li>• Pineapple</li> <li>• Plantain</li> </ul>	<ul style="list-style-type: none"> <li>• Fruit juices</li> <li>• Fruit canned in syrup</li> <li>• Juice drinks</li> </ul>

Glycemic load table						
	Low		Medium		High	
<b>Beans</b>	<ul style="list-style-type: none"> <li>Most beans, lentils or other legumes</li> </ul>				<ul style="list-style-type: none"> <li>Beans with added sugar</li> </ul>	<ul style="list-style-type: none"> <li>Baked beans</li> </ul>
<b>Dairy</b>	<ul style="list-style-type: none"> <li>Unsweetened milk</li> </ul>	<ul style="list-style-type: none"> <li>Unsweetened Greek yogurt</li> </ul>	<ul style="list-style-type: none"> <li>Fruit-flavored yogurts</li> </ul>		<ul style="list-style-type: none"> <li>Flavored or sweetened milk</li> </ul>	<ul style="list-style-type: none"> <li>Yogurts with candied toppings</li> </ul>
<b>Grains</b>			<ul style="list-style-type: none"> <li>100% whole grains</li> <li>Whole wheat flour</li> </ul>	<ul style="list-style-type: none"> <li>Barley</li> <li>Bean/lentil/legume pasta</li> <li>Brown rice</li> <li>Bulgur</li> <li>Flatbread</li> <li>Old-fashioned oats</li> <li>Steel cut oats</li> <li>Quinoa</li> </ul>	<ul style="list-style-type: none"> <li>Processed foods</li> <li>Refined or "white" flour</li> </ul>	<ul style="list-style-type: none"> <li>Instant oatmeal</li> <li>Couscous</li> <li>White, jasmine or yellow rice</li> <li>White pasta</li> </ul>
			<p><i>These grains might have a moderate or high glycemic load. Make sure to read the nutrition label and look for grams of fiber and sugar, as well as the words "whole grain" on the package.</i></p>			
			<ul style="list-style-type: none"> <li>Bread</li> <li>Bagels</li> </ul>	<ul style="list-style-type: none"> <li>Cereals and bars</li> <li>Crackers</li> <li>Muffins</li> </ul>	<ul style="list-style-type: none"> <li>Pancakes or waffles</li> <li>Pasta</li> </ul>	<ul style="list-style-type: none"> <li>Pizza</li> <li>Tortillas</li> <li>Wraps</li> </ul>
<b>Sweets</b>					<ul style="list-style-type: none"> <li>Brownies</li> <li>Cake</li> <li>Chips</li> </ul>	<ul style="list-style-type: none"> <li>Chocolate spreads</li> <li>Cookies</li> <li>Cupcakes</li> <li>Doughnuts</li> </ul>
<b>Drinks</b>	<ul style="list-style-type: none"> <li>Sugar-free drinks</li> </ul>	<ul style="list-style-type: none"> <li>Unsweetened tea and coffee</li> <li>Unsweetened milk</li> </ul>	<ul style="list-style-type: none"> <li>Smoothies with added protein, such as unsweetened yogurt or nut butters</li> </ul>		<ul style="list-style-type: none"> <li>Lemonade</li> <li>Juice and juice drinks</li> <li>Energy drinks</li> <li>Soda</li> </ul>	<ul style="list-style-type: none"> <li>Sports drinks</li> <li>Sweet tea</li> <li>Sweetened coffee drinks</li> </ul>

# Family Education Sheet

## Protein, Fat, Lower Carb Foods and Diabetes



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This family education sheet can help you better understand how proteins and fats can be incorporated into your child's healthy diet.

### Key points

- One of the most common questions children, parents and caregivers have is, "What can I eat that doesn't require insulin?"
- Remember, insulin helps make sure that your child's body can use the nutrition they eat. Taking insulin for meals and snacks throughout the day will help your child have steady blood glucose values.
- Protein and fat often have little to no carbohydrates and are often called "free" by some people because of their low carbohydrate amounts.
- However, this isn't quite accurate. When eaten in large amounts, many of these foods can affect blood glucose levels often hours after they've been consumed.

### Proteins

We encourage protein foods because they help your child feel full and have little impact on blood glucose levels right after they're eaten. Because of this, proteins like meat and cheese often become go-to snacks. These can be part of a healthful diet, but portion sizes are important.

Large portions of protein slow the rate of digestion. This:

- Makes people feel full longer
- Is especially helpful when protein is eaten with carbohydrate. Eating a paired protein + carbohydrate meal or snack can slow the rise of blood glucose from carbohydrates right after eating.
- May cause blood glucose to rise hours after eating the protein. Because of this, additional insulin may sometimes be needed for meals that are high in protein and fat.

Large portions of protein also:

- May cause unintended weight gain due to the high amounts of calories and fat
- Should not take the place of snacks with carbohydrate in order to avoid insulin injections

We recommend age-appropriate serving sizes of a variety of plant and animal proteins with meals and snacks. A dietitian can explain portion sizes right for your child.

### Fats

Fats, like protein, don't have many carbohydrates and they have little impact on blood glucose levels right after they're eaten. Eating fat helps children feel full and is

necessary for the body. But it's important to know that eating large portions of fat affect blood glucose levels.

Large portions of fat slow the rate of digestion. This:

- Makes people feel full longer. When fat is paired with carbohydrate, it can help slow the rise of blood glucose from carbohydrates.
- May cause blood glucose to rise hours after eaten. Because of this, additional insulin may sometimes be needed for meals that are high in protein and fat.

Large portions of fat also:

- Increases insulin resistance (which increases the amount of insulin needed)
- May cause unintended weight gain due to the high amounts of calories
- Should not take the place of snacks with carbohydrate in order to avoid insulin injections

We recommended heart-healthy, unsaturated fats as a part of a balanced diet. A dietitian can explain how your child can eat healthful amounts of fat.

### Low-carbohydrate foods

Some foods have very little carbohydrates. Some children may be able to eat a few grams of carbohydrate without a big effect on blood glucose levels. However, every child is different and low-carbohydrate foods may require insulin over time. It's important to monitor blood glucose trends regularly and to talk with your diabetes team when you may need to make changes.

Examples of low-carbohydrate foods are:

- 1 cup raw (or ½ cup cooked) non-starchy vegetables (cucumbers, bell peppers, broccoli)
- 1 sugar-free popsicle
- 1 sugar-free hard candy
- 2 Tbsp nuts/seeds
- 1 cup popcorn
- 1 cheese stick
- 1 hardboiled egg
- 1 oz. deli meat
- Low-carb specialty foods, like yogurt or bars

It's important to keep track of portion sizes of these low-carbohydrate foods. If your child eats more than 1 portion, it increases the chance that the food will affect their blood glucose levels. Even with just 1 portion, blood glucose can still rise. Track blood glucose levels to see if you need to cover low-carbohydrate foods with insulin.

## Low-calorie, zero carbohydrate foods

There are some foods that are very low in calories and carbohydrates. This means you can typically add these to meals and snacks without seeing much of an impact on blood glucose levels.

- Bouillon or broth
- Coffee or tea (without milk or sugar)
- Herbs and spices
- Garlic
- Lemon/lime juice
- Mustard
- Onion
- Soy sauce

\*A note on sugar-free/diet drinks. Drinks like diet soda, "zero" sports drinks or diet juices often have no calories and no carbohydrates. They do not require insulin and often do not impact blood glucose values right after drinking. These drinks do have artificial sweeteners. If you have questions about artificial sweeteners, please ask your child's dietitian and medical team.

## Does this mean that there are no "free foods"?

Except for the low-calorie, zero carbohydrate items listed, there are no real "free foods." Protein and fat foods often do not have many carbohydrates, but they do have impact on blood glucose values over times and on your child's overall health. This is why eating age-appropriate portion sizes as part of balanced diet is important.

This does not mean that your child will need insulin for everything they eat. However, you will need to monitor blood glucose levels and consider the effect of all foods when making decisions around the amount of insulin to give.

### Contact us

If you have questions about diabetes, protein, fat, and lower carbohydrate foods, please contact your registered dietitian. To set-up an appointment, please call (617) 355-4677 or email [nutritiondept@childrens.harvard.edu](mailto:nutritiondept@childrens.harvard.edu).



When your child snacks, it's important to choose a variety of foods to create a balanced and paired snack. A balanced and paired snack is a snack that contains foods from multiple food groups (e.g. fruits, vegetables, dairy, proteins, and whole grains) and contains a mix of proteins, fats, and carbohydrates. Balanced, paired snacks help keep blood glucose steady and help your child feel full longer. This helps cut down on the amount of "grazing" or constant snacking in between meals.

### Should my child snack more than other children?

- No. Your child doesn't need to snack just because they have diabetes. Children should have a snack when they're hungry and stop eating when they feel full.
- If your child was recently diagnosed with diabetes, they may be feeling "extra" hungry and may be wanting to snack more than usual. Their appetite will return to normal within a few weeks after diagnosis.

### Are protein and fat "free snacks"?

- No. Proteins and fats, like cheese or meats, don't usually have carbohydrates. But they can still increase your child's blood glucose levels, typically hours after eating them.
- Choosing snacks that are just protein and fat in order to limit insulin injections can cause higher blood glucose levels at the next meal. And snacking on protein and fat may add unnecessary calories and lead to weight gain.
- It's OK to add small portions of fat to snacks, like a light dip, dressing, avocado or nuts. Just be mindful of the portion size.
- Proteins and fats take longer to digest. This means they help children feel full longer. Adding protein and fat to whole grain or high fiber carbohydrates help make a balanced and paired snack.

### How many snacks are OK a day?

- If your child is hungry for snacks, try to aim for 1-2 per day, in between meals.
- This could be a morning snack between breakfast and lunch and/or an afternoon snack between lunch and dinner if your child is hungry. Choosing a balanced, paired snack with protein/fat and a high fiber carbohydrate will help your child feel full at snack time so they can wait a few hours until the next meal. It's OK if your child's snack sometimes looks like a "mini" meal.
- Having multiple snacks in between meals or "grazing" on snacks all day makes it hard to interpret blood glucose levels. It can also fill your child up so they may not want the next meal.
- If your child is requiring multiple snacks between meals talk to your dietitian about your child's meal and snack routines.

### What kinds of snacks are best?

- Choose whole foods for snacks if you can.
- Whole foods are foods with little to no processing and additives. They have important nutrients, like vitamins, minerals and fiber, which many processed foods do not have. Examples include fruits, vegetables, unsweetened dairy products, nuts/seeds, beans, and lean animal proteins like eggs, poultry, or fish.
- Processed, packaged snacks are sometimes thought to be "easier" because they contain nutrition labels, but they are not always the most healthful option. Talk to your child's dietitian if you need help carbohydrate-counting foods without food labels.

### How can I build a paired snack?

- Start with a protein to build healthful, well-balanced snacks. Then pair it with a fruit, vegetable or whole grain.
- Many of the foods below have carbohydrates. Carbohydrate amounts may vary. Always remember to read the nutrition label or look up the carbohydrates using paper or electronic carbohydrate counting resources if needed.
- The portion sizes listed may vary based on your child's age.

## First, pick 1 protein



### Protein starters

- 1 string cheese
- 2 Tbsp. peanut butter (7g) (carbs vary, read nutrition label)
- ¼ cup hummus (8g)
- ¼ cup tuna fish
- 15 slices turkey pepperoni
- ½ cup cottage cheese (3g)
- 1 cup cow's milk (12g)
- 1–2 oz. diced turkey or chicken
- 6–8 oz. unsweetened yogurt (carbs vary, read nutrition label). Greek yogurt is highest in protein.
- 1 hardboiled egg
- 1/4 cup nuts or seeds (7g)
- ½ cup cooked beans/legumes (20g)
- 1–2 slices deli meat (turkey, chicken, ham, roast beef)

## Choose 1 fruit, vegetable or grain



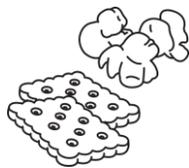
### Fruit options

- 1 cup of sliced strawberries (13g)
- ½ cup unsweetened applesauce (14g)
- 1 small apple—5.4 oz. (21g)
- 1 medium banana—7" (27g)
- 1 medium peach—5.5 oz. (15g)
- 1 small pear—5.8 oz. (23g)
- ¾ cup pineapple (16g)
- 15 grapes (13g)
- 1 cup raspberries—4.3 oz. (15g)
- 1 cup blueberries (21g)
- 1 medium orange—6.3 oz. (15g)
- 1 cup cubed melon—5.5 oz. (12–14g) cantaloupe, honeydew, watermelon



### Vegetable options: all portions are for 1 cup raw

- Carrot strips (12g)
- Pepper strips (4g)
- Celery sticks (3g)
- Cucumbers (3g)
- Broccoli or cauliflower flowerets (4g)
- Pea pods (5g)
- Cherry tomatoes (6g)
- Salad greens (2g)
- Zucchini or summer squash (4g)



### Grain options: choose whole grain products when possible

- 1 serving multigrain or bite-size round tortilla chips
- 1 serving whole grain crackers
- 1 whole grain English muffin
- 1 mini whole wheat pita bread
- 1 cup whole grain dry cereal
- 1 frozen whole grain waffle
- 1 granola bar. Look for bars less than 6g sugar and more than 3 grams fiber per serving.
- 1 slice whole grain bread
- 3 cups popcorn
- 1, 6-inch tortilla or whole grain wrap

## Contact us

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# Family Education Sheet

## Physical Activity & Type 1 Diabetes



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This family education sheet explains how to keep your child safe during and after physical activity.

### Key points

- Physical activity effects every child's blood glucose levels differently.
- Hypoglycemia (low blood sugar) is a risk for people with type 1 diabetes both **during** and **after** physical activity.
- Your child may need adjustments to their carbohydrate intake, their insulin doses or both in order to have safe blood glucose levels during and after physical activity.

### Should my child exercise?

Physical activity can improve a child's overall health and fitness. Exercise is recommended for all children, including those with type 1 diabetes.

Exercise may have benefits for your child's weight, heart, muscles, mood, sleep, confidence and blood glucose levels. Physical activity effects every child's blood glucose levels differently. Talk with your child's diabetes team before they start any physical activity to develop a plan that's right for your child.

### How does exercise impact blood glucose levels?

Consider these things when your child exercises:

- Type of physical activity
- Intensity of physical activity
- Duration of physical activity

Physical activity can impact blood glucose values both **during** and **after** physical activity.

In general, aerobic exercise, like long-distance running, swimming and biking, makes blood glucose levels go down. Anaerobic or brief, high-intensity exercise like sprinting or weightlifting, contribute to blood glucose levels rising. Many team sports like soccer or basketball are a mix of aerobic and anaerobic activity.

Hypoglycemia (low blood sugar) is a risk for people with type 1 diabetes both during and after physical activity. When your child exercises in the afternoon and evening, the risk of nocturnal hypoglycemia (low blood sugar overnight) goes up, since physical activity can impact blood glucose levels several hours after the activity.

Your child may need adjustments to their carbohydrate intake, their insulin doses or both in order to have safe blood glucose levels **during** and **after** physical activity. Your diabetes team will help you identify a plan to closely monitor blood glucose levels during and after exercise in a way that works for your child.

### What supplies should I always have when my child is exercising?

- Blood glucose meter with supplies
- Glucose tabs or other fast-acting carbohydrates, like juice boxes or sports drinks with carbohydrates
- Snacks like dried or fresh fruit, crackers with nut butter or cheese, granola bars and lots of water

Make sure your child always wears a medical ID bracelet.

### How can I keep my child safe during physical activity?

It's very important to closely watch your child's blood glucose levels and to keep good records.

- Check your child's blood glucose 15–20 minutes before activity.
- If your child is physically active for more than 1 hour, plan to check blood glucose every 30 minutes or halfway through the activity.
- Have snacks with carbs (fruit, granola bars, peanut butter or cheese crackers) available as well as fast-acting carbohydrates (juice, glucose tabs) in case your child has a low blood glucose reading.

In the beginning, we recommend that your child has a meal or snack with carbohydrates before participating in physical activity lasting an hour or more. Often, we encourage carbohydrates before exercise to be given without insulin or with an insulin reduction. This helps protect against exercise-induced hypoglycemia. Carbohydrates may be needed for exercise lasting less than an hour based on your child's blood glucose trends.

The amount of carbohydrate your child needs will vary depending on the type, length and intensity of exercise. It will also be impacted by their blood glucose level before exercise and how recently they had insulin.

#### Rule of Thumb for Exercise

15-30 grams of uncovered carbohydrates for every 60 minutes of moderate exercise

### How can I keep my child safe after physical activity?

It's very important to closely watch your child's blood glucose levels and keep good records. Blood glucose levels can drop many hours after your child is done exercising. This is especially true if your child exercises for a long time.

- Check your child's blood glucose directly after the activity and plan to check more frequently (every 1-2 hours) after the activity.

- Your child should refuel with a balanced meal containing carbohydrate, protein and fat after the activity.
- You child may need an insulin adjustment after the physical activity. For example, if your child’s blood glucose is elevated (150 – 250 mg/dL) we may suggest that you don’t correct their blood glucose with insulin and see if the blood glucose levels come down on their own. However, if blood glucose values are staying above 250 mg/dL, they may need a reduced correction dose.
- Your child may need adjustments to how they dose insulin for carbohydrates after physical activity. For example, they may need to only dose for 50-75% of their carbohydrates at a meal they have right after exercise in order to prevent hypoglycemia (low blood glucose) after physical activity.
- Your child may need a change in their basal (long acting) insulin to accommodate for increased activity like sports camps or tournaments, multi-day hiking trips, of other periods of time where activity is increased and lasts several days.

**Remember!** Physical activity impacts each child’s blood glucose differently. Monitoring your child’s blood glucose trends during and after activity will help you and your diabetes team determine how to adjust carbohydrates and/or insulin over time.

### What else should I do to keep my child safe?

- Help your child’s exercise partners — teammates, coaches or people they exercise with — understand signs of hypoglycemia and how to help treat it.
- Pay attention to differences in blood glucose values on practice vs. game/competition days. Your child’s stress and excitement during a competition may impact blood glucose differently than practice days.

*Think ahead! Plan when meals and snacks will be if you know there will be physical activity. Be prepared with preferred meal and snack items, especially if your child has to eat in between practices and games. Talk with your child about the plan for meals, snacks, blood glucose checks and any adjustments that may be needed to insulin. Having a plan can make everyone feel safe and comfortable.*

### Suggested Schedule for Meals and Snack on Exercise Days

3-4 hours before exercise	Immediately before exercise	During exercise	Right after exercise	1-2 hours after exercise
Eat a balanced meal with whole grain / low-glycemic carbohydrate, protein and fat.	Have 15 g of carbohydrate based on blood glucose levels and activity type.  Example:  If blood glucose is <150 mg/dL before an hour-long practice, have a 15 g snack.  If blood glucose is >150 mg/dL, don’t have a snack and check blood glucose again in 30 minutes.	Monitor blood glucose levels.  If participating in aerobic exercise lasting longer than 1 hour plan to have 15 g of carbohydrate per every additional 30 minutes of activity.  Note:  Additional carbohydrates during exercise may not be needed for anaerobic, competitive or quick exercise unless indicated by blood glucose levels.	Monitor blood glucose levels.  If a meal will be in less than 1 hour, a snack is not needed unless indicated by blood glucose levels.  If a meal will be more than 1 hour after exercise finishes, have a 15 g carbohydrate snack.	Monitor blood glucose levels.  Eat a balanced meal with whole grain / low-glycemic carbohydrate, protein and fat. You child may need a modified insulin dose based on blood glucose levels and trends.  Consideration:  Your child may need a bedtime snack based on blood glucose values, length of the activity and intensity of the activity earlier in day. A bedtime snack should have both carbohydrate and protein. Examples: fruit with nut/seed butter or a low-sugar yogurt with berries

**Drinks plenty of fluids before, during and after exercise!**

*Monitor blood glucose values closely. Work with your diabetes team to discuss blood glucose values and possible adjustments to insulin dosing.*

*This table is adapted from the International Society for Pediatric and Adolescent Diabetes 2018 Clinical Practice Guidelines on exercise in children and adolescents with diabetes.*

### Contact us

Please contact your child’s registered dietitian if you have questions about exercising. Call (617) 355-4677 or email [nutritiondept@childrens.harvard.edu](mailto:nutritiondept@childrens.harvard.edu) to set up an outpatient appointment.

# Family Education Sheet

## Diabetes Resources



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[www.bostonchildrens.org/familyeducation](http://www.bostonchildrens.org/familyeducation)

App	Category	Summary of App Features
<b>Fooducate</b> 	Food Management	<b>Fooducate</b> is a nutrition-focused app that assesses the quality of foods based on a letter grade system (A, B, C or D). It has a scannable barcode system to easily find foods within its database. Includes in-app recipes.
<b>Glucose Buddy</b> 	Glucose Tracking	<b>Glucose Buddy</b> is a tracking app for blood glucose levels, insulin doses, carb intake and physical activity. Compatible with Dexcom G6 and manual entry for glucometer users. You can link your app with <a href="http://glucosebuddy.com">glucosebuddy.com</a> online for more functionality.
<b>mySugr</b> 	Food Management Glucose Tracking	<b>mySugr Diabetes Logbook</b> logs meals, medication, blood glucose values, activity and more. Compatible with some glucometers. Blood glucose graph and estimated HbA1c are provided with a daily, weekly and monthly analysis.
<b>Calorie King</b> 	Food Management	<b>Calorie King</b> is a food database often called the "Google" of food. Simply search for common foods, including restaurant foods, and nutritional information is displayed based on serving size in volume or weight.
<b>CRON-o-meter</b> 	Food Management	<b>CRON-o-meter</b> is a tracking application for nutrition, health and fitness. You can log, track and share data about your daily foods, exercises, biometrics and notes. You can enter recipes from scratch to identify carbs for home-cooked food.
<b>MyFitness Pal</b> 	Food Management	<b>MyFitness Pal</b> is a database of 5,000,000 foods and an easy-to-use food log. All major nutrients are tracked, such as calories, fat, protein, carb, sugar, fiber and cholesterol. It includes step tracking.
<b>Figwee</b> 	Food Management and Carb Counting	<b>Figwee</b> is a visual database of thousands of images of weighed portions that allow you to fine-tune estimations when carb counting without measuring cups, spoons or food scales.
<b>Carbs &amp; Cals</b> 	Food Management and Carb Counting	<b>Carbs &amp; Cals</b> is a visual database of thousands of images of weighed portions that allow you to fine-tune estimates when carb counting without measuring cups, spoons or food scales. You can log meals, snacks and exercise, and you can set up targets and keep track of your intake.
<b>Carb Counting with Lenny</b> 	Carb Counting for kids	<b>Carb Counting with Lenny</b> leads kids and parents through diabetes education games designed to help children learn to carb count.

## Online Resources

Name of Website:	Web Address:
Boston Children's Hospital Diabetes Program Private Facebook page	<a href="https://www.facebook.com/groups/2315590128531569/">https://www.facebook.com/groups/2315590128531569/</a>
Juvenile Diabetes Research Foundation	<a href="http://www.jdrf.org">www.jdrf.org</a>
American Diabetic Association	<a href="http://www.diabetes.org">www.diabetes.org</a>
Academy of Nutrition and Dietetics	<a href="http://www.eatright.org">www.eatright.org</a>
USDA MyPlate	<a href="http://www.choosemyplate.gov">www.choosemyplate.gov</a>
The Calorie King	<a href="http://www.calorieking.com">www.calorieking.com</a>
T1 Everyday Magic	<a href="https://www.t1everydaymagic.com/">https://www.t1everydaymagic.com/</a>
Juicebox Podcast	<a href="https://www.juiceboxpodcast.com/">https://www.juiceboxpodcast.com/</a>

*Not all information found on the internet is accurate or useful. If you have questions about information you read on the internet, check with your child's diabetes team.*

## General Diabetes Books for Caregivers

Title	Author	Description
<i>Understanding Diabetes: A Handbook for People Who Are Living with Diabetes, 14th Edition</i>	H. Peter Chase, MD & David M. Maahs, MD, PhD	<ul style="list-style-type: none"> <li>The Children's Diabetes Foundation's best-selling reference book for those newly diagnosed with T1DM and their families.</li> <li>Available at: <a href="http://childrensdiabetesfoundation.org/books">childrensdiabetesfoundation.org/books</a></li> </ul>
<i>A First Book for Understanding Diabetes, 14th Edition</i>	H. Peter Chase, MD & David M. Maahs, MD, PhD	<ul style="list-style-type: none"> <li>Accessible for young children, this primer is companion to <i>Understanding Diabetes: A Handbook for People Who Are Living with Diabetes</i>.</li> <li>Available at: <a href="http://childrensdiabetesfoundation.org/books">childrensdiabetesfoundation.org/books</a></li> </ul>
<i>Kids First, Diabetes Second: Tips for Parenting a Child with Type 1 Diabetes</i>	Leighann Calentine & Robin Porter	<ul style="list-style-type: none"> <li>Diabetes mom and blogger Leighann Calentine shares her family's experiences with her daughter's type 1 diabetes.</li> </ul>
<i>Raising Teens with Diabetes: A Survival Guide for Parents</i>	Moira McCarthy, Jake Kushner MD, & Barbara J. Anderson Ph.D.	<ul style="list-style-type: none"> <li>A guide to navigating the teen years while managing T1D. Written by diabetes mom, author, and advocate Moira McCarthy.</li> </ul>
<i>Think Like a Pancreas: A Practical Guide to Managing Diabetes with Insulin</i>	Gary Scheiner	<ul style="list-style-type: none"> <li>Diabetes educator Gary Scheiner helps you "think like a pancreas" by helping to understand the art and science of managing type 1 diabetes.</li> </ul>
<i>Type 1 Diabetes for the Newly Diagnosed: What to Expect, What to Do, How to Thrive</i>	Ariel Warren	<ul style="list-style-type: none"> <li>Ariel Warren is a dietitian, diabetes educator, and has been living with type 1 diabetes since age 4. This book is a guide for those navigating the first few months of a new type 1 diabetes diagnosis.</li> </ul>

## Carbohydrate Counting Books

Title	Author
<i>The Calorie King: Calorie, Fat &amp; Carbohydrate Counter</i>	Allan Borushek
<i>The Ultimate Guide to Accurate Carb Counting</i>	Gary Scheiner
<i>The Complete Guide to Carb Counting</i>	American Diabetes Association

## Cookbooks

Title	Author
<i>The Clean &amp; Simple Diabetes Cookbook</i>	Jackie Newgent
<i>The Type 1 Diabetes Cookbook: Easy Recipes for Balanced Meals and Healthy Living</i>	Laurie Block
<i>The Everything Guide to Cooking for Children with Diabetes</i>	Moiura McCarthy
<i>Diabetes Snacks, Treats, and Easy Eats for Kids: 150 Recipes for the Foods Kids Really Like to Eat</i>	Barbara Grunes

## Books for Children

Title	Author
<u><a href="http://www.t1everydaymagic.com/lilly-and-disneys-type-1-diabetes-bookshelf/">Lily and Disney's Type 1 Diabetes Electronic Bookshelf</a></u> <u><a href="http://www.t1everydaymagic.com/lilly-and-disneys-type-1-diabetes-bookshelf/">www.t1everydaymagic.com/lilly-and-disneys-type-1-diabetes-bookshelf/</a></u>	Over 12 electronic books for children highlighting characters with Type 1 Diabetes navigating things like sleepovers, school, and sports.
<i>The Ups and Downs of Audrey May</i>	Missy Mareau Garcia
<i>Year One with Type One: A True Story of a Boy with Type 1 Diabetes</i>	Mike Suarez
<i>Teddy Talks: A Paws-itive Story About Type 1 Diabetes</i>	Vanessa Messenger
<i>Super Sammy! A Tale for Type 1 Superheroes</i>	Josh Hall
<i>Caillou: Emma's Extra Snacks</i>	Anne Paradis
<i>Taking Diabetes to School</i>	Kim Goesselin
<i>Listening to My Body</i>	Gabi Garcia
<i>The Great Katie</i>	Kate M. Maitand Deland
<i>Ballerina Dreams: A Book for Children with Diabetes</i>	Zippora Karz
<i>My Sister Has Diabetes: and How That Makes Me Feel</i>	Grace Rooney
<i>Shia Learns about Diabetes Care</i>	Shaina Hatchell
<i>Daisy the Diabetic Unicorn Finds a Friend - A Special Story and Coloring Book for Kids with Type 1 Diabetes</i>	Type One Toddler

## Books for Adolescents

Title	Author
<i>Sugar Linings: Finding the Bright Side of Type 1 Diabetes</i>	Sierra Sandison
<i>Diabetes? Wow...: An Illustrated Guide to Help Answer Type 1 Diabetes Questions</i>	Briar Hopper
<i>Highs &amp; Lows of Type 1 Diabetes: The Ultimate Guide for Teens and Young Adults</i>	Patrick McAllister

# {DISCHARGE PLANNING}

# Family Education Sheet

## Scheduling Your Outpatient Diabetes Follow-Up Appointments



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You will need to schedule outpatient follow-up appointments with the Diabetes Program to continue your family's diabetes management education, medical care and support. The outpatient diabetes team plays an important role in successfully managing your child's diabetes.

We recommend that you set up these appointments before going home:

### New diagnosis of diabetes: Type 1 / Type 2 (please circle)

- 1 visit with diabetes nurse educator or doctor within 1 week: \_\_\_\_\_
- 1 visit with registered dietitian within 2 weeks: \_\_\_\_\_
- 1 visit with diabetes doctor within 6–8 weeks: \_\_\_\_\_
- 1 visit with social worker or psychologist within 6–8 weeks: \_\_\_\_\_

### Return admission (hospital stay) for diabetes

- 1 visit with diabetes nurse educator or doctor within 2–3 weeks: \_\_\_\_\_
- 1 visit with social worker or psychologist within 2–3 weeks: \_\_\_\_\_

Before you go home, please call the scheduling line during the hours of operation.

You will speak with an administrative assistant who will help you schedule these appointments. **Please have your personal/work schedule available when you call** so you will not have to cancel or reschedule. **It is important for you to be flexible during the scheduling process so we can make your first appointments within the necessary timeframes.**

#### Type 1 and Type 2 Diabetes Program Scheduling Line

Phone number 617-355-8136

Fax number 617-730-0194

Hours Monday–Friday  
9 a.m.–5 p.m.



## What is the School and Camp Medication Order Form?

This form allows the school or camp nurse to:

- Check your child's blood glucose
- Correct low blood glucose with a fast-acting carbohydrate and snack, if needed
- Give insulin to cover for carbohydrates and correct for high blood glucose
- Check for ketones
- Give an emergency injection of glucagon

The School/Camp Medication Order form must be signed by the provider before your child leaves the hospital.

## What supplies should I bring to my school or camp nurse?

- 1 blood glucose logbook
- 1 blood glucose meter
- 1 Glucagon Emergency Kit
- Alcohol wipes
- Blood glucose test strips
- Fast-acting carbohydrate (such as glucose tabs)
- Ketone testing supplies (urine or blood ketone test strips)
- Lancets
- Snacks

If your child is on a basal-bolus insulin regimen or gets insulin based on a sliding scale, then also bring:

- \_\_\_\_\_ insulin or insulin pen
- Insulin syringes or pen needles



This Family Education sheet explains what you should know after you are discharged (when you leave the hospital).

### Who will I be in touch with when we go home?

The outpatient diabetes team will be your main contact for daily questions and concerns about managing your diabetes.

### How do I contact the diabetes team?

- Call 617-355-6369 and ask for the diabetes nurse or doctor on call to be paged.
- If you need an interpreter, call 617-355-6369. The page operator will connect you to Interpreter Services.

### How does the daily blood glucose review work?

Until your first outpatient appointment, please page the diabetes nurse educator on call **every day** before 10 a.m. During this call, you and the nurse educator will:

- Review the past 24 hours of blood glucose values
- Review the past 24 hours of insulin doses

You can also ask your nurse educator any questions you may have during this call.

**Before calling, please have your blood glucose logbook updated and available.**

### Important reminder:

**Check blood or urine ketones if your blood glucose is greater than 300 mg/dL or if you are vomiting (throwing up).**

### What should I do if I have an urgent issue or question?

Page the diabetes nurse or doctor on call right away you have a concern, such as:

- Moderate or large urine ketones or blood ketones greater than or equal to 1 mmol/L
- You're vomiting (throwing up)
- You can't eat or drink
- Blood glucose that is still low after being treated with rapidly absorbed carbohydrates (such as glucose tabs, juice, etc.)
- Low blood glucose level (hypoglycemia) that was treated with Glucagon and/or you have called 911
- You made a mistake with a dose of insulin
- You missed a dose of insulin

The Diabetes team at Boston Children's Hospital is available 24-hours-a-day, 7 days a week for any urgent issue listed above.

