

# Taking Control: Managing the Highs and Lows



Nicklaus  
Children's  
Hospital

© Nicklaus Children’s Hospital 2018

This diabetes book does not contain or replace medical advice, or any recommendations for any specific medical situation. All content must be evaluated by a licensed physician or other qualified healthcare provider before use. Consultation with your diabetes medical team, such as an endocrinologist or other physician, certified diabetes educator, nutritionist or dietician is recommended to provide medical care. You should not make any changes in the management of Type 1 diabetes without first consulting your physician or other qualified medical professional.

This book and any information herein is solely for the purpose of education. The information should not be relied on as complete and accurate in all situations or relied on to recommend a course of treatment for a particular patient. It also should not be used in place of a medical evaluation, consultation or the advice of a licensed physician or other qualified health care provider, and such a professional should be contacted in each case. Patients with medical questions or concerns are advised to contact a licensed physician or other qualified healthcare provider promptly.

The authors and Nicklaus Children’s Hospital reserve the right, in their sole discretion, to add, remove, or correct any content, errors or omissions in any portion of this book, at any time without notice. Information in this book may contain inaccuracies or errors. The authors and Nicklaus Children’s Hospital believe the information contained in this book is accurate, but reliance on any such opinion, statement, or information shall be at your sole risk. The authors and Nicklaus Children’s Hospital have no obligation to update this book, and any information may be out of date.

Use this book at your own discretion. The information is provided “as is” without any warranty, express or implied. The authors and Nicklaus Children’s Hospital disclaim all explicit and implicit warranties, including without limitation warranties of merchantability and fitness for a particular use or purpose. Under no circumstances will the authors or Nicklaus Children’s Hospital be liable for any direct, indirect, special or other consequential damages arising out of any use of this book or the information contained herein.

This book does not substitute for qualified medical professional care and should not be used for an emergency. In an emergency, please call 911 or go to your closest emergency room for immediate care.

# Taking Control: All About the Highs and Lows

## Table of Contents

Meet the Diabetes Team .....	2
What is Diabetes? .....	4
a. Types of diabetes	
Blood Glucose Monitoring .....	6
Insulin .....	8
a. Different types of insulin	
b. Insulin delivery	
c. Insulin pens	
d. Insulin pumps	
e. Administration sites	
f. How to administer an injection	
g. Proper needle disposal	
Hyperglycemia (High Blood Sugar) .....	13
a. Causes	
b. Symptoms	
c. Treatment	
Urine Ketone Testing .....	14
Hypoglycemia (Low Blood Sugar) .....	15
a. Causes	
b. Symptoms	
c. Treatment	
Diabetic Emergencies .....	17
a. Severe hypoglycemia	
b. Glucagon	
c. Diabetic ketoacidosis	
Sick Days .....	21
Exercise .....	23
School Days .....	24
Nutrition .....	25
a. Carbohydrates	
b. How to carbohydrate count	
c. "Free" foods	
d. How to read a nutrition label	
Discharge Information .....	29
Resources and Support Services .....	31
Acknowledgements and References .....	31
Scenarios .....	32

# MEET THE DIABETES TEAM

Welcome to the diabetes program. We understand this may be a very overwhelming time for you. Our job over the next couple of days is to try and ease some of the feelings you are experiencing. You and your child will meet with several people during your stay. Each of us will provide you and your family with the information you need to feel comfortable at home.

## **Doctor/Endocrinologist**

An endocrinologist is a doctor that specializes in diabetes management. He/she will be stopping by at least once a day to see how you are doing and adjust the child's insulin dosages based on his/her blood glucose (also known as blood sugar level). After discharge, you and your child will need to follow up regularly with the endocrinologist.

## **Nurse Practitioner**

A nurse practitioner is a nurse who has completed advanced practice training. He/she works closely with the endocrinologist to monitor progress. A nurse practitioner can also adjust insulin doses, refill prescriptions, and provide diabetes education. You may see the nurse practitioner during follow up visits once you go home.

## **Diabetes Educator**

The diabetes educator will teach you how to care for your child's diabetes at home. He/she will teach you how to check blood sugar levels, give insulin injections, and tell you what to do in the event of high/low blood sugars. Once you go home, the education will continue at your follow up endocrinology visits.

## **Nurse**

The nurse will provide basic care needs. He/she also helps reinforce the education provided by the diabetes educator. Many times, it is the nurse who provides support during your first blood glucose check and insulin injection.

## **Dietitian**

The dietitian will talk to you about your child's eating habits. He/she can advise on what to eat and what not to eat in order to help keep the blood sugar under control.

## **Social Worker**

The social worker will help you and your child cope with the new diagnosis, work to ensure medications and supplies are delivered before discharge, provide you with information about community resources, and assist with any needs to support you and your child.

## **Child Life Specialist**

The child life specialist will help your child learn about his/her new diagnosis using age-appropriate techniques. This will assist with the challenges that are faced during hospitalization.

**Psychology Services**

Psychological services provides an additional support for you and your child. This service allows you and the child to talk about any feelings or emotions being experienced as well as provide techniques or suggestions on ways to cope.

**My Team Members are:**

Endocrinologist: \_\_\_\_\_  
Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Nurse Practitioner: \_\_\_\_\_  
Phone: \_\_\_\_\_ Email: \_\_\_\_\_

Diabetes Nurse Educator: \_\_\_\_\_  
Phone: \_\_\_\_\_ Email: \_\_\_\_\_

Dietitian: \_\_\_\_\_  
Phone: \_\_\_\_\_ Email: \_\_\_\_\_

Social Worker: \_\_\_\_\_  
Phone: \_\_\_\_\_ Email: \_\_\_\_\_

Child Life Specialist: \_\_\_\_\_  
Phone: \_\_\_\_\_

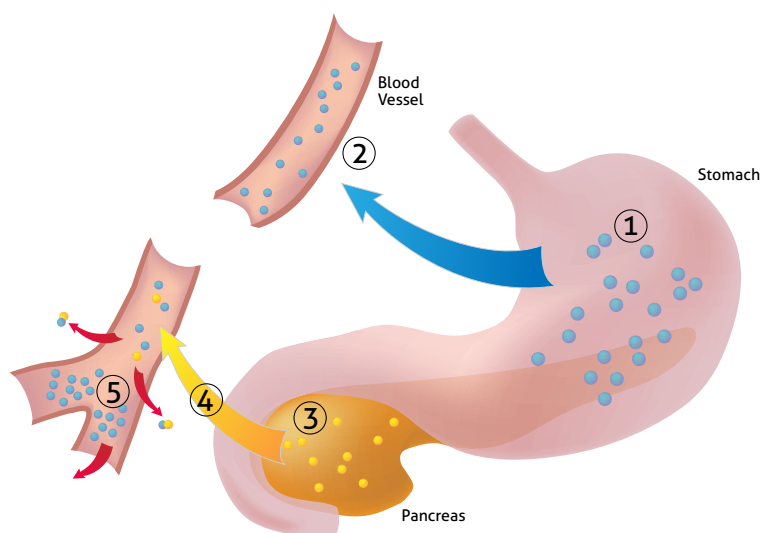
Psychologist: \_\_\_\_\_  
Phone: \_\_\_\_\_

# WHAT IS DIABETES?

Diabetes mellitus is a group of disorders affecting the management of blood glucose (sugar) levels in the blood. Glucose comes from the food you eat and provides the cells with energy. After the glucose enters the bloodstream, insulin (a hormone produced by the pancreas) helps glucose move into cells. The cells need glucose in order to produce energy. People with diabetes have problems getting glucose in their cells for various reasons. When this happens, the body is starved of energy. Over time, high levels of glucose in the blood can hurt the eyes, kidneys, nerves and/or heart. There are different types of diabetes. We will be discussing the most common, type 1 and type 2, in this book.

## Type 1 Diabetes

Type 1 diabetes is usually diagnosed early in life; during childhood or as a young adult. It is also known as juvenile diabetes. In type 1, the body does not produce enough insulin.



1. The stomach converts food into glucose.
2. Glucose enters the bloodstream.
3. The pancreas makes little or no insulin.
4. Little or no insulin enters the bloodstream.
5. Glucose builds up in the bloodstream.

## Causes:

Diabetes is believed to be caused by three things:

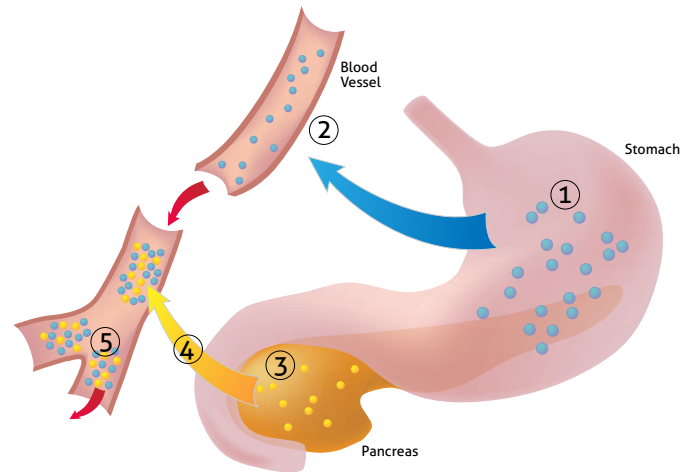
- **Genetics:** over 50 percent of diagnosed kids have inherited the gene combination DR3/DR4 from their parents.
- **Autoimmune response:** the body begins to attack its own parts because the body does not think these parts belong inside the body. With type 1 diabetes, the body attacks the islet cells in the pancreas where insulin is made. The damaged islet cells then cause the immune system to develop something called antibodies.
- **Virus, chemical, or environment:** our genetic make-up determines if a body will allow a virus, chemical, or substance in the environment to get into the islet cells and cause damage.

## Treatment:

Proper management includes balancing insulin, food, and exercise to control blood glucose levels.

## Type 2 Diabetes

Type 2 is the most common type of diabetes. It is often associated with being overweight. Type 2 occurs when the body doesn't produce enough insulin or the cells do not respond well to the insulin (insulin resistance). At first, the pancreas will make extra insulin to make up for the cells' resistance; however with time, the pancreas can no longer keep up. People with type 2 diabetes may have normal or high insulin levels. Type 2 diabetes most commonly occurs after the age of 40, but is now also being seen in overweight children and teenagers.



1. The stomach converts food into glucose.
2. Glucose enters the bloodstream.
3. The pancreas makes insulin.
4. Insulin enters the bloodstream.
5. Glucose cannot get into the cells of the body. Glucose builds up in the blood.

### Causes:

- **Genetics:** There is a greater chance of developing type 2 diabetes if your parents have it. The genetic mutation that causes it is still unknown.
- **Lifestyle Choices:** Lack of exercise, unhealthy meal choices, and/or overweight/obesity

### Treatment:

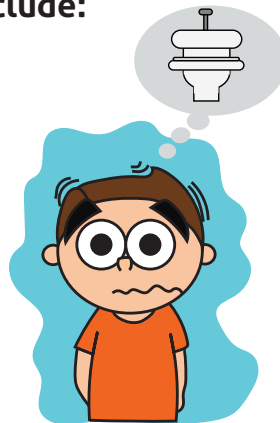
- Lifestyle changes: diet and exercise
- Medication by mouth
- Insulin injections (only when medication by mouth does not work)

**HEALTHY TIP:** 30-60 minutes of exercise at least five times a week is important for everyone.

### Most commonly seen symptoms include:



Very thirsty



Needing to pass urine more often than usual



Very hungry

# BLOOD GLUCOSE MONITORING

The glucose (sugar) in the child's blood must be checked at certain times. The blood sugar is checked by performing a finger stick and using the blood glucose monitor. The child's blood sugar will need to be checked every day right before each meal and at bedtime.

It is important to check blood glucose before bedtime because this is the longest period in the day the child will go without eating. Checking the blood sugar at bedtime will help determine if a snack is needed before going to sleep in order to avoid a drop in blood sugar during the night.

Blood sugars should also be checked if the child feels or looks sick. It is also important to check blood sugars before the child exercises or participates in sports.

## What is too high and what is too low?

A safe blood glucose level depends on many factors; the doctor will help determine a safe range for the child.

"Target blood sugar" is a range for the child's recommended blood sugar level. Target blood sugars according to age can be seen in the table below.

Toddlers and Preschoolers (0-4 years)	80 - 200 mg/dl
School age (5-12 years)	80 - 180 mg/dl
Adolescents and young adults (13-19 years)	80 - 150 mg/dl

*These are initial guidelines but may change based on the individual patient response or as necessary by the doctor at follow-up appointments.*

## Do I have to keep track of blood sugars?

Logging the blood sugar levels regularly in a log book will help the endocrinologist determine if the insulin dose is appropriate. Logging blood sugar levels will help identify patterns. The goal is for people with diabetes to learn how to manage their condition over time.

## What is a Hemoglobin A1c (HbA1c)?

Hemoglobin A1c is a blood test that tells us the average blood sugar levels over the last three months. According to the American Diabetes Association, all children younger than 18 years should strive to have a Hgb A1c of less than 7.5 percent. Your doctor will order this test periodically to monitor the blood sugars over time.

**TIP:** *The blood sugar should be checked right before starting to eat. If more than one hour passes since the blood sugar was checked and he/she has not started to eat, the blood sugar level should be checked again before eating. This is important because the blood sugar level could have changed as well as the amount of insulin needed.*

ADA\* HgbA1C Conversion Table and Blood Sugar Levels

Hemoglobin A1C	Average Blood Sugar
6%	125 mg/dl
7%	154 mg/dl
8%	183 mg/dl
9%	212 mg/dl
10%	240 mg/dl
11%	269 mg/dl
12%	298 mg/dl

\*Retrieved from ADA - A1c and eAG. Last reviewed 2014.



# How do I Check the Blood Sugar?

1



Wash your hands and the child's hands.

2



Gather supplies.

3



Open test strip and insert into glucose monitoring device.

4



If the child is able, allow him or her to choose a finger to stick. Clean the finger with alcohol and allow to air dry completely.

5



Press lancet on side of finger and press button to lunge needle.

*TIP: The side of finger has less nerve endings which means it is less painful.*

6



Squeeze finger for a drop of blood and wipe it away.

7



Squeeze finger and apply second drop to test strip.

8



Record result in log book.

9



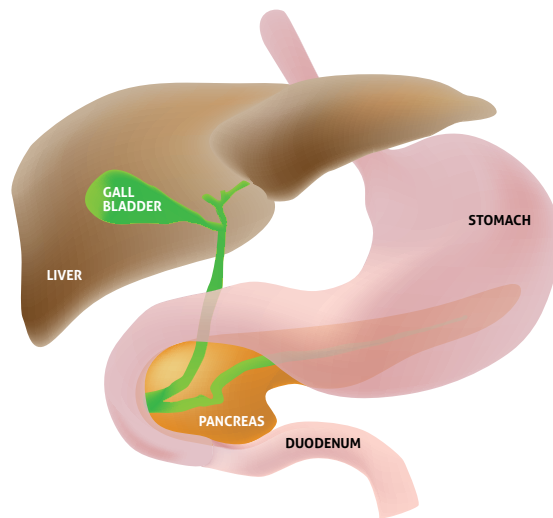
Discard test strip and needle.

**\*\*\* It is important to note that there are many different glucose monitors and lancets, they may work slightly differently. Be sure to read the instruction manual that came with your devices for exact instructions.**

# INSULIN

The child now has to use insulin. Common questions include: What is insulin? Why is the child using insulin? How do you use insulin?

Insulin is a hormone made in the pancreas by the beta cells of the Islet of Langerhans. The pancreas is an organ found behind the stomach. Insulin is necessary for the body. Insulin is in charge of taking the sugar we get from food to the cells. Then the cells use the sugar to nourish the body and produce energy. When there is not enough insulin made by the body, a person with type 1 diabetes needs insulin injections. Injections are given because stomach acid would destroy the insulin if it were given by mouth.



There are four types of insulin. The doctor will determine which type(s) would work best for the child. The four types of insulin are rapid-acting, short-acting, intermediate-acting and long-acting insulin.

- The rapid-acting insulins are Humalog<sup>®</sup>, Novolog<sup>®</sup>, and Apidra<sup>®</sup>. This type of insulin is clear in color.
- The short-acting insulin is regular insulin. It is considered short acting because it lasts longer than Humalog<sup>®</sup>, Novolog<sup>®</sup>, and Apidra<sup>®</sup>.
- The intermediate insulin is known as NPH, Humulin<sup>®</sup> N, or Novolin<sup>®</sup> N. This type of insulin is cloudy in appearance.
- The long-acting insulins are Lantus<sup>®</sup> and Levemir<sup>®</sup>. This type of insulin lasts for twenty-four hours and should not be mixed with any other insulin in the same syringe.

## How are the four types of insulin different?

All insulins are grouped according to the following:

- Onset of action (when the insulin starts to work)
- Peak (when the insulin works the best)
- Duration (how long the insulin works for)

See table 1-1 for a comparison of the different insulins

Table 1-1

Types of Insulin	Brand Name	Onset	Peak	Duration
<b>Rapid-Acting</b>	Humalog®, Novolog®, Apidra®	5-10 minutes after injection	1-2 hours after injection	4-6 hours
<b>Short-Acting</b>	Regular	30-60 minutes after injection	2-4 hours after injection	6-8 hours
<b>Intermediate</b>	NPH	1-2 hours after injection	4-6 hours after injection	12-18 hours
<b>Long-Acting</b>	Lantus®, Levemir®	2 hours after injection	No peak	24 hours

**How often do I need to use insulin?**

Basal/bolus therapy is the most common insulin therapy used today. This therapy works the way the pancreas used to work before diabetes. It involves using a long-acting insulin (basal) once a day, and a rapid-acting insulin (bolus) several times a day with meals and snacks.

**This type of treatment:**

- Allows for a more flexible schedule
- Works with carbohydrate counting
- Requires 4-6 injections a day

**Insulin Delivery**

The thought of giving an injection might be scary at first but with time and practice, giving insulin becomes easier. There are different ways in which insulin is given.

A syringe and vial is the most widely used method.



1. Wash your hands.



2. Wipe the top of insulin vial with alcohol.



3. Pull the plunger to the amount of insulin needed.



4. Inject the air into the insulin vial.

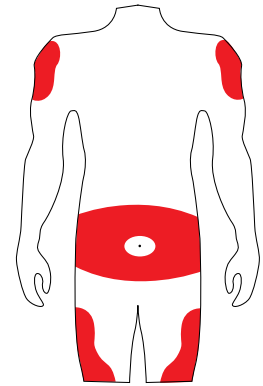


5. Turn insulin vial upside down and pull plunger to the amount of insulin needed.

**TIP:** Check for air bubbles in the syringe before injecting. Air bubbles mean you will give less insulin than needed. If you have air bubbles, push insulin back into vial and repeat step 5.

## Suggested Administration Sites

Insulin works the fastest when the injections are given in the stomach (an inch or more away from the belly button). Some suggested sites for insulin injections are the back of the upper arms, the thighs, and the abdomen. It is important to remember to always rotate the site. If injections are continuously given at the same site, the area will harden and will not absorb the insulin.



## Injecting Insulin Using a Syringe



1. Choose site and wipe area with alcohol.



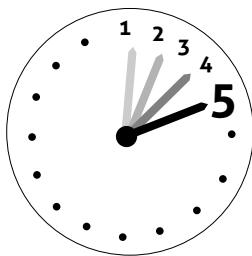
2. Once alcohol completely dries, pinch skin using fingers and hold it.



3. Insert needle completely into skin.



4. Push plunger down to give the insulin.



5. Once all medication has gone in, count to 5 seconds.



6. Release skin and pull needle out of skin.



7. Dispose of needle into appropriate container.



**Insulin pens** are increasingly becoming more popular, and more insurance companies are covering the cost. Insulin pens are available as both reusable or disposable. Reusable insulin pens contain a cartridge of insulin that is inserted into the pen. Disposable pens come prefilled with insulin. When using pens, the insulin dose is dialed on the pen and the insulin is injected through one small pen needle. Before injecting insulin, pen needles must be primed.

## Steps to Prime Insulin Pens:

1. Wash your hands.
2. Remove the pen cap and clean the rubber stopper with alcohol.
3. Place the pen needle on the rubber stopper using pressure and twist until secure.
4. If the pen is brand new, dial to number 5 and hold the pen up vertically with the needle facing up. Push the injection button until you see insulin coming out of the needle and the dial marks 0. If you do not see any insulin come out, repeat this step.
5. If the pen is not new, follow steps 1-4 but set the dial at 2.

## REMEMBER:

- **First use:**  
Prime with 5 units
- **Every use thereafter:**  
Prime with 2 units

## Injecting Insulin Using an Insulin Pen



1. Remove pen cap and clean rubber stopper with alcohol.



2. Put on pen needle.



3. Dial to appropriate amount needed to prime needle and push injection button until dial marks 0.



4. Dial amount of insulin needed.



5. Choose injection site and cleanse with alcohol.



6. Insert needle into skin completely and push injection button until dial reaches 0 and count to 10 seconds before removing.



7. Remove pen needle and dispose. The pen needle needs to be changed with every use.



**Insulin pumps** are computerized devices that are worn continuously and deliver insulin into the fat layer below the skin through a flexible plastic tube. The insulin is given at a steady rate mimicking the body's natural insulin release. In addition, an on demand or bolus dose, based on the blood sugar and the amount of carbohydrates eaten, may be given. Insulin pumps are for those who already have experience using insulin. It can be an effective option. We can discuss more about insulin pumps at the office clinic visits.

---

### **How to Safely Dispose of Needles**

Pen needles and syringes should be disposed of in a hard plastic container such as a "sharps container," which you can get at a local pharmacy or a colored laundry detergent bottle. For detergent bottle use, follow the steps listed below:

- Write in large letters "medical waste" on the container and keep it in a safe place out of children's reach with the top on at all times
- When the container is half to three-fourths full, put duct tape around the top to further secure it
- Contact the local city waste management and ask if there are any special guidelines to follow. If there are no guidelines, you may place the sealed and labeled container inside the regular trash

# BEDTIME BLOOD SUGAR CHECKS



Bedtime blood sugar levels need different care than the blood sugar levels of the child during the day. This is because the child will be going to sleep and this is the longest time period the child will go without eating. It is very important to prevent the blood sugar from dropping during the night.

It is also important to understand that the “bedtime blood sugar” should be taken a minimum of 3 hours after the last rapid acting insulin dose was given with dinner and is not related to whether the child is going to sleep or not. If the bedtime blood sugar is taken before a minimum of 3 hours have passed since the rapid acting insulin dose was given with dinner, it will lead to an inaccurate reading. An inaccurate reading can result in giving too much insulin at bedtime or too little if it is needed. Below you will find a table showing target blood sugars for bedtime. The table shows what blood sugars are too low and need a snack, and which blood sugars are too high and need insulin according to the child’s age. Any snack given according to the table below, does not require insulin unless more carbohydrates than what was recommended was consumed.

Age	Target Bedtime Blood Sugar	Too Low	Too High
<b>Toddlers and Preschoolers</b> (0-4 years)	150 – 300 mg/dl	<b>If less than 150 mg/dl</b> give 5-8g of a complex carbohydrate snack (carbohydrate <b>and</b> protein) with no insulin coverage	<b>Only if more than 300mg/dl</b> give insulin looking at your sliding scale and subtracting 1 unit
<b>School age</b> (5-12 years)	130 – 200 mg/dl	<b>If less than 130 mg/dl</b> give 10-15g of a complex carbohydrate snack (carbohydrate <b>and</b> protein) with no insulin coverage	<b>Only if more than 200mg/dl</b> give insulin looking at your sliding scale and subtracting 1 unit
<b>Adolescents and young adults</b> (13-19 years)	120 – 200 mg/dl	<b>If less than 120 mg/dl</b> give 15g of a complex carbohydrate snack (carbohydrate <b>and</b> protein) with no insulin coverage	<b>Only if more than 200mg/dl</b> give insulin looking at your sliding scale and subtracting 1 unit

*These are initial guidelines but may change based on the individual patient response or as necessary by the doctor at follow-up appointments.*

It is recommended that a blood sugar after bedtime is taken between 3 and 4 a.m. for the first 3-4 days post discharge from the hospital and anytime that there is a change in the child’s long acting insulin or if there has been increased physical activity in the late afternoon/evening hours.

# HYPERGLYCEMIA (High Blood Sugar)

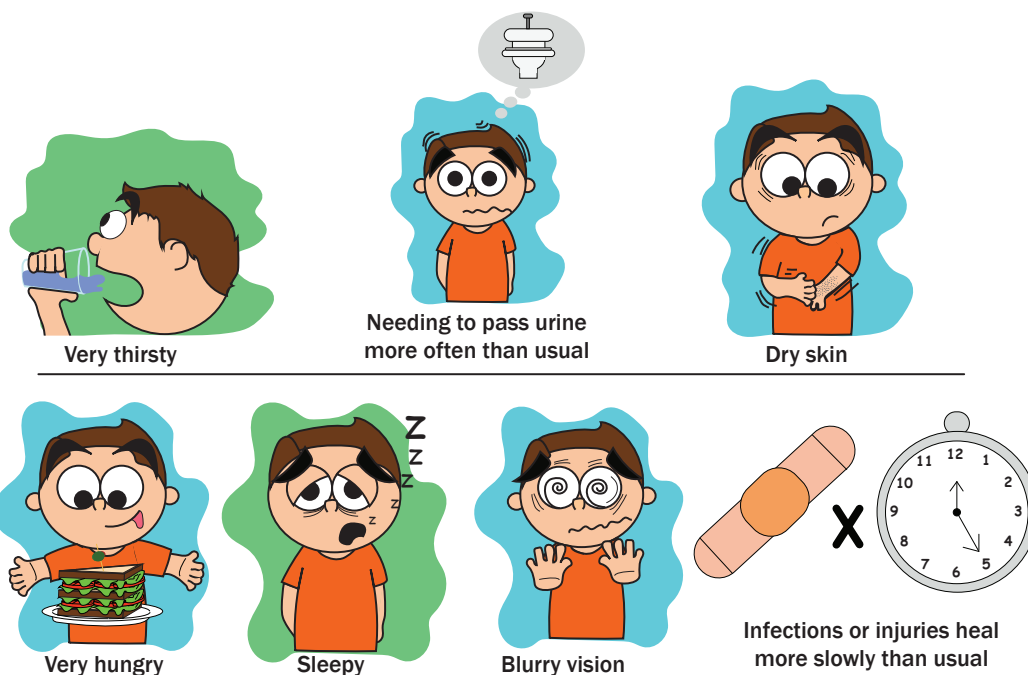
## What is hyperglycemia?

Hyperglycemia, also known as high blood sugar, occurs when there is a build up of glucose in the blood. The glucose in the blood cannot enter the body's cells because there is not enough insulin, therefore it stays in the blood stream. Hyperglycemia is defined as a blood sugar greater than what the child's target goal range should be.

## What can cause hyperglycemia?

- Not enough insulin
- Too much food
- Being less active than normal
- Sickness
- Stress

## Signs and Symptoms of High Blood Sugar:



## How is hyperglycemia treated?

- Check the blood sugar if any of the above symptoms are present.
- Check the urine for ketones. See "urine ketone testing" (page 13) for instructions.
- Additional rapid-acting insulin may be needed. This can occur either immediately or with the next meal depending on how high the blood sugar is and if there are ketones present in the urine

## Call the doctor if the child has:

- High blood sugar levels for three or more days (it may mean that the doctor needs to adjust the dose of insulin)
- Moderate or large ketones



# URINE KETONE TESTING

## What are ketones?

Ketones are harmful toxins in the blood. Without insulin, cells cannot get enough glucose for energy and therefore start breaking down the fat in the body for energy. The process of breaking down fat results in the formation of "ketones." The kidneys try to get rid of the ketones through the urine.

## When is it necessary to check the urine for ketones?

- When sick (cold, flu or fever)
- When the blood sugar is very high (above 250 mg/dL or as instructed by the doctor)
- When an insulin shot is missed
- After vomiting even once
- When using an insulin pump and there is blockage in the catheter or pump failure

## What needs to be done when there are ketones in the urine?

- Drink lots of water or non-sugary drinks to flush the ketones out
- Use the sliding scale to lower the blood sugar
- Re-check the blood sugar two hours after the correction to ensure the blood sugar is decreasing
- In case of moderate or large ketones, notify the endocrinologist because more insulin may be needed to lower the blood sugar
- Continue checking for ketones with every urine until a negative reading is achieved

## Testing Urine for Ketones



1. Gather supplies



2. Collect urine



3. Dip the test strip in the urine



4. Wait the appropriate amount of time



5. Compare the test strip color to the label on the bottle

### HELPFUL HINT:

*Make sure that all the squares on the strip come into contact with the urine. Let the strip sit out after dipping it in the urine for 60 seconds (or the time that it says on the directions of the bottle or box) then read the strip using the label on the bottle.*

# HYPOGLYCEMIA (LOW BLOOD SUGAR)

## What is hypoglycemia?

Hypoglycemia is low blood sugar that occurs when there is little glucose in the blood. Blood sugars below 70 mg/dL are considered low. When this happens the body does not have the source of energy it needs to function properly.

## What can cause hypoglycemia?

- Late or missed meals or snacks
- More exercise than usual
- Too much insulin or the wrong dose
- Sickness, especially with vomiting and/or diarrhea

## Signs and Symptoms of Low Blood Sugar:



It is very important to know the signs and symptoms of hypoglycemia because a low blood sugar can happen quickly and must be treated immediately. If it is not treated, loss of consciousness (inability to wake your child) or a seizure can occur.

## How is hypoglycemia treated?

If the child has signs or symptoms of hypoglycemia, check his/her blood sugar immediately with the glucose meter and treat as described below.

- Have the child eat or drink a fast-acting carbohydrate. A fast-acting carbohydrate is a food or drink that contains only carbohydrates with no fat or protein. Fat slows the rate of emptying of the stomach so it will take longer for the carbohydrate to be absorbed and enter the bloodstream. (See chart for examples)

Fast-Acting Carbohydrate	Amount (15-20 grams of carbohydrate)
Glucose tablets	3-4 tablets
Orange or apple juice	4 ounces
Lifesavers	6 candies
Cake icing	1 tablespoon
Regular soda	5 ounces



\*\*Chocolate candy should not be used to treat hypoglycemia because it contains fat which slows digestion and does not allow glucose (sugar) to enter the blood stream fast enough \*\*



- Fast-acting carbohydrates should raise the blood glucose level within 15 minutes and the child should begin to feel better. It is important to check the blood sugar level again after the 15 minutes. If it is still below 70 mg/dL, give another fast-acting carbohydrate and re-check the blood glucose level in 15 minutes
- After treating the hypoglycemia successfully, give a light snack (1 carbohydrate AND 1 protein) if the next meal or snack is more than one hour away. This will keep the blood sugar level within goal range

# DIABETIC EMERGENCIES

**There are two diabetic emergencies:**

1. Severe hypoglycemia
2. Diabetic ketoacidosis

**What is severe hypoglycemia?**

- The blood sugar is so low that the brain does not have enough glucose to function adequately
- When the child has a blood sugar level below 70 mg/dL **AND** cannot eat or drink
- The child becomes unconscious (you are unable to awaken your child)
- He/she has a seizure

Every diabetic child reacts differently to blood sugar levels. One child may be awake and able to drink with a blood sugar level of 50mg/dL, while a different child may be difficult to arouse or completely unconscious. This is why a case of severe hypoglycemia is not defined by a specific low blood sugar level but rather by how your child is behaving.

**How is a low blood glucose emergency treated?**

If the child is having symptoms of low blood sugar, it is important to check his/her blood sugar right away. If the blood sugar is low (below 70mg/dL) but you can still wake child, follow the steps outlined in the hypoglycemia management section, page 15. If the child is not awake enough to follow simple commands such as drinking from a cup or straw, place the child on his/her side and get the emergency **glucagon injection**. If the child is having a seizure, protect his/her head by using something cushioned to prevent injury.

- Glucagon is a medication that raises the blood sugar level usually within 10-20 minutes and will make the child wake up (become conscious) again. It is a hormone that is normally made in the pancreas

- It is of utmost importance **NOT** to put any food or drink in the mouth of a person who is unconscious or is having a seizure, because he/she may choke

**TIP:**

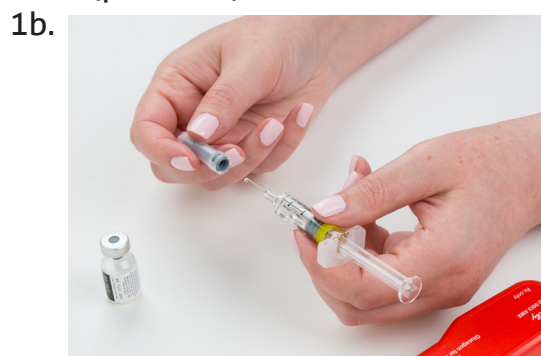
- *Make sure to check the expiration date and replace the glucagon kit before it expires.*
- *Store unmixed glucagon at room temperature.*
- *Throw out any mixed glucagon not used.*
- *Always keep your glucagon emergency kit in the same place.*



The **glucagon injection** kit in the picture comes in a case that holds a glass vial with a white tablet and a syringe with fluid in it. The injection must be prepared before use.

## Steps for Preparing and Injecting Glucagon:

1. Remove the cap from the vial with the white tablet (picture 1a). Next, remove the cap from the syringe to expose the needle (picture 1b). Using the syringe in the case, poke the needle through the top of the vial containing the white tablet (picture 2).

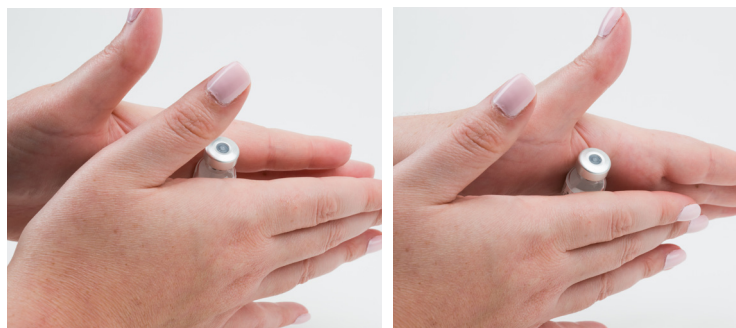


2. Inject all of the fluid from the syringe into the vial.



3. Mix the solution with the tablet by rolling the vial between your hands until the solid tablet is completely dissolved (you can no longer see the white pieces).

**The vial should never be shaken, only rolled.**



4. Insert the needle of the syringe back into the now mixed vial and flip it upside down to take the amount of glucagon needed.



- If the child weighs **less** than 44 pounds (20 kilograms) he/she will need half the syringe of glucagon (extract up to the first black line that says 0.5 mg).
- If the child weighs **more** than 44 pounds (20 kilograms) he/she will need the whole syringe of glucagon (extract up to the second black line that says 1.0 mg).

5. Inject the glucagon into the child's outer thigh holding the syringe straight and not at an angle to ensure that the needle reaches the child's muscle where it will be absorbed quickly.



6. Push the plunger until you have injected all of the glucagon in the syringe into the child, then gently remove the needle from the child's thigh.
7. Maintain the child on his/her side immediately after the injection because vomiting after the glucagon injection is common. Putting the child on his/her side will prevent him/her from choking if he/she does vomit while being in a very fatigued state or unconscious.
8. The child should wake up within 15 minutes. As soon as the child is awake and is able to swallow, give him/her a fast-acting carbohydrate and light snack to keep the blood sugar above 70 mg/dL. Check the child's blood sugar more often for the next 24 hours.
9. Call the doctor to notify him or her of the hypoglycemic event once the child is feeling better.

**TIP:**

*Remember to always replace your glucagon kit in case of another emergency.*

**Call 911 or your local emergency number if:**

- There is an inability to give glucagon in a low blood-glucose emergency
- It is not possible to awaken the child within 15 minutes of giving glucagon
- The child is unable to eat within one hour after receiving glucagon
- The child's seizure does not stop after five minutes

## What is diabetic ketoacidosis (DKA)?

Diabetic ketoacidosis occurs due to high blood sugars. It happens when ketones build up in the blood faster than the kidneys can get rid of them. It is a serious condition that requires immediate attention.

### Causes of DKA:

- Not injecting enough insulin (error in carbohydrate counting at meals, applying the sliding scale, or error in measuring insulin with the syringe or dialing it on the insulin pen)
- Taking medications that increase blood sugar
- Illness
- Vomiting

### Signs and Symptoms of DKA:

- Nausea
- Vomiting
- “Fruity” smelling breath
- Fast breathing
- Fast heartbeat

### Identification and Treatment of DKA:

- Check blood sugar levels and check urine for ketones
- Give extra insulin for high blood sugars as directed by a doctor or nurse practitioner
- Maintain hydration with fluids by mouth or through an intravenous (IV) catheter

If moderate or large ketones are present, have the child start drinking water and call the doctor. If the child is feeling sick with vomiting and is unable to tolerate anything by mouth, take the child to the nearest emergency room immediately because he/she needs an IV (intravenous catheter) and special IV fluids for hydration that will flush the ketones out of the body. The child’s blood sugar will also rise unusually high in this condition and the child will need additional insulin in a hospital setting for it to be controlled safely.

#### **TIP:**

*If the blood sugar is greater than 250 mg/dL, check the urine for ketones using the urine dip sticks in order to catch DKA signs early.*

# SICK DAYS

People with diabetes get sick just like anyone else. Infections, surgeries, and injuries can cause the body to feel extra stress. This added stress can cause the blood sugar to rise to high levels without warning. Extra care is needed to control the blood sugars during this time in order to prevent diabetic ketoacidosis which is a medical emergency.

## Sick Day Management:

- Check the blood sugar every two to four hours
- Check the urine for ketones each time the child urinates
- Never forget to give an insulin dose
- Administer additional insulin if needed to control high blood sugars
- Have the child drink plenty of fluids to stay hydrated
- Monitor for signs and symptoms that would require immediate attention

## TIP:

*If you need an over-the-counter drug to control symptoms such as cough and nasal congestion, ask your doctor or pharmacist for a list of sugar-free products that are available.*

## Signs and Symptoms that would Require Immediate Attention:

- If the child has vomited more than three times and can't keep anything in his/her stomach
- If the child has moderate or large ketones present in the urine
- If the child has difficulty breathing
- If the child's blood sugar cannot be maintained above 70 mg/dL
- If the child is not eating or drinking enough



If the child has any of these symptoms, **call the doctor or go to the nearest Emergency Room!**



**Foods to Eat when Sick:**

- Broth type soups; bouillon or chicken noodle or canned soup
- Sugar-free or sweetened gelatin depending on blood sugar level
- Regular or diet soda depending on blood sugar level
- Popsicles: regular or diet depending on the blood sugar level
- Sports drink
- Juices
- Graham crackers
- Saltine crackers
- Banana or other fruits
- Instant mashed potatoes
- Instant pudding mixes
- Bread or toast
- Applesauce

**Use sugar-free fluids if glucose is 150 mg/dL or higher.**

**Drink plenty of liquids:**

To prevent loss of body fluids (dehydration), have the child drink at least 4 - 6 ounces ( $\frac{1}{2}$  to  $\frac{3}{4}$  cup) of water or sugar-free liquids every hour. Examples are sugar-free soda, ice chips, water, sugar-free ginger ale or club soda. The child should take small sips of fluids if he/she is nauseous.

If the child cannot eat his/her usual diet or soft foods and the glucose is below 150 mg/dl, sip on liquids that contain sugar. Examples are regular Sprite®, regular ginger ale, tea with honey, or a sports drink. Sipping liquids that have sugar prevents the glucose from dropping too low. These fluids will also provide extra calories or energy that the body needs to fight and recover from illness.

# EXERCISE

Exercise is important for everyone whether diabetes is present or not. Exercise helps keep blood sugar levels in a good range. It is recommended to exercise 30-60 minutes daily. Exercise makes the body more sensitive to insulin which means insulin has a greater effect on lowering blood sugar levels. When the body exercises, it uses glucose at an increased rate from the blood in order to provide the muscles with energy. A snack may be necessary before exercising in order to avoid low blood sugars.

## Here are some tips to help avoid a low blood sugar when exercising:

- Check the blood sugar before exercise
- Try to plan activities after a meal or snack
- Try to plan activities around the same time each day
- Add an additional snack if the blood sugar is within goal range before exercising
- Simple rule: Add a snack of 15 grams of carbohydrates for every 30 minutes of exercise
- Use sports drinks during hard exercise
- Check the blood sugar more frequently during and up to 24 hours after exercise because the blood sugar may decrease as the body is replacing lost glucose used during exercise
- Drink more water than usual to prevent dehydration
- Avoid giving insulin in the body part being used such as the legs before/after a soccer game

### **SAFETY TIP:**

*The child should not exercise if he/she has ketones in the urine.*



# SCHOOL DAYS

The child spends a good portion of his/her day at school. It is important to let the school know the child has diabetes. The teacher, principal, and school nurse should all be aware. If the child rides a school bus, the bus driver should know as well. Letting close friends know is also a good idea and can serve as a support system for your child.

Many schools require a Diabetes Medical Management Plan (DMMP) to be filled out. The plan lets the school know what needs to happen while the child is at school in order to manage his/her diabetes. The plan consists of:

- Insulin regimen
- Blood sugar goals
- When and how often to test the blood sugar
- Low blood sugar treatment and follow up
- High blood sugar treatment and follow up
- Contact information for the endocrinology office
- Family's emergency contact information

In addition to the DMMP, many schools require that extra supplies be left at the school. We recommend putting together a diabetes kit for the school. The diabetes kit consists of:

- Insulin
- Syringes or pen needles
- Extra glucometer to be left at school
- Glucometer testing strips
- Lancet device/lancets
- Extra glucagon kit
- Glucose tablets or juice box (to treat low blood sugar)
- Urine ketone strips

Children should always have juice or glucose tablets readily available to treat low blood sugar. For younger children, we recommend having juice or glucose tablets in the classroom. For older children, we recommend carrying juice or glucose tablets in their backpack or pockets.

## **504 Law**

Section 504 is a civil rights law that protects children with diabetes against discrimination. It ensures that children with diabetes have equal access to education and school-sponsored activities. It also gives you as parents the right to request a 504 meeting with the school to develop a 504 plan. The 504 plan is a legal agreement between you and the school that outlines what services and modifications will be available for the child. The plan is based on the DMMP mentioned above. Not every child with diabetes needs a formal 504 plan. Some schools are comfortable making any kind of accommodations needed for your child. While in other cases, the 504 plan is needed to make sure the school knows its role in the child's care.

# NUTRITION

## Carbohydrate Counting

If the child has been diagnosed with type 1 diabetes, he/she will need to be on a special diet called “**carbohydrate counting**” diet. The diet is simply what the name indicates; the need to count carbohydrates while following a healthy diet.

## Why is carbohydrate counting important?

- It provides good blood sugar control.
- It helps keep track of the amount of carbohydrates that the child may eat at meals/snacks.
- It allows you to determine the amount of insulin to give at meals/snacks.

*The first step* in carbohydrate counting is learning what carbohydrates are and which foods contain carbohydrates.

## What are carbohydrates?

- One of the three main food groups (also known as a “macronutrients”), protein and fat are the other two groups. Carbohydrates:
  - Provide necessary nutrients to help the body and brain work properly
  - Also provide energy

## What foods have carbohydrates?

- ◆ Starches
  - Breads
    - Examples: bagels, muffins, waffles
  - Cereals and grains
    - Examples: oatmeal, rice, pasta
- ◆ Vegetables
  - Starchy
    - Examples: corn, peas, potatoes
  - Non-starchy
    - Examples: tomatoes\*, onions\*, broccoli\*
  - Legumes and beans
    - Examples: garbanzos, lentils, black beans
- ◆ Fruits
  - All fruits and fruit juices
- ◆ Dairy
  - Examples: milk, yogurt, ice cream
- ◆ Sweets
  - Examples: cookies, brownies, custards, candy



### Which foods do not have carbohydrates?

There are some foods/beverages that you will not have to count because they are **free** of carbohydrates or only have **small** amounts.

- ◆ Protein foods
  - Examples: chicken, fish, beef, turkey, ham, bacon, eggs, cheese\*, nuts\*
- ◆ Fats
  - Examples: butter, oils, mayonnaise
- ◆ Non-starchy vegetables
  - Examples: tomatoes\*, lettuce\*, cucumbers\*, carrots\*
- ◆ Artificial sweeteners
  - Examples: Splenda®, Sucralose®, Stevia®
- ◆ Diet drinks
  - Examples: diet soda, Crystal Light®
- ◆ Water



*NOTE:* Foods marked with an asterisk (\*) are foods low in carbohydrates. They may become foods that need to be counted depending on the portion consumed. It is also important to note that although the food items mentioned above will not be counted, you will have to keep a healthy balance.

### How do I count carbohydrates?

The registered dietitian (RD) will educate you on how to carbohydrate count (“carb count”). Education is based on the American Diabetes Association and Academy of Nutrition and Dietetics Exchange List for Diabetes. It is based on *exchanges*, meaning *portions, servings, or choices*. *The Exchange List for Diabetes* will have an extensive list of foods and the amounts of carbohydrates.

### STARCHES/FRUITS/SWEETS/COMBINATION FOODS

1 carbohydrate exchange (serving/portion) = 15 grams of carbohydrate

—Therefore—

2 carbohydrate exchanges = 30g

3 carbohydrate exchanges = 45g

—and so on—

#### Examples of 1 carbohydrate exchange

Starches	Fruits	Other Foods
¼ bagel	1 apple	6 chicken nuggets
1 small pancake (4 inches across)	½ banana	2 small chocolate chip cookies
1 slice of bread	1 ¼ cup strawberries	½ cup mac and cheese
⅓ cup of rice	½ cup apple juice	2 tablespoon pancake syrup
½ cup corn	½ cup orange juice	½ cup regular ice cream
½ cup beans	17 grapes	1 cup lentil soup

## MILK AND OTHER DAIRY PRODUCTS

1 milk exchange = 12 grams of carbohydrate

*Examples of 1 milk exchange*

8 ounces of milk (1 cup)
8 ounces soy milk (1 cup)
6 ounces plain yogurt ( $\frac{3}{4}$ cup)

## NON-STARCHY VEGETABLES

1 non-starchy vegetable exchange = 5 grams of carbohydrate

1 cup raw vegetables OR  $\frac{1}{2}$  cup cooked vegetables

### Let's practice:

*Sample breakfast:*

$\frac{1}{2}$  cup oatmeal = 15 grams

8 ounces milk = 12 grams

1  $\frac{1}{4}$  cup strawberries = 15 grams

1 egg = 0 grams

TOTAL = 42 grams of carbs

Now that you are able to carbohydrate count you will be able to determine how much insulin to give the child after his/her meals. The amount of insulin will depend on the insulin-to-carbohydrate ratio prescribed by the doctor.

*Example:* 1 unit of Humalog per every 15 grams of carbohydrate

If your child ate the above meal (42 grams) you will simply divide by 15, which is the *insulin to carb ratio*.

$42 \div 15 = 2.8$  units → **You would provide 3 units**

*Rounding:*

- Round up if the number next to the decimal point is 5 or greater.
  - Example: 3.8 units → 4 units
- Stay at the same number if the number next to the decimal point is 4 or less.
  - Example: 2.1 units → 2 units

### How many grams of carbohydrates does the body need?

The amount of carbohydrates the body needs will be determined by the registered dietitian. Since every person is unique, the amount of carbohydrates is based on gender, age, and physical activity. The dietitian will provide the amount of carbohydrates for meals and snacks. Carbohydrate-free snacks that do not require insulin will also be an option.

Remember, carbohydrates are necessary for the body to work well and stay healthy. Keep in mind, it is not only the amount of carbohydrates that matter, but what type of carbohydrate is eaten. Try to provide natural sources of carbohydrates (fruits, vegetables, milk, etc.) rather than processed/added sugars (such as candies, table sugar, sweets). When you provide grains, attempt to provide whole/high fiber versus refined/low fiber. One example is providing whole wheat rather than white bread or pasta.

**“Free Food” Snack Ideas:**

- Sugar-free Jell-O
- Turkey/ham rolls
- Mozzarella cheese string
- Tuna salad (with carrot/celery sticks)
- Handful of nuts
- Hardboiled egg
- Diet sodas, diet iced teas (i.e. Crystal Light®)
- 1 cup raw non-starchy vegetables (carrots, lettuce, peppers or broccoli)

**General Recommendations Regarding Free Food Snacks:**

- Should be less than 20 calories
- Usually less than 5 grams\* of carbohydrate in each serving
- Limit free foods to no more than three servings per day
- Spread free foods throughout the day

*NOTE: The child’s specific free food allowance is based on his/her insulin-to-carbohydrate ratio prescription. Please discuss it with the dietitian.*

**Reading a Nutrition Label:**

3 main sections to look at:

1. Serving size
2. Servings per container
3. Total carbohydrate

Example using above label:

1. Serving size = 1 cup
- 2 Servings per container = 2 cups (whole can)
3. Total carbohydrate = 22 grams
  - a. Always based on serving size (in this case 1 cup)

Note: If the child wants to eat an entire can of soup it has 44 grams of carbohydrates because we are doubling the serving size.

Nutrition Facts			
Serving Size 1 Cup (128g)			
Servings Per Container 2			
Amount Per Serving			
<b>Calories</b> 180	Calories from Fat 85		
% Daily Value*			
<b>Total Fat</b> 10g	<b>20 %</b>		
Saturated Fat 3g	<b>28 %</b>		
Trans Fat 1g			
<b>Cholesterol</b> 30mg	<b>10 %</b>		
<b>Sodium</b> 50mg	<b>28 %</b>		
<b>Total Carbohydrate</b> 22g	<b>10 %</b>		
Dietary Fiber 0g	<b>0 %</b>		
Sugars 5g			
<b>Protein</b> 5g			
Vitamin A 5%	Vitamin C 2%		
Calcium 15%	Iron 5%		
*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		300mg	375mg
Dietary Fiber		25g	30g

**TIP:**  
 A “free food snack” is when the carb count results in 0.4 or less which means the child does not need insulin. If the carb count results in more than 0.4, the food is not a “free food snack” and the child needs insulin **unless** the snack is before physical activity or at bedtime with a blood sugar level within or below the recommended bedtime range.

You are now ready to **carbohydrate count!!** Please keep in mind this information is only a guide. Your dietitian will teach you how to carb count and provide all the information needed for you to feel comfortable to carb count on your own.

**Resources:**

*Phone Applications (Apps)*

- Carb Counting with Lenny®
- Calorie King®
- My Fitness Pal®

# DISCHARGE INFORMATION

We want to make sure you have everything you need to go home. Before you leave we will ask to see all the supplies and medications filled. The following is a list of what you should have:

- Humalog or Novolog \_\_\_\_\_
- Lantus or Levemir \_\_\_\_\_
- NPH \_\_\_\_\_
- Insulin syringes or pen needles \_\_\_\_\_
- Urine ketone sticks \_\_\_\_\_
- Blood glucose meter \_\_\_\_\_
- Lancet device \_\_\_\_\_
- Lancets \_\_\_\_\_
- Log book \_\_\_\_\_
- Glucagon emergency kit \_\_\_\_\_

## Storing insulin:

Insulin is good for 28 days or four weeks once it is opened. It can be left at room temperature during this time. Unopened insulin vials or pens should be kept in the refrigerator until the expiration date on vial, pen or box.

## Storing blood glucose strips:

Do not store test strips outside the vial. Replace the cap immediately after removing strip. Discard strips as per manufacturer instructions.

## Insulin dose and injection schedule:

Insulin: carbohydrate ratio= \_\_\_\_: \_\_\_\_ with meals

Type of insulin: \_\_\_\_\_

Bedtime insulin dose= \_\_\_\_ units of \_\_\_\_\_ (type of insulin)

Insulin sensitivity factor= \_\_\_\_ unit for every \_\_\_\_ above \_\_\_\_

### TIP:

*When you open a new vial or pen, write the date or expiration on the label so you know when to throw it out. Expired insulin does not work well to control blood sugars.*

## OR

Morning insulin dose- Give before breakfast or immediately after

\_\_\_\_ units of \_\_\_\_\_ (type of insulin)

\_\_\_\_ units of \_\_\_\_\_ (type of insulin)

Lunch insulin dose- Give before lunch or immediately after

\_\_\_\_ units of \_\_\_\_\_ (type of insulin)

\_\_\_\_ units of \_\_\_\_\_ (type of insulin)

Dinner Insulin dose- Give before dinner or immediately after

\_\_\_\_ units of \_\_\_\_\_ (type of insulin)

\_\_\_\_ units of \_\_\_\_\_ (type of insulin)

Bedtime insulin dose

\_\_\_\_ units of \_\_\_\_\_ (type of insulin)

\_\_\_\_ units of \_\_\_\_\_ (type of insulin)

### TIP:

*Remember to rotate sites with each injection.*



**Blood glucose monitoring schedule:**

Check the child's blood glucose at least \_\_\_\_ times a day

\_\_\_\_ Before breakfast

\_\_\_\_ Before lunch

\_\_\_\_ Before dinner

\_\_\_\_ At bedtime

\_\_\_\_ When there are symptoms of high or low blood sugar

**Remember to record in the log book:**

- Blood sugar result
- Insulin doses
- Urine ketone results
- Any schedule changes or food changes that can explain a high or low blood sugar reading

**Goal or target range:**

The target goal range is \_\_\_\_ to \_\_\_\_ mg/dl

**What to do when symptoms of hypoglycemia (low blood sugar) are present:**

- Check the child's blood sugar level
- If below 70 mg/dl, treat with 15 grams of a fast-acting carbohydrate
- Wait 15 minutes and recheck blood sugar
- If blood sugar is still below 70 mg/dl, give another 15 grams of fast-acting carbohydrates
- After 20-30 minutes of correction, give a light snack or provide meal to maintain blood sugar level

**What to do when symptoms of hyperglycemia (high blood sugar) are present:**

- If blood sugar is greater than 250 mg/dl, check urine for ketones
- Additional insulin may be needed to bring the blood sugar down

**When to check the urine for ketones:**

- When sick
- If the blood sugar is greater than 250 mg/dl

**Follow up appointment:**

The child's first outpatient appointment is scheduled for:

Date: \_\_\_\_\_

Time: \_\_\_\_\_

**What to bring to each appointment:**

- Log book
- Discharge instructions
- A list of questions you or the child may have

**TIP:**

*Encourage water or a sugar-free drink if ketones are present.*

*Notify endocrinologist if the child has moderate or large ketones.*

## RESOURCES AND SUPPORT SERVICES

- **AACE Diabetes Resource Center**  
<http://resources.aace.com/>
- **American Diabetes Association**  
<http://www.diabetes.org/>
- **Children with Diabetes**  
[www.childrenwithdiabetes.com](http://www.childrenwithdiabetes.com)
- **Diabetes Camping Association**  
[www.diabetescamps.org](http://www.diabetescamps.org)
- **National Diabetes Education Program**  
*YouTube*  
<https://www.youtube.com/user/ndepgov>
- **National Diabetes Information Clearinghouse**  
[www.niddk.nih.gov/health/diabetes](http://www.niddk.nih.gov/health/diabetes)
- **Understanding Diabetes**  
[www.uchsc.edu/misc/diabetes/ud10.html](http://www.uchsc.edu/misc/diabetes/ud10.html)

### Medical Alert ID

- **Medic Alert Foundation**  
1-800-432-5378  
[www.medicalert.org](http://www.medicalert.org)
- **Lauren's Hope**  
1-800-360-8680  
[www.laurenshope.com](http://www.laurenshope.com)
- **American Medical ID**  
1-800-363-5985  
[www.americanmedical-id.com](http://www.americanmedical-id.com)
- Contact your diabetes team for a list of local current support groups

**Nicklaus Children's Hospital**  
**Diabetes in Children**  
*YouTube® videos*



## ACKNOWLEDGEMENTS AND REFERENCES

### Special thanks for the development of this book:

- 3 Northeast nursing and dietary staff
- Endocrinology outpatient office
- Graphic Design and Medical Photography
- Marketing Department

- 
- American Diabetes Association. (2016). Type 1 Diabetes. Retrieved from <http://www.diabetes.org/diabetes-basics/type-1/?loc=hottopics>
  - American Diabetes Association. (2016). Standards of Medical Care in Diabetes. The Journal of Clinical and Applied Research and Education. 39. S86-S93. DOI: 10.2337/dc16-S014
  - American Diabetes Association. (2014). Choose Your Foods: Food lists for diabetes. Chicago, IL: Academy of Nutrition and Dietetics
  - American Diabetes Association. (2016). Hypoglycemia (Low Blood Glucose). Retrieved from <http://www.diabetes.org/living-with-diabetes/treatment-and-care/blood-glucose-control/hypoglycemia-low-blood.html>
  - American Diabetes Association. (2016). Hyperglycemia (High Blood Glucose). Retrieved from <http://www.diabetes.org/living-with-diabetes/treatment-and-care/blood-glucose-control/hyperglycemia.html>
  - Centers for Disease Control and Prevention. (2016). Diabetes. Retrieved from <http://www.cdc.gov/media/presskits/aahd/diabetes.pdf>

# SCENARIOS

**Sliding Scale** – Humalog/Novolog (based on blood sugar levels):

151-200 mg/dl	0.5 unit
201-250 mg/dl	1 unit
251-300 mg/dl	1.5 units and check urine for ketones

**Carbohydrate Count:**

0.5 unit per 10 grams of carbohydrates

Example:

- Blood sugar level before breakfast: 170 mg/dl.
- Number of carbohydrates eaten for breakfast: 45 grams

According to the sliding scale: 170 mg/dl requires 0.5 unit.

For the carbohydrates: Divide the 45 grams of carbohydrates by 10 and then multiply that result by 0.5 to calculate how many carbohydrates are needed.

- $45 \div 10 = 4.5$  and
- $4.5 \times 0.5 = 2.25$

Therefore for the sliding scale and carbohydrate count:  $0.5 + 2.25 = 2.75$  which you round to 2.5 units of insulin for breakfast.

To round half units, look at the first number after the decimal point and determine whether it is closer to 0 or 5.

- Example: Looking at 2.75 the first number after the decimal is 7 which is closer to 5 than it is to 0.
  - Therefore, the most precise measurement for 2.75 when rounding using half units is 2.5.

\*\*\*Looking at a number line will help you understand this concept better. The result will always be a half, whole number or a whole number and a half. Example: 0.5 (half), 7 (whole number), 3.5 (whole number and a half).

**Sliding Scale** – Humalog/Novolog (based on blood sugar levels):

151-200 mg/dl	1 unit
201-250 mg/dl	2 units
251-300 mg/dl	3 units and check urine for ketones

**Carbohydrate Count:**

1 unit per 8 grams of carbohydrates

Example:

- Blood sugar level before breakfast: 185 mg/dl.
- Number of carbohydrates eaten for breakfast: 61 grams

According to the sliding scale: 185 mg/dl requires 1 unit.

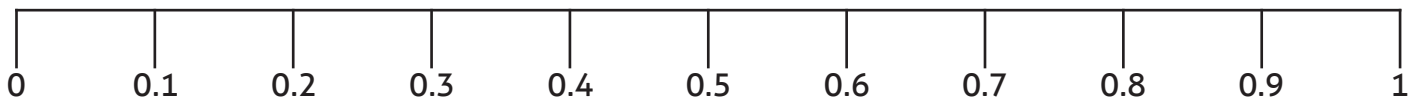
For the carbohydrates: Divide the 61 grams of carbohydrates by 8.

- $61 \div 8 = 7.625$

Therefore for the sliding scale and carbohydrate count:  $1 + 7.625 = 8.625$  which you round to 9 units of insulin for breakfast.

To round, look at the first number after the decimal point and if it is 5 or greater, go to the next number. If the first number after the decimal point is less than 5 stay at the same number.

Example: Looking at 8.625 the first number after the decimal point is 6 which is greater than 5. Therefore the most precise measurement when using whole units for 8.625 is 9.





3100 SW 62 Avenue  
Miami, Florida 33155  
305-666-6511

[nicklauschildrens.org](http://nicklauschildrens.org)