

How Do I Use an Insulin Pump?

This guide tells you about how to set up and use the pump.



I think I am ready for an insulin pump. What else do I need to know?

I will meet with my diabetes team soon to talk about the insulin pump. I want to know more so I can ask better questions.



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Dear Reader

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

- Is the Insulin Pump Right for Me?
- Is the Insulin Pen Right for Me?
- How Can I Manage My Type 1 Diabetes Better?
- Is the Continuous Glucose Monitor Right for Me?
- How Can a Continuous Glucose Monitor Help Me Manage My Diabetes Better?
- How Can a Continuous Glucose Monitor Help and Carb Counting Help Me Manage My Diabetes Better?

Some of us use an insulin pump and some of us do not. Some of us had thought about using the pump. Some had not thought about it until we helped with this guide.

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

Insulin pumps have been around for many years. But now more people with diabetes can have one. It is a very useful way to give insulin. Many people like the pump and some prefer to give shots.

The first guide we produced is called “Is the Insulin Pump Right for Me?” We produced it to help you figure out if you would like to use a pump. And if you do, we offer ideas on how to use it.

This guide goes into more detail about the pump. It includes:

- How to put on a pump
- How to put insulin into a pump
- How to enter basal and bolus settings
- What to do if things go wrong

We hope this guide helps you understand the insulin pump even better and how to manage your diabetes with it.

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

Let's get started!

THIS IS WHAT DYLAN AND HER MOM, ROSA HAD TO SAY ABOUT THE PUMP:

Rosa: *"I was nervous about having a machine give insulin to my son. I was afraid it would give too much or not enough. Dylan and I took a class and we learned how the pump works and I was not afraid anymore."*

Dylan: *"I was never afraid! I knew I could learn how to program the pump!"*



Introduction

I'm curious to learn more about the insulin pump.

We are glad you are curious to learn more about the pump. It could be right for your child to manage their diabetes.

We want to help you learn about this awesome technology. Using the insulin pump to manage your child's diabetes can help improve their blood sugar control. It can give your child more freedom.

Do you have more guides I could read?

Yes. You may want to read our other guides:

- Is the Insulin Pump Right for Me?
- Is the Insulin Pen Right for Me? • How Can I Manage My Type 1 Diabetes Better?
- Is the Continuous Glucose Monitor Right for Me?
- How Can a Continuous Glucose Monitor Help Me Manage My Diabetes Better?
- How Can a Continuous Glucose Monitor Help and Carb Counting Help Me Manage My Diabetes Better?

If I'm serious about trying a pump, is there something I should know?

Yes! Your child should only use a pump if you are ready to figure out and fix any problems that come up.

Be sure to read and understand Section 3 & 4 about figuring out and fixing problems that can come up with the pump. If you are not ready to fix pump problems, shots are safer for your child.

I'm the one that needs to make decisions about how I treat my child's type 1 diabetes.

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

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

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

Thank you for inviting us to join your child's team!



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SECTION 1 — How Do I Put on the Pump?

How do I get started?

This guide will let you know the steps you will need to follow to use the pump for your child. We have tried to make the steps to prepare for and start using your child's pump simple. As you read this, it may seem complicated. But once you have done it a few times it will get easier.

As much as we can, we have tried to make the information “unbranded”. This means not specific for one type or brand of pump. But, this is not always possible to do. So, you need to check the details for your child's brand of pump.

Each pump comes with its own booklet. It often comes with a DVD and a website that lets you go through the steps while watching someone do it.

Also, someone from your child's diabetes team will make sure you can do everything just right before your child wears the pump.

Will we know how to use the pump when we get it?

Yes. Someone from your child's diabetes team or the pump company will teach you how to use the pump before your child uses it. They will do this by showing you how to follow the instructions in your child's pump book. They will help you start it the first time. Then you would do it yourself. If you have questions, there is a phone number you can call in your child's pump book for help.

But it is important to know the steps you will need to follow. We provide that information in this guide for both pumps with tubing and pumps without.

What are the steps for starting pumps with tubing after the first time?

Step #1: Get all the supplies you will need and put them in one place. This includes your child's insulin. Make sure the place is clean and dry. Also, make sure it has good lighting so you can see.



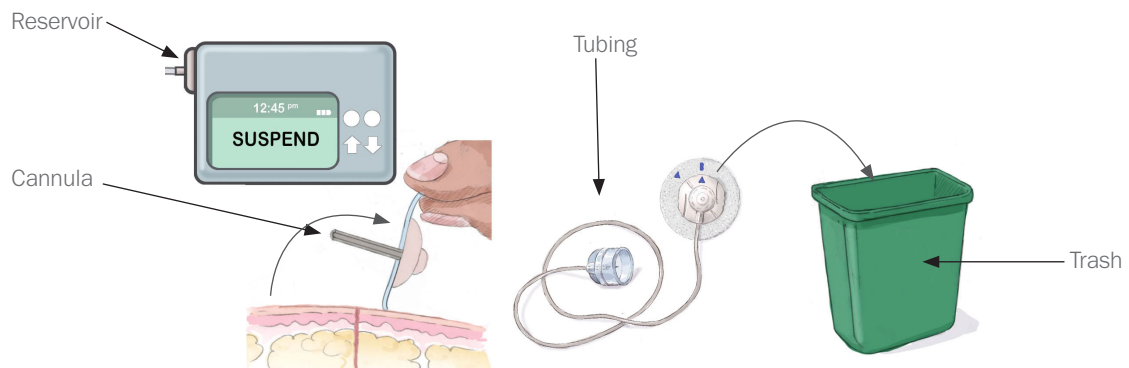
Step #2: Make sure you have a trash basket or sharps container nearby so you can throw out what you finished with.



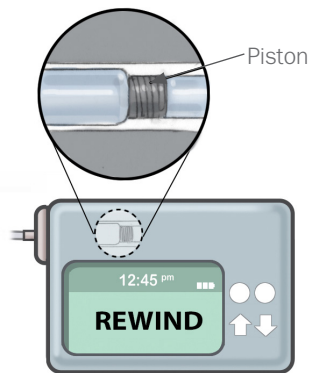
Step #3: Wash your child's hands.



Step #4: Put your child's pump on "suspend". Then remove the cannula from under the skin. Take the tubing and reservoir from the pump and throw it out.



Step # 5: Program the pump to know your child is making a site change. You need to rewind the piston.

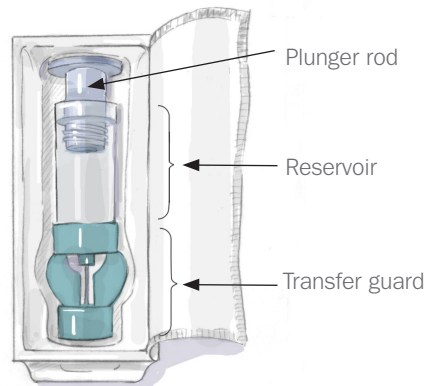


The piston is inside the reservoir compartment

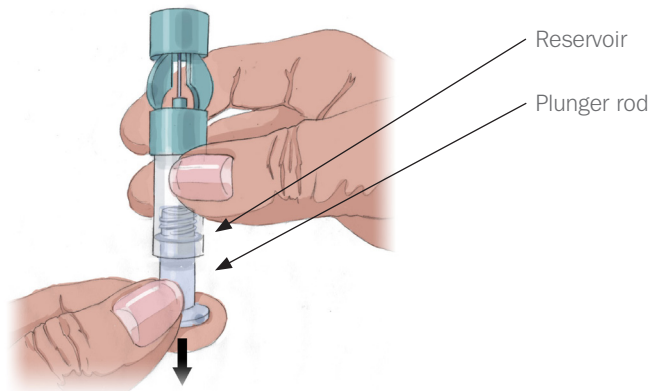
Step #6: Fill the reservoir. This is the tube that holds the insulin. Each pump will tell you to do this a bit differently. But the main point is that you take insulin from your child's insulin vial and put it into the reservoir.

To fill the reservoir, follow these steps:

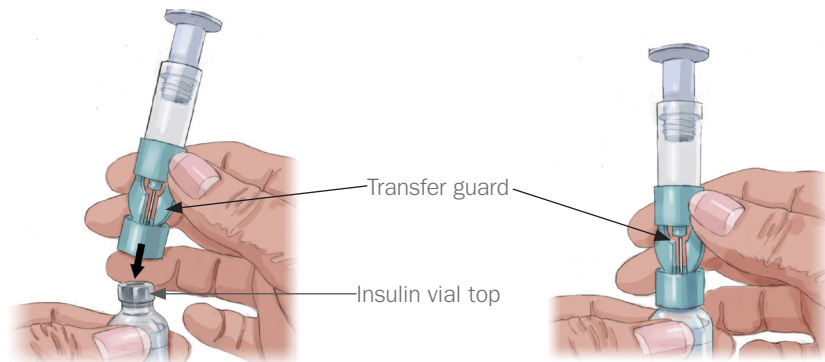
a. Remove the reservoir from the package.



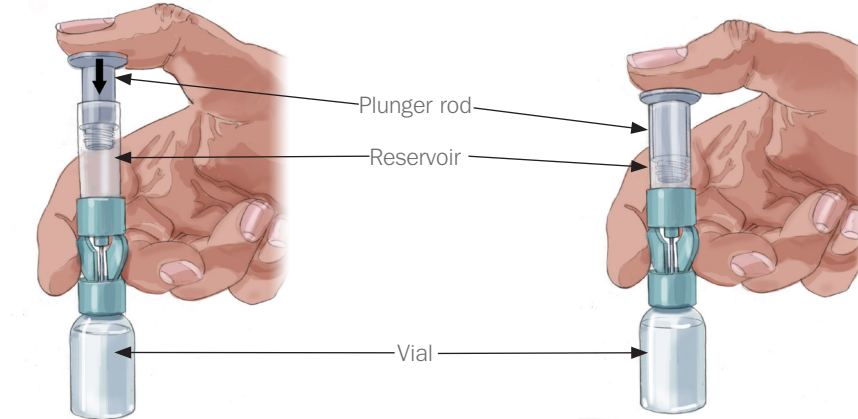
b. Pull the plunger rod down to fill the reservoir with air.



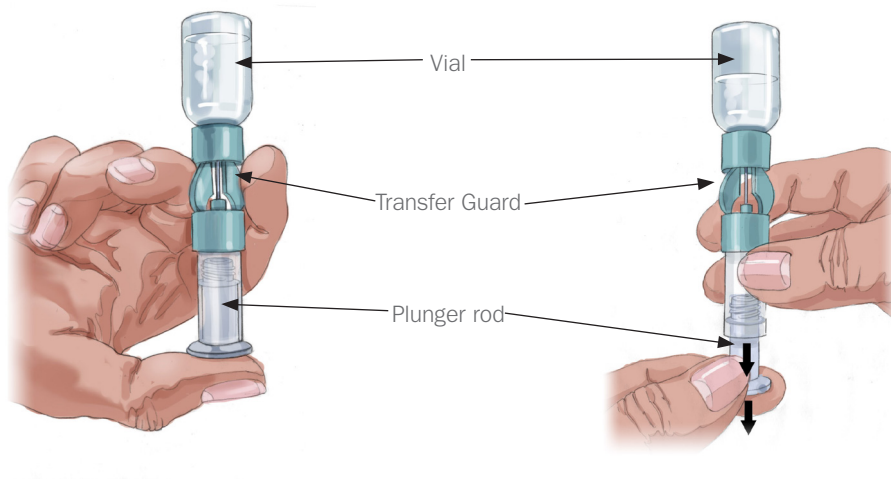
- c.** Wipe the top of the insulin vial with alcohol. Then hold down the transfer guard and press it down onto the insulin vial.



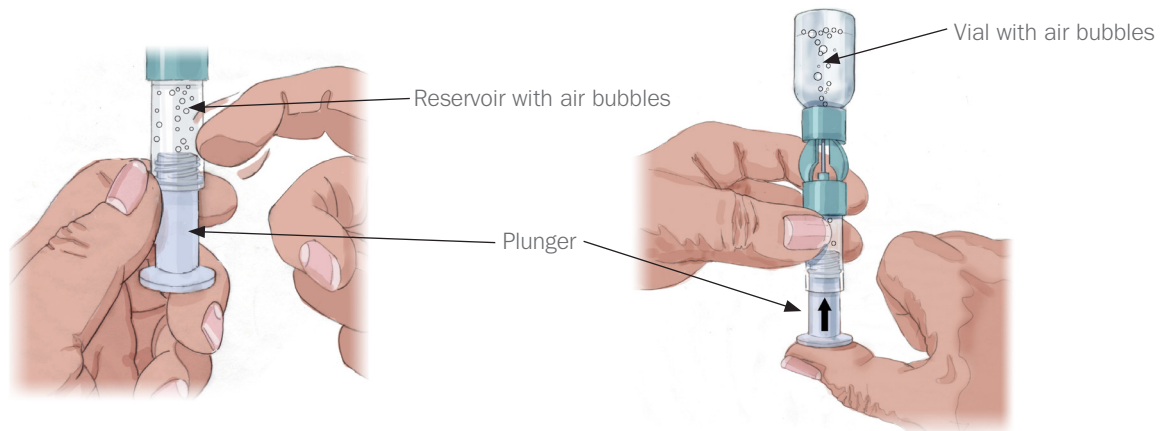
- d.** Use your thumb to push air from reservoir into vial. Keep holding the plunger rod down.



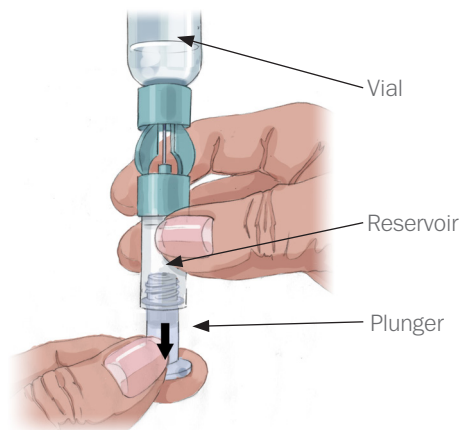
- e.** Flip the vial over so it is now on top. Slowly pull the plunger down to fill the reservoir.



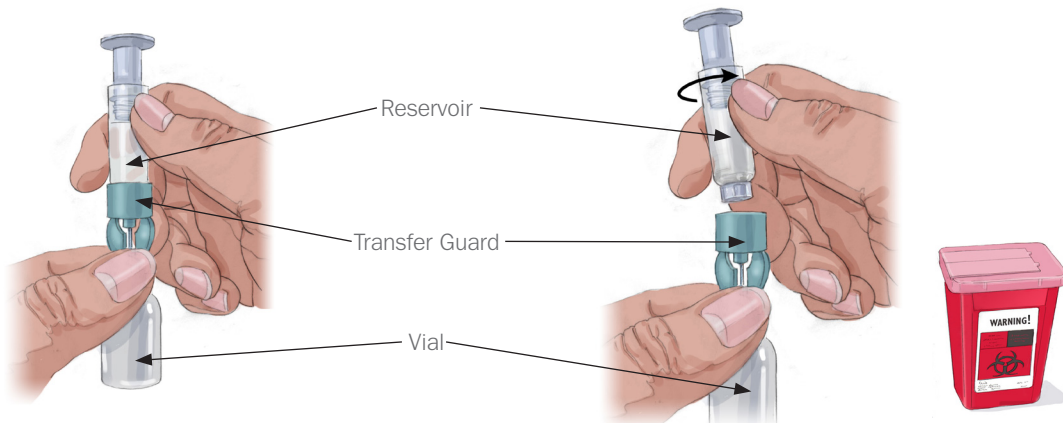
- f.** Check the reservoir for air bubbles. Tap the side of the reservoir to force any bubbles to rise to the top. Push the plunger up to move the air bubbles from the reservoir into the insulin vial.



- g.** After getting rid of the air bubbles, slowly pull the plunger down to fill the reservoir with enough insulin to last 2 to 3 days.

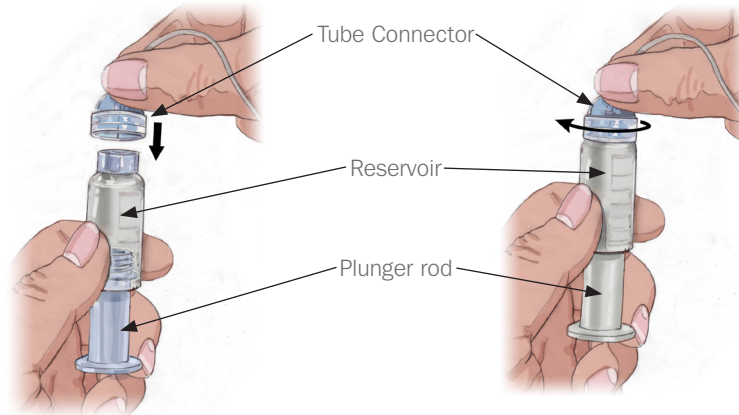


- h.** You do not want insulin on the top of the reservoir. To make sure this does not happen, flip the vial over, so the vial is upright. Hold the transfer guard, and turn the reservoir counter-clockwise. Pull the reservoir straight up to remove it from the transfer guard. Discard the transfer guard into a sharps container.

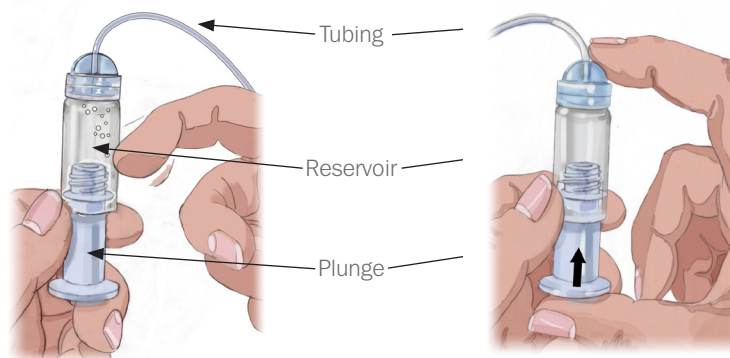


Step #7: Connect the reservoir to the tubing connector.

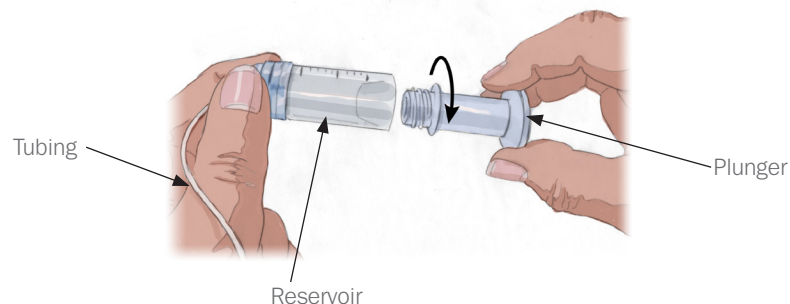
- a. Hold the reservoir in one hand. With the other hand, gently push the tubing connector of the infusion set onto the top of the reservoir. Turn clockwise until it slides and locks into place.



- b. Tap the sides of reservoir to force any air bubbles to rise to the top. Push up on the plunger rod until the bubbles are out and until there is some insulin in tubing.



- c. Unscrew the plunger rod from the reservoir. Do this by turning the plunger rod **counter-clockwise** until it unscrews from the reservoir. Be careful not to pull out the plunger rod from the reservoir or the insulin will spill out.



Step #8: Fill the tubing. This is called “priming”.

The infusion set is the tubing that goes from the reservoir of insulin in the pump to the cannula that is on your child’s body. It comes in different lengths. So, you can decide how long you want your child’s tubing to be.

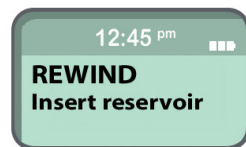
Once you have attached the reservoir to the tubing you need to have insulin run through the tubing to fill it up. This is priming the tubing.

To prime the tubing:

- a.** Press the “rewind complete” button. Insert the newly filled reservoir into the pump’s reservoir compartment. Lock it into place by turning the reservoir clockwise until it locks.

Here are some examples of what the screen looks like.

Medtronic:



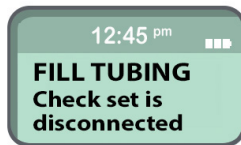
Tandem: t-slim

Install a filled cartridge.
Tap UNLOCK icon when completed.
Tap NEXT to continue.

- b.** Press the “fill tubing” screen. Make sure the infusion set is not connected to your body. Then select “yes”.

Here are some examples of what the screen looks like.

Medtronic:



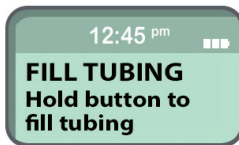
Tandem: t-slim

Verify that the infusions set is not connected to the body. Tap NEXT

- c. Press and hold down the button to fill the tubing. The pump will beep as the insulin fills the tubing. Release the button when you see drops at the tip of the connector needle. Then press the button once more.

Here are some examples of what the screen looks like.

Medtronic:



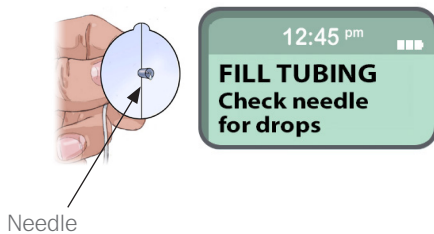
Tandem: t-slim

Tap START the pump will beep and vibrate regularly while the tubing is being filled.
"Starting Fill"

- d. If you see drops at the end of the insertion needle and there are no air bubbles in the tubing select "yes" and press the button. If "no", repeat the earlier steps.

Here are some examples of what the screen looks like.

Medtronic:



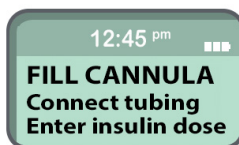
Tandem: t-slim

Tap stop after seeing 3 drops. Verify and tap DONE.

- e. When the "fill cannula" screen appears, you are ready to insert the infusion set.

Here are some examples of what the screen looks like.

Medtronic:

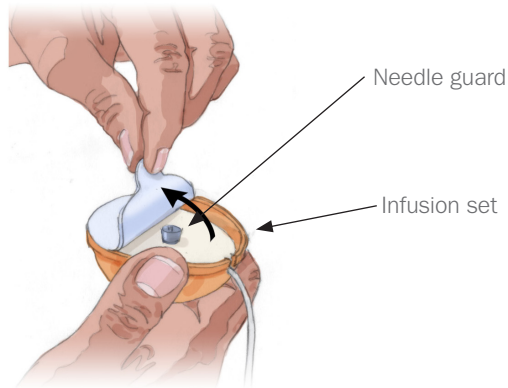


Tandem: t-slim

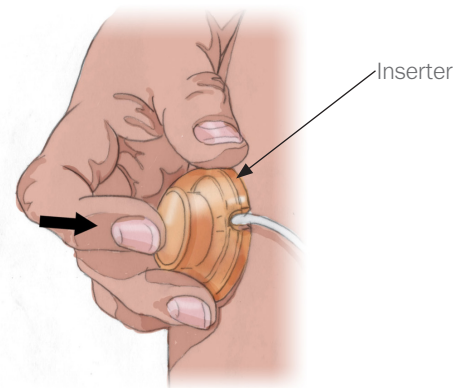
Fill Cannula
Connect filled tubing to site, then tap NEXT.
Select amount needed for cannula fill.

Step #9: Prepare the inserter.

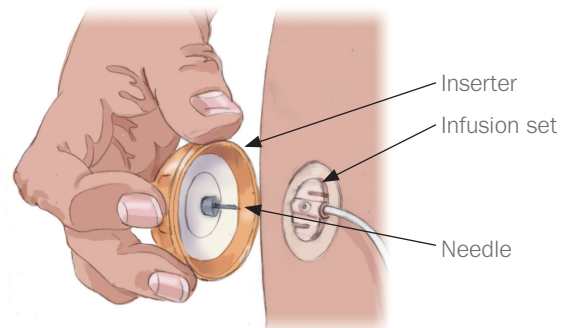
- a.** The way you do this is based on the type of pump and infusion set your child is using.



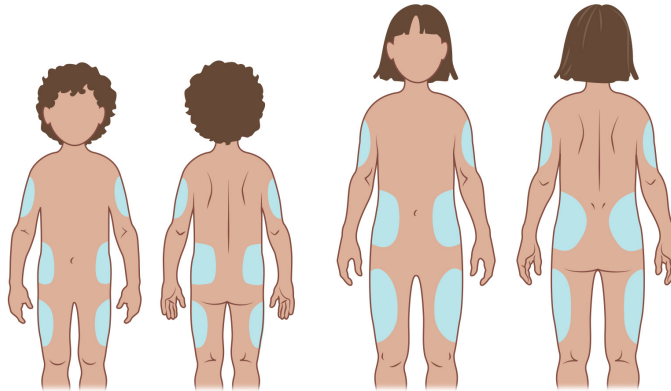
- b.** What you are doing is getting the inserter device ready to push the needle and the cannula under the skin.



- c.** The needle will then come out. And the plastic cannula will stay under the skin.



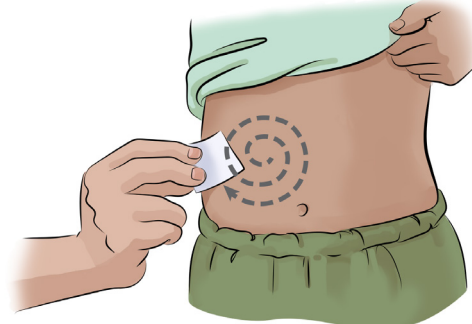
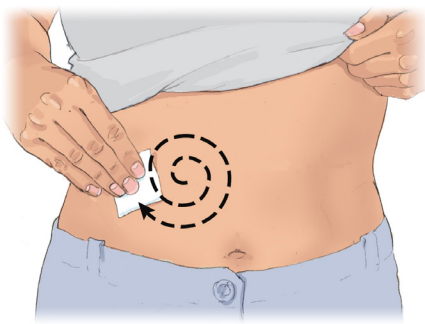
Step #10: Choose a site to insert your infusion set.



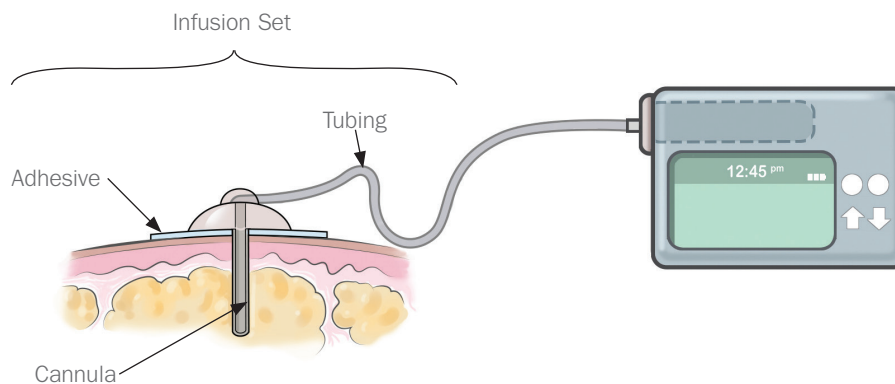
*The best place to insert the infusion set on the body are the shadowed areas of this drawing. Follow your diabetes team's instructions on where to insert.

Step #11: Clean the site with alcohol.

Clean an area the size of a tennis ball with an alcohol wipe where you will be putting in your child's infusion set. Start from the center of where you will put it in and clean outwards in a circular motion.

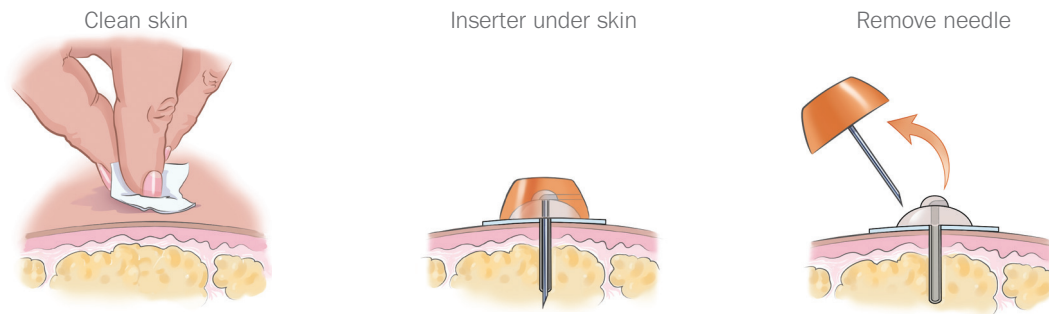


Step #12: Choose a site to insert your child's infusion set.



Put the cannula under the skin. The cannula is the part of the setup that goes under the skin. It has adhesive tape on the bottom that holds it in place. On the top, there is a spot where you attach your tubing.

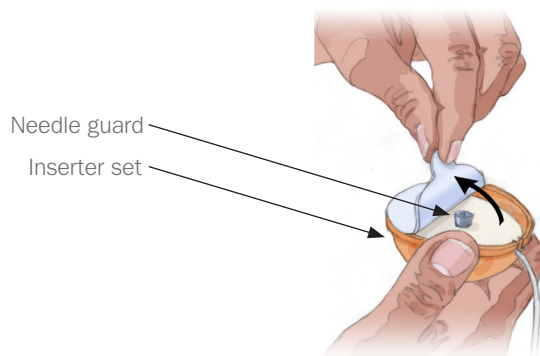
In most cases, the cannula has some sort of tool that inserts it under the skin. This is the inserter. It has some sort of spring inside of it to quickly push the cannula under the skin.



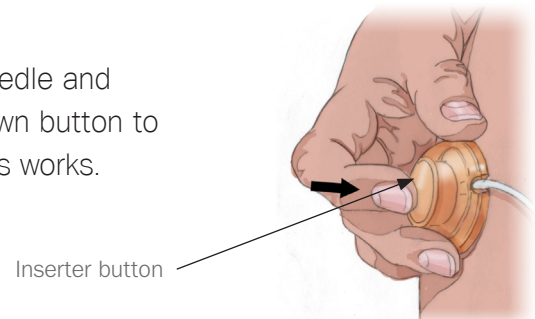
There are many different types of inserters. So, if one type does not work or is not comfortable, you can ask the pump company or your child's diabetes team for a different type.

To insert:

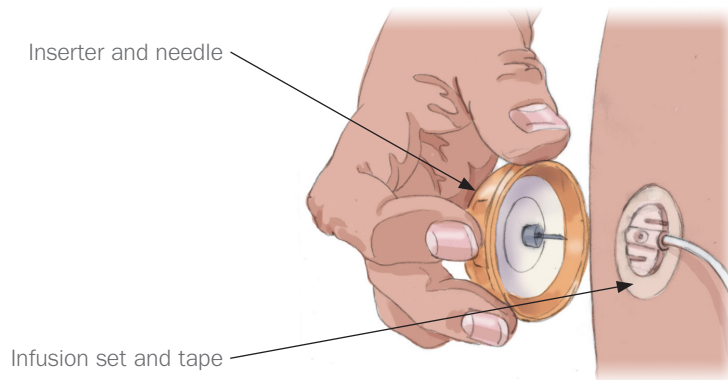
- a.** Clean your skin. Slowly remove the needle guard. Do this by turning it to loosen it. Then lift it away to expose needle of inserter set.



- b.** Hold the inserter against site on your child's body that you just cleaned. Then find the button of the inserter.
- c.** Push the button of the inserter to insert the needle and cannula under the skin. Each inserter has its own button to push. So, you will need to learn how your child's works.



- d. Pull the inserter and the needle away from your child's body. Press the tape firmly against skin.

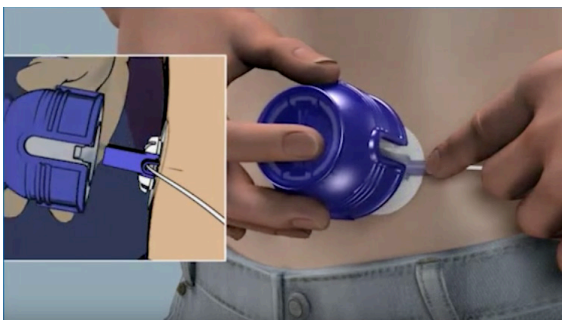


- e. Put the needle into a sharps container.



Below are two different pump infusion sets.

Example 1: Quick set[®] infusion set used by Medtronic

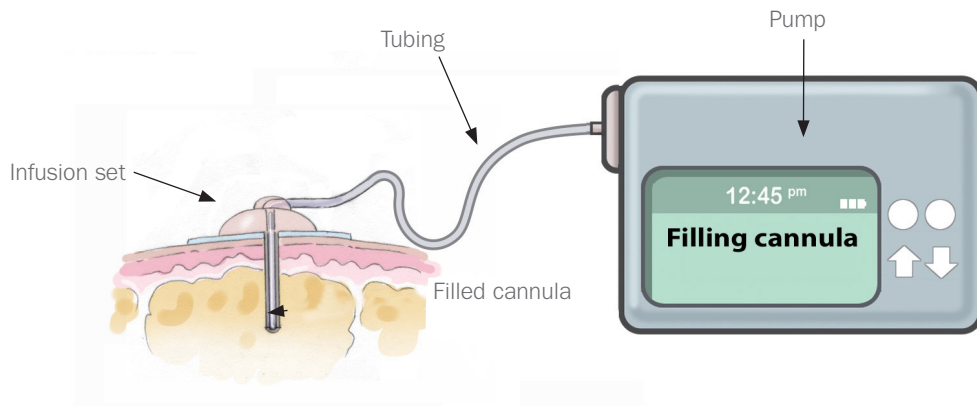


Example 2: Autosoft90 or Autosoft 30 Infusion set used by Tandem® t-slim



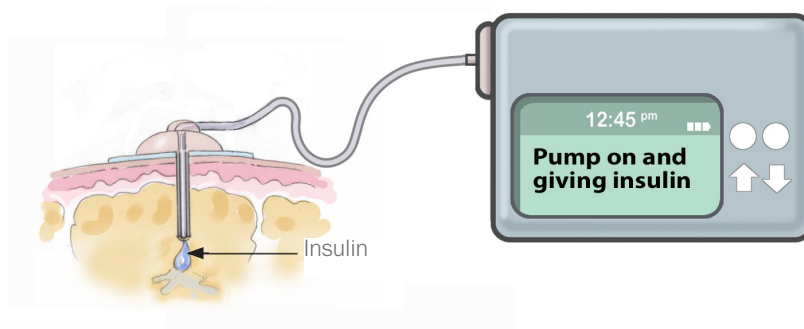
Step #13: Fill the cannula.

In this step, you fill the empty cannula before you start your child's insulin pump.



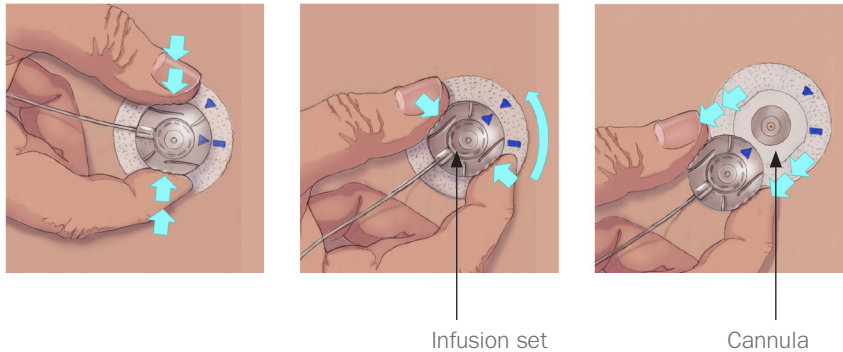
- a. Press the button to fill cannula.
- b. The small amount of insulin you need to fill the cannula is based on how long the cannula is. If it is 6 mm long you would enter 0.3 units of insulin. If it is 9 mm long you would enter 0.5 units.

Step #14: Make sure the pump has restarted and is giving your child insulin. Check your child's blood sugar in 2 hours to be sure they are getting insulin.



How do I take off my child's pump with tubing?

To take it off, just follow the instructions for your child's infusion set. In most cases you must squeeze, twist and gently take the infusion set off from the cannula.



You can do this if your child wants to take a shower, swim or exercise. But **never keep the pump off for more than one hour** because your child's body will not have any insulin.

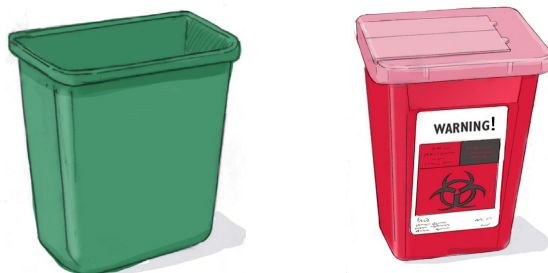
What are the steps for starting a tubeless pump?

Many of these steps are the same as pumps with tubing but there are some differences.

Step #1: Get all the supplies you will need. This includes your child's insulin. Put them all together in one place that is clean, dry and has good lighting so you can see.



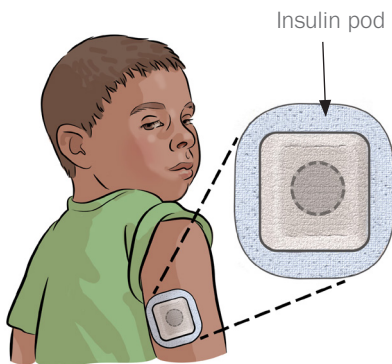
Step #2: Make sure you have a trash basket and a sharps container nearby so you can throw out what you are finished with.



Step #3: Wash your child's hands.



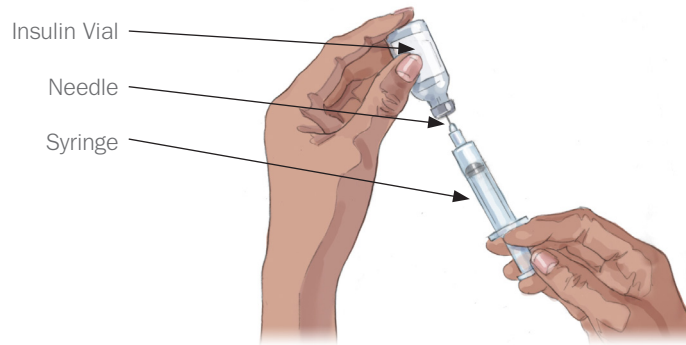
Step #4: The Personal Diabetes Manager (PDM) will beep and alert to change your child's pod at day 3. Hit "action" on the PDM and select "activate new pod". (Please note: the PDM will guide you through all the steps).



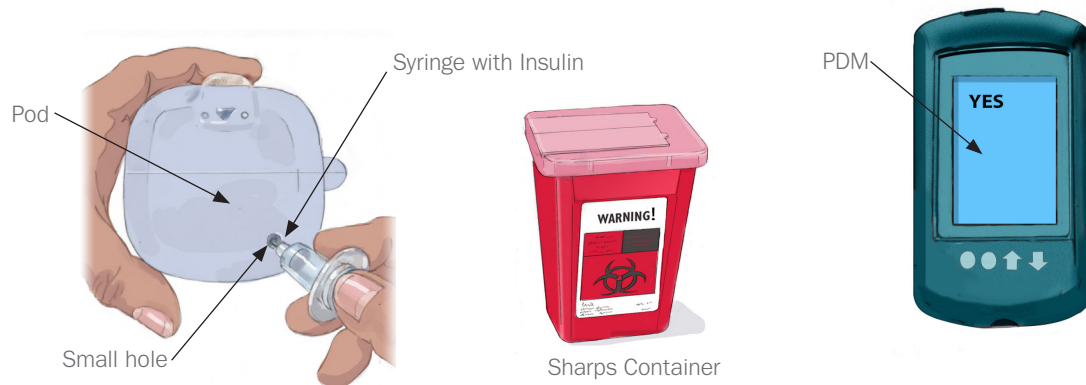
Step #5: Open new pod packet. Remove the pod from the packet. Put together the syringe and the needle.



Step #6: Fill the syringe with 2 to 3 days of insulin. Clear any air bubbles.



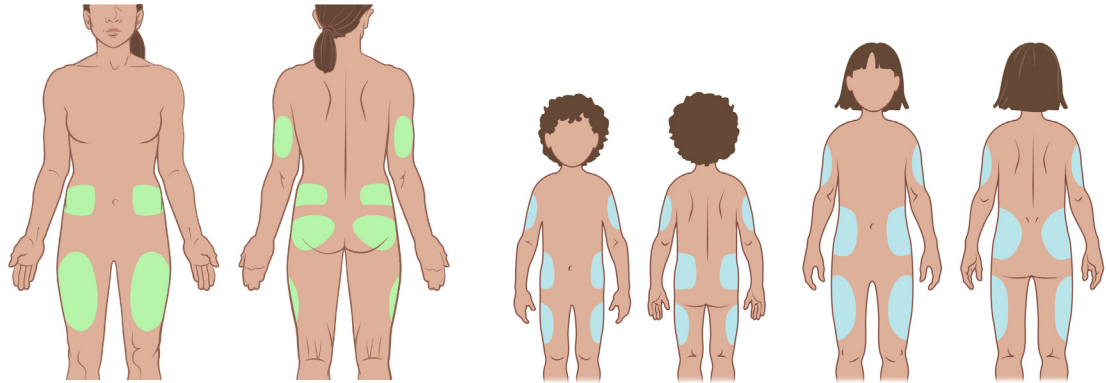
Step #7: Insert the syringe in the small hole on the pod. Press down and fill pod with insulin and wait until you hear 2 beeps. Remove the syringe. Screw off the needle and throw it away in a sharps container. Press “next” on the PDM and it will prime itself.



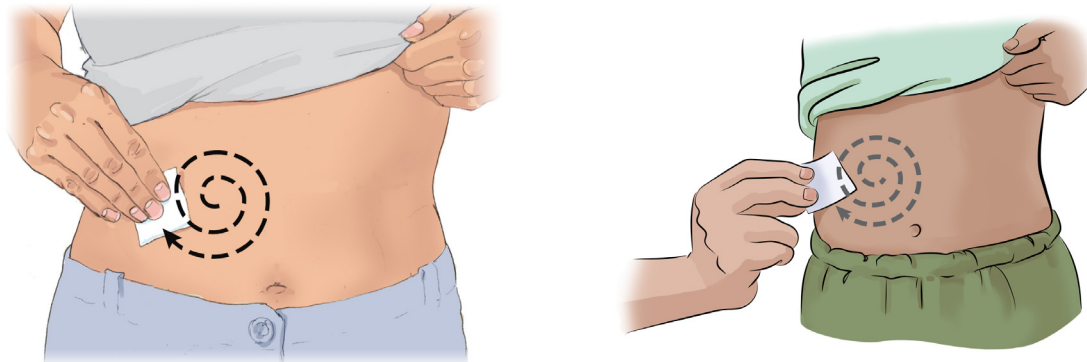
Step #8: Remove the old pod your child is wearing and throw it out. Press “next” on the PDM. Then press “YES, activate a new pod now”.



Step #9: Find a site on your child's body where you will put their new pod.



Step #10: Clean the site with alcohol. Clean an area the size of a tennis ball with an alcohol wipe where you will be putting on your child's pod. Start from the center of the insertion site and clean outwards in a circular motion.

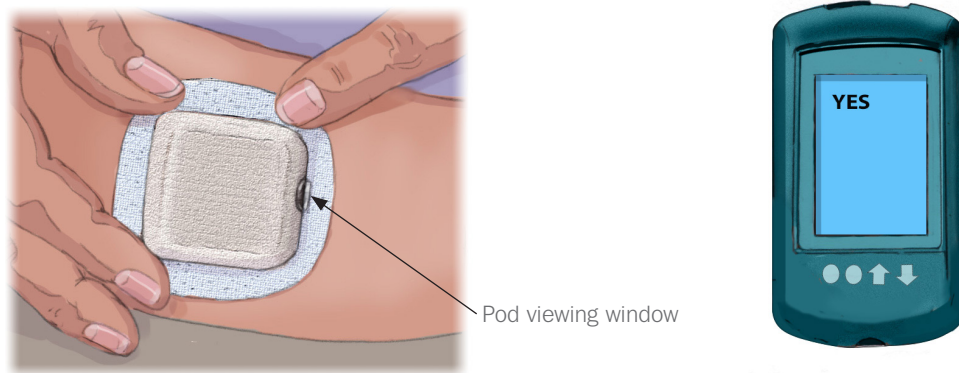


Step #11: Remove the needle cap. Take off the adhesive, or tape, on the back of the pod. Hold the pod by the side and stick it on your child's skin. Pat down the adhesive on your child's skin.



Step #12: You will use the PDM to have the pod insert the tiny cannula under the skin and start the insulin flowing into the body. Press “next” on the PDM. Then it will tell you to press start to insert the cannula. You can pinch your skin to get a good angle. You will hear a beep, then the needle will quickly poke under the skin to put the cannula under the skin. The needle will move back up, into the pod. So you will not feel it when you are wearing the pump. Once the pump has been placed, you will not be able to take it off and put the same one back on again.

Step #13: Check to be sure that the cannula is inserted in the right way. To do this, look through the pod-viewing window to check that the cannula is in place. If it is inserted right, hit “YES” on the PDM. Now you are all set to go.



How do I take off my child's tubeless pump?

You only stop a tubeless pump when it is time to start a new one. It is not reusable. If a tubeless pump fall off you can't put it back on again. You will have to use a new one.

To prevent infections, wash your hands before you remove your child's pod.

Here are a few suggestions on how to remove pods:

- You can start at one point and peel the adhesive off slowly. Then clean that area with an alcohol pad.
- You can remove the pod when your child is in the shower. This will clean the area where the pod was and clean their skin for a new site. Be sure the new site is clean and dry.
- You can use an adhesive remover like Medi-Sol® pads or spray that you can find online. Then clean the area with an alcohol pad or alcohol wipes to get the adhesive goo off. Put some antibiotic ointment on the area to heal.
- You can also use De-Solv-it. This is an adhesive remover they use for newborns in hospitals. You can find it at your local pharmacy. Baby oil or coconut oil work well too.

SECTION 2 — What Do I Need to Know About Insulin and the Pump?

In order to learn about how insulin works with a pump, you first need to know about insulin.

What is basal insulin?

Basal insulin is also “background” insulin. Basal means base, or baseline amount.

Someone without diabetes always has a little bit of insulin in their body to keep blood sugar levels normal. The liver makes sugar all the time. And the pancreas makes a little bit of insulin to balance it.

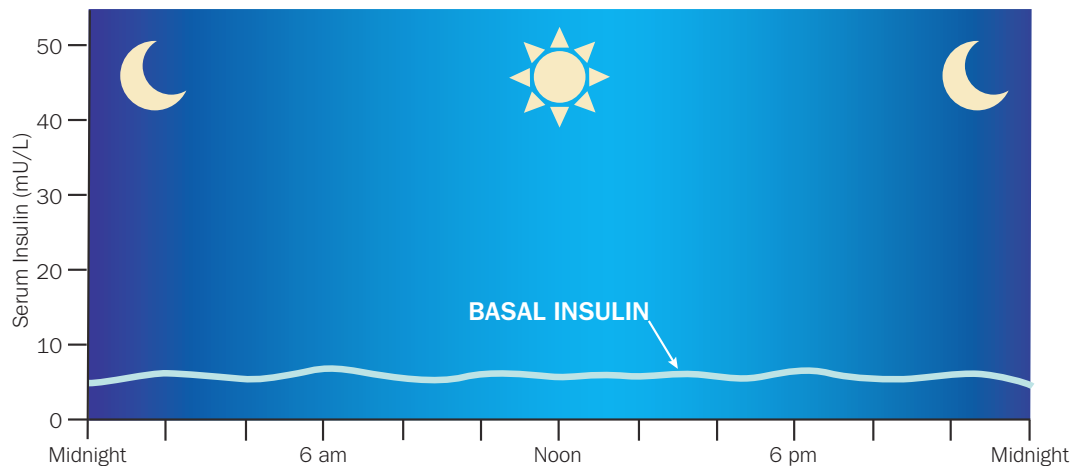
The basal level of insulin goes up and down based on the blood sugar levels. So, people without diabetes do not have low blood sugar levels overnight or if they miss a meal. That’s because the body is very good at keeping sugar levels just right.

If your child has diabetes their body does not make enough of its own insulin. So, you must give your child basal insulin. You do this with a shot of long acting insulin. In most cases, you give your child these shots once or twice a day.

LONG ACTING INSULIN OR BASAL INSULIN NAMES	
Generic Name	Brand Name
NPH Cloudy Insulin	Humulin®, Novolin®
Glargine 100	Lantus®
Glargine 100	Basaglar®
Glargine 300	Toujeo®
Detemir	Levemir®
Degludec	Tresiba®

The pump does not use long acting insulin. The pump uses rapid acting insulin for the basal insulin. It gives out small amounts of short acting insulin constantly to give your child the basal insulin level their body needs.

The chart below shows a picture of basal insulin in the body. Look at how the basal insulin line is a little wavy. This is very different than bolus insulin described in the next section.

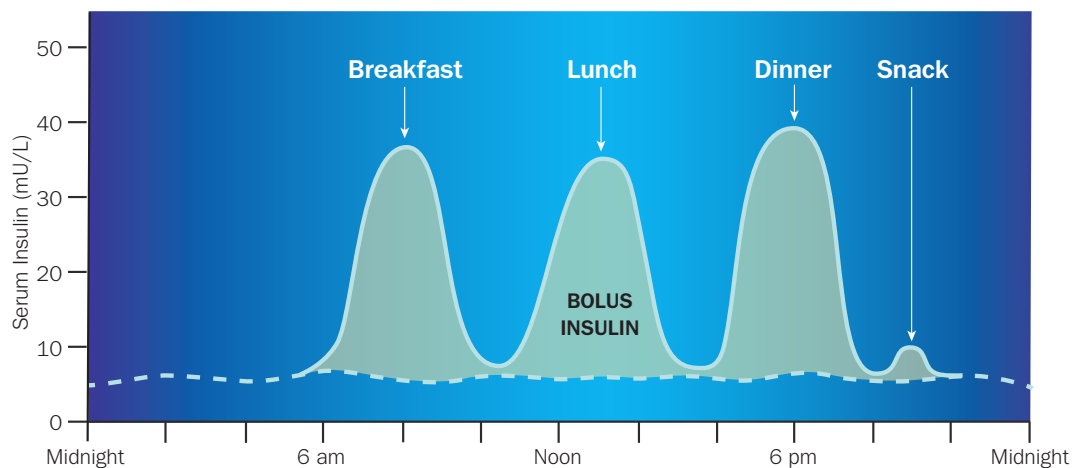


What is bolus insulin?

Bolus insulin is what the body needs to keep blood sugar levels stable after eating. In someone without diabetes, the pancreas also makes bursts of insulin. These bursts happen when people eat. These bursts also happen when their blood sugar levels rise because of stress or illness. This is insulin that comes out in addition to the basal insulin level.

If your child has diabetes, you inject rapid acting insulin before they eat food or if their blood sugar level is too high. This gives their body the burst of insulin it needs to control their blood sugar.

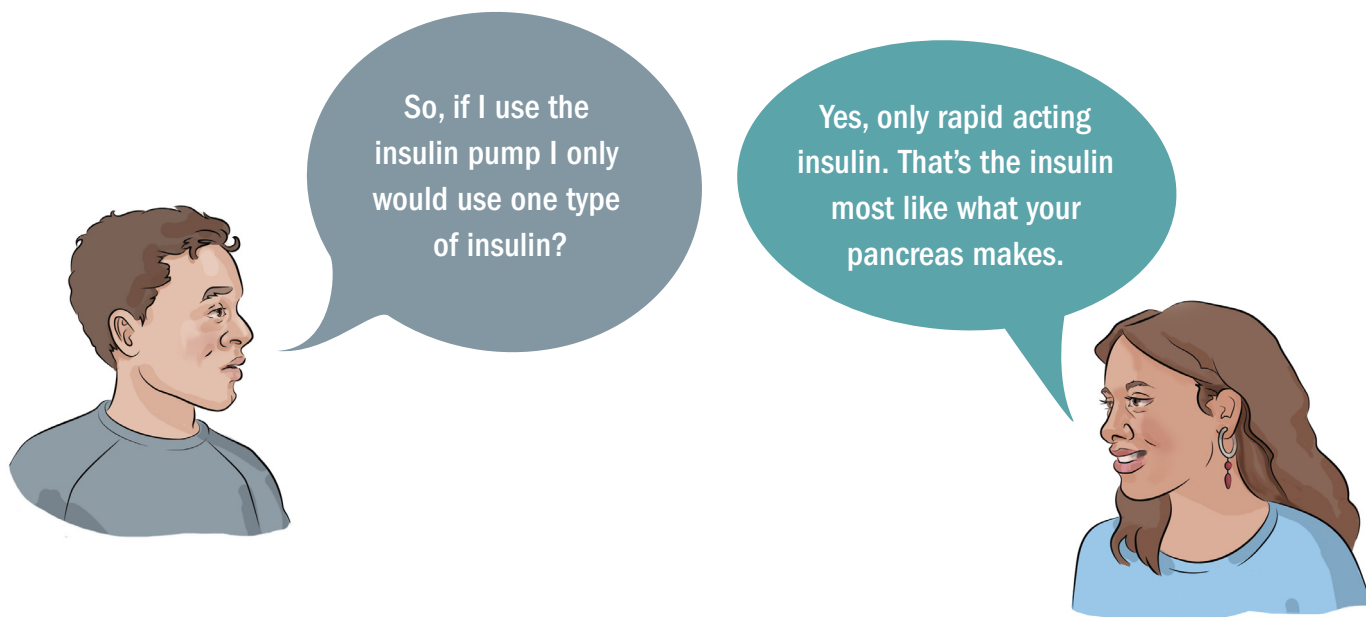
The chart below shows a picture of bolus insulin in the body. Look how the line is very wavy



How does basal insulin work with the pump?

An insulin pump gives out both basal and bolus insulin in a way that is close to how the pancreas does. This is because the pump only gives out rapid acting insulin.

Basal insulin covers your child's insulin needs between meals and through the night.



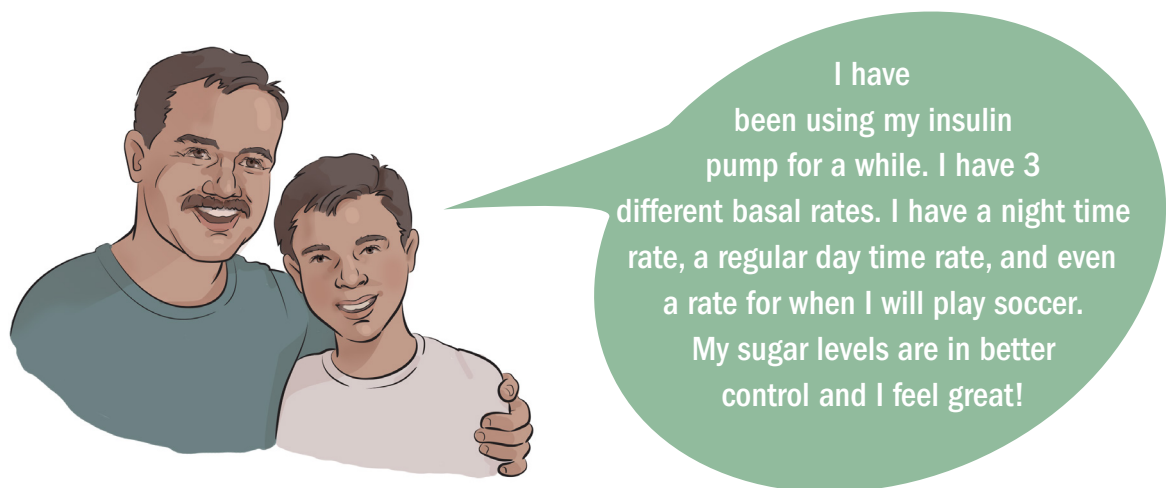
The pump sends out small amounts of basal insulin 24 hours a day. This is close to how the pancreas does when there is no diabetes.

Your diabetes team will tell you what your child's basal insulin rates should be. Once you set the basal rates in the pump, it will give out the same basal rate profile every day until you program it to give out different basal rates. Your child's diabetes team can make changes to your child's basal rate each time you see them.

After you have more experience you can program how much basal insulin your child's pump gives out based on their body's needs throughout the day. For instance, you can program your child's pump to:

- Give out less basal insulin during the night than during the day or
- Give out more insulin during the early morning than the afternoon

In other words, you can program your child's pump to give out basal insulin at different rates and times to match your child's needs. If you are not sure, you can always check with your child's diabetes team.



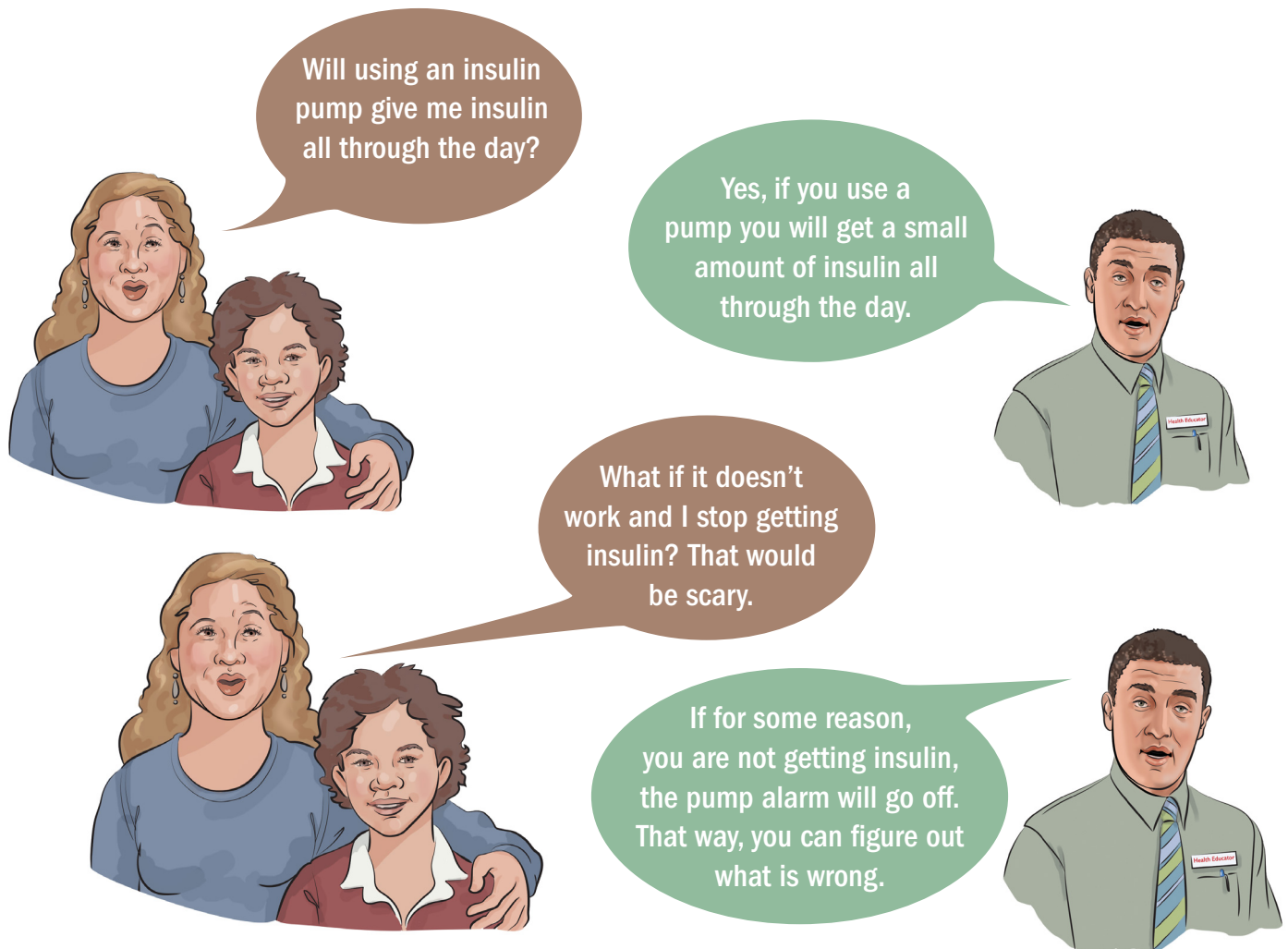
The pump also has a feature called a temporary basal rate. You can set it to make temporary changes in your child's basal insulin based on their needs. For instance, you can decrease the basal rate for exercise. You can increase it when your child is sick.

How does rapid acting insulin work?

Rapid acting insulin acts fast. It acts a lot like insulin that the pancreas makes. However, it starts and stops acting more slowly than the insulin made by someone without diabetes.

The pump uses only rapid acting insulin. When rapid acting insulin enters the body, it:

- Enters the bloodstream in 10 to 15 minutes
- Has its strongest sugar lowering effect in 1 to 1½ hours
- Stops lowering sugar levels in 5 to 6 hours



How do bolus doses work with the pump?

Each time you eat and test your child's blood sugar level, your pump will tell you how much bolus insulin to give. It tells you based on the information you give it.

You will always have a choice about the dose you give. If you think the pump is wrong, you can "override" it. That means you can give more or less of what it says. You are the one that controls the pump. It does not control you.

You will tell the pump to give your child insulin when they eat and if their blood sugar levels are too high. These are bolus doses or pre-meal doses.

The pump will use a "dose calculator" to figure out how much insulin to give your child. You need to put this information into the pump:

- Your child's blood sugar level
- How many grams of carbohydrates (carbs) they are eating

This is so the pump can figure out your child's dose.

The dose the pump suggests is based on:

- The pump settings that are put into your child's pump by their diabetes team
- How many grams of carbs they are eating
- Whether they need a correction dose to bring their blood sugar down or up

This will mean that the pump may say "give 5.6 units" or "give 7.2 units". You get to choose if you think this is the right dose. If you want to, you can give a little bit more or a little bit less based on what you know about your child's diabetes. Insulin pumps leave the choice up to you.

You can also decide not to use the pump dose calculator and put in your own dose. So, you can just say "give 4 units" or "give 2 units". This is a sort of short cut, if you do not want to put in the carbs or blood sugar level.

What is a correction bolus?

A correction bolus is when you give your child an insulin shot to correct a blood sugar level that is out of their target range.



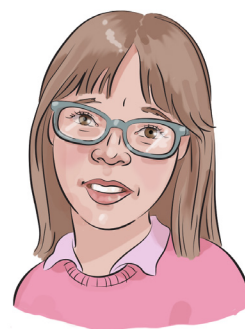
You can stop sending out insulin to your body at any time. This includes, basal insulin. It also includes any active bolus or temporary basal. Be aware that when your pump is stopped, no insulin goes into your body.

How would I cancel or stop a bolus with the pump?

There may be times when you want to stop or interrupt a bolus. Such times might be if you find your child's blood sugar falling too fast or they eat less food than you expect. The pump lets you stop sending out a bolus if you need to. You do this by setting the pump to "Suspend" mode.

When the pump is in Suspend, no insulin at all goes into your child's body.

The other day I had programmed my bolus for breakfast. But before I could start eating I got a call from my daughter's school. Then I had to leave. I suspended and cancelled sending out the bolus so I wouldn't get a low blood sugar.



No matter what kind of pump your child has you will need to enter your pump settings. You will do this with your child's diabetes team.

There are two important settings:

1. The **basal rate**
2. The **bolus calculator** that includes your child's carbs ratio and correction dose

What is the basal rate setting?

The basal rate is the small amount of insulin your child's pump gives them every hour. It is supposed to be the right amount of insulin to keep their sugar from going too high or too low in between meals and through the night.

Often the basal rate is around 1.0 units per hour. Although this is different in different people. Sometimes the basal rate is highest early in the morning and lowest later in the day. You will work with your child's diabetes team to figure out what their starting rates will be and how they will change throughout the day.

If you want your child's pump to stop giving insulin, you can turn off, or suspend, their basal rate. You can also do something called a temporary basal rate. This means you can lower or raise their basal rate for a certain amount of time. For instance, if their blood sugar is low and you want to give less insulin, you can lower their basal rate by half for the next two hours. That is, you can set a 50% basal rate for 2 hours. Your child's diabetes team will help you learn to do this if it is something that could help them.

What is the bolus calculator?

All brands of pumps have a feature that figures out, or calculates, the amount of insulin you need to give:

- Before meals and snacks
- To lower high sugars between meals

When your child starts using the pump, you should already be carb counting and correcting. Your child's diabetes team puts their carb and correction ratios into the pump.

So, it does the calculations for you.

Each pump is slightly different. So, you will need to learn how your child's pump figures out their doses. But the basic steps are the same:

- 1.** Either your child's blood sugar reading will automatically go from their meter into their pump or you will enter it by hand.
- 2.** You enter how many carbs your child plans to eat.
- 3.** You press the "activate" button and allow the pump to send out the bolus.

You can always increase or decrease their dose more than the pump says if you think the dose is not right.

The bolus calculator will lower the suggested dose of insulin based on your child's blood sugar level and based on "insulin on board" or "active insulin". For instance, if their blood sugar is too low, the calculator will lower the insulin.

The idea of active insulin is very important because the pump keeps track of when you gave your child's last dose of insulin. If it was not very long ago (for instance in the past 3 hours), it will subtract it from the suggested bolus.

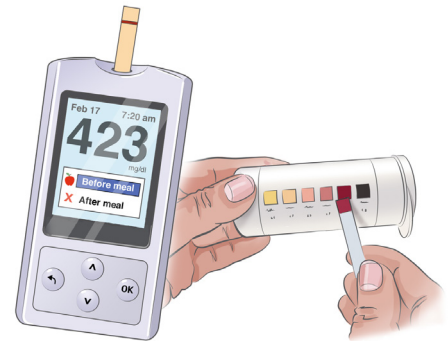
For instance, let's say you give 10 units of insulin and the amount of time that it stays in your child's body is 3 hours. Then 1 ½ hours after you have given the insulin half of it, or 5 units, will be left in your child's body. Your pump knows this and will subtract this amount from any bolus dose you give so you do not give too much. Make sure you talk to your child's doctor about how long active insulin stays in their body. How old and how active they are makes a difference.

SECTION 3 — How Can I Stay Safe When I Am Using the Pump?

Yesterday was the scariest day of my life. Dean had NEVER had ketones.

We've had nights where he just wouldn't come down, but nothing like this. When you hear an alarm every 5 minutes when you should be sleeping, your brain turns off. My brain was so tired. He was coming down a little after a bolus. I fell back to sleep and stopped hearing the alarms. I am grateful he came walking out of his room in the morning because for so many families, that does not happen. DKA kills so many in their sleep.

His pump site had failed and his body was not getting insulin



When I woke up I felt yucky. I had cold sweats, an upset stomach, and was very tired. We tested my ketones. The ketone stick was so dark. My mom freaked out! Like really freaked out!



I told him—we are going to the ER. I paged his doctor, texted his dad and jumped in the car. Half way to the ER, the doctor called us. She said he was most likely fine, syringe him, change his site, and test in an hour. But he never shown positive on one of those ketone sticks. Why was this high different? It was because the pump site was not working.

We went home and I gave myself a shot of insulin. We changed my infusion site and my mom made me drink so much water! My blood sugar came down after the site change and my ketones came back to normal.

To say yesterday aged me is an understatement.

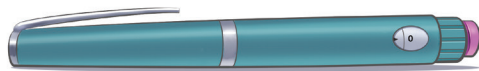
How will my child stay safe when they are using the pump?

You will need to read this part of our guide many times. That is because it is how your child will stay safe when they are using the pump.

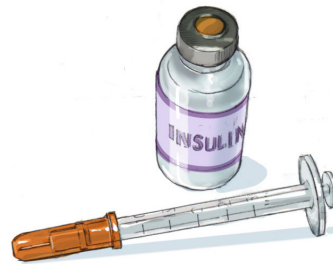
You need to **take steps right away to fix the problem** if:

- Your child's pump stops working.
- Your child's blood sugars are too high for no reason.

If you don't get your child's pump to work and their blood sugar levels don't start to go down within an hour or two you need to give them a shot of insulin with an insulin pen or a syringe and insulin vial. This is so you are sure insulin has gone into your child's body.



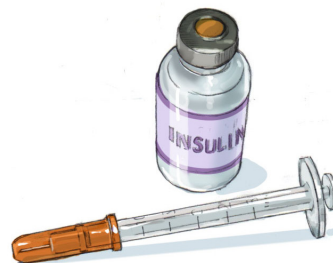
Insulin pen



Syringe, needle and insulin vial

DO NOT FORGET

- If you are not sure your child is getting insulin in their body, give them a shot of insulin if their blood sugars are high and not coming down.
- Even if they use a pump, always carry with you the supplies you need to give a shot of insulin.



If your child uses a pump with tubing, insulin comes through the pump tubing in a tiny flow. It can become clogged or stopped for all sorts of reasons that you might not notice. If your child uses a tubeless pump, insulin comes through the pod in a tiny flow into the skin.

How will I know their pump is working right?

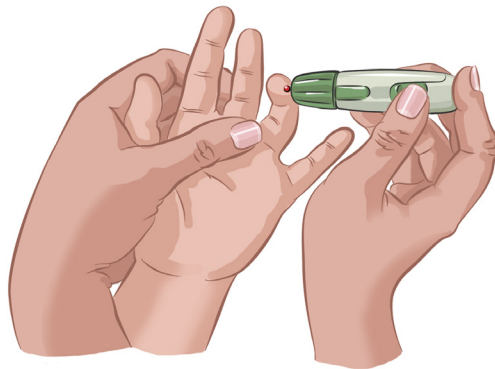
The way you tell that your child's pump is working right is by testing their blood sugar level at least 6 to 8 times per day. And you should space these out over the course of the day:

- First thing in the morning
- Before breakfast
- Before snack
- Before lunch
- Before snack
- Before dinner
- At bedtime

What are the basic rules when using the pump?

Test your child's blood sugar at least 6 to 8 times a day: when they wake, before each meal, snack and at bedtime. If they do not snack between meals, still check at a halfway time between meals. Or you can wear a continuous glucose monitor. See our guide, *Is the Continuous Glucose Monitor Right for Me?*, for more information. Some continuous glucose monitors work with the pump and help control the insulin dosing for you.

It is very important to test before bed so you can find and fix a problem before your child goes to sleep. If not, they may be high all night long.



- **Always test your child's blood sugar two hours after they start a new infusion set** to make sure the insulin pump is working.

- **Always test your child's blood sugar before you or your child drives.** Also, make sure you keep a blood sugar level above 100 mg/dl (5.6 mmol/L) to avoid low blood sugar during your journey. This is most important if your child is driving. If they are not driving it is good to get in the habit of testing.
- **Change and rotate your child's infusion set every 2 to 3 days.** Insulin in the pump stops working after 3 days due to the heat of your child's body and the pump or pod.
- **Change infusion set three to four hours before going to bed.** If your pump site fails, you might not notice a problem until the morning.
- **Keep emergency supplies on hand all the time.**



- **Each month check the end dates on your child's supplies.** This includes their glucagon emergency kit, insulin, test strips and other medications.
- **Order refills for medications way before your child needs them.** Give your child's diabetes team a complete list of what they need. This includes the type of insulin they use, strips for their meter and all pump supplies. Give this list to your child's team because they do not want you to run out of supplies.
- **Wear medical identification all the time.**

How do I deal with sudden high blood sugars when my child is using their pump?

There are many reasons your child may have sudden high blood sugars. Some causes could be:

- A pump problem
- Being sick
- Eating too many carbs
- Not giving the right amount of insulin
- Exercising less
- Feeling stressed
- Taking certain medications, such as steroids

In most cases, preparing and giving your child insulin shots will bring your child's blood sugar down to a safe level.

What should I do if my child is feeling sick?

If your child is feeling sick to their stomach or are vomiting, check their blood glucose and ketones right away. If their ketones are positive or they cannot eat and drink, call your child's diabetes team or go to an emergency department right away.

See page 33 for more about ketones.



What should I do if my child's not feeling sick but their blood sugars are too high?

Sometimes there are reasons for blood sugars being too high. For instance, they could be high because your child ate too many carbs. Or maybe you did not give your child enough insulin.

But if their blood sugar is above 300 mg/dl (16.7 mmol/L) without a reason for being high, follow these steps:

1. Take a correction bolus through the pump.
2. Drink plenty of fluids.

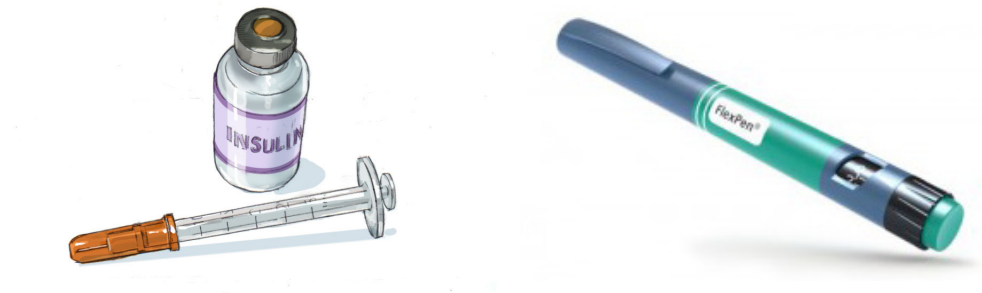
If your child is over 16 years old, drink 8 to 16 ounces of water per hour.

If your child is under 16, drink 1 ounce per each year of age. For example, if your child is 7 years old, drink 7 ounces of water an hour.

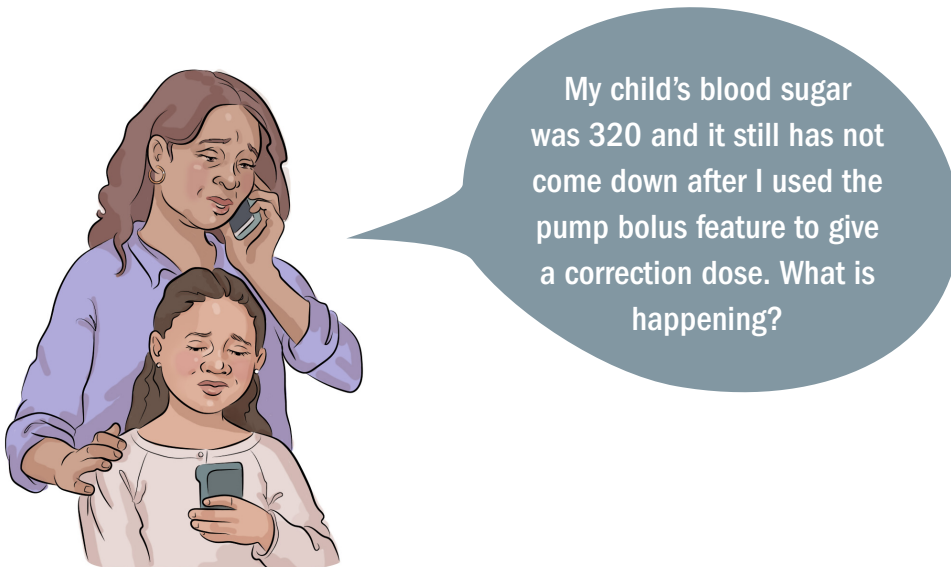


3. Test your child's blood sugar again in one hour.
4. If your child's blood sugar has not come down by at least 50 mg/dl (2.8 mmol/L) then give a correction dose by shot with a syringe or pen and **not through the pump**.

If your child's blood sugar does not come down with a correction dose through their pump it is possible that their pump is not giving them insulin. This could be due to clogged tubing, a bad site or other reasons. **The only way you can be sure your child is getting insulin in their body is if you give it with a shot.**



5. After you have given your child a shot and are sure they have insulin in their body, you can troubleshoot the pump. In most cases, this means changing your child's infusion site and tubing.





Why should I check for urine ketones?

There can be times that your blood sugar is too high due to a shortage of insulin in the blood causing your child's body to break down body fat for energy. When this happens, your child's body produces a chemical called ketones.

Ketones can make your blood acidic. Acidic blood can cause a serious condition called diabetic ketoacidosis (DKA). When someone has ketones in their urine, it often means that person needs medical help.

Checking your child's urine for ketones can help you manage your child's diabetes better. When a pump fails, your child can be at risk for having ketones.

When do I check my child's urine for ketones?

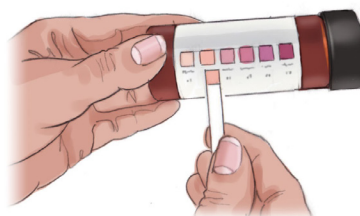
Check your child's urine for ketones:

- If your child's blood sugar is more than 300 mg/dl (16.7 mmol/L) without them eating too many carbohydrates and other sugars
- If they are sick to their stomach or vomiting
- If you think their pump is not working right
- When your child is sick or has an infection, and is having trouble controlling their blood sugar levels

How do I check for urine ketones?

You will need:

- Urine ketone test strips



- A watch with a second hand

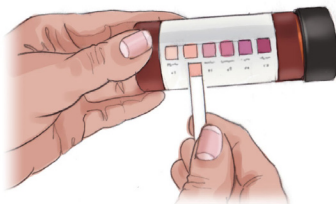


How to check:

- Have your child urinate (pee) on the end of the strip that has the light-colored square on it. Or dip the strip into a cup of your child's urine.



- Follow the instructions on the bottle of strips for the directions and how much time to wait for the color change.
- Compare the end of the ketone strip to the color chart on the bottle or in the package of the strips. This is how to find out the level of ketones in the urine.



- Write down your results for your records.

If my child has positive ketones in their urine what should I do?

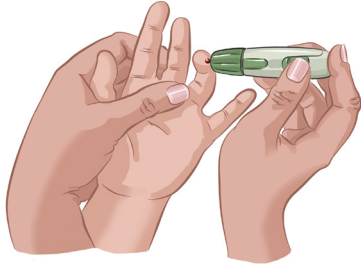
If the ketones are positive:

1. Drink plenty of fluids.

- If you are over 16 years old, drink 8 to 16 ounces of water per hour.
- If you are under 16, drink 1 ounce per each year of age. For example, if you are 7 years old, drink 7 ounces of water an hour.



2. If your child's positive ketones are in a low level, give them insulin by shot—at least every 2 hours based on their correction. If your child's ketones are at a moderate level or greater, call your child's diabetes team because your child may need more insulin for their correction doses.
3. Test your child's blood sugar levels until ketones are gone, at least every 2 hours.



4. Be sure to call your child's diabetes team right away if your child:



- Has ketones that are more than trace positive
 - Are not able to lower your child's blood sugar level into their normal range within 6 hours of giving them shots
5. Even though you have called your child's diabetes team, go to the emergency room if they:

- Are vomiting



- Are not able to drink fluids



SECTION 4 — What Are the Common Pump Problems?

What is pump troubleshooting?

To troubleshoot means to figure out and fix a problem. With a pump, it means learning how to understand if your child's pump is not working right. This includes knowing warning signs from your child's body that might relate to a pump problem such as high blood sugars or infection. It also includes being ready to solve problems that might happen.

There are problems that can happen when your child wears a pump. And there is almost always a solution.

Who can I call if I am having a problem with the pump?

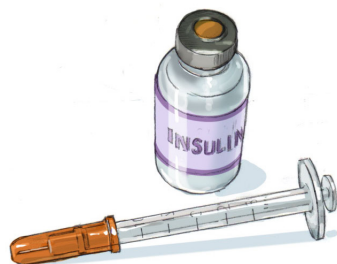
You can call your child's diabetes team if they are having a pump problem. You can also call the company that makes your child's pump so they can help you. They can send you a new pump, if your child needs one.

How do I know if the pump fails or is not working as it should?

- **Your child's pump will beep and warn you** if something is not working right.
- **Check your child's blood sugar 2 hours after you start a new infusion set.** This way you can make sure your child's pump is sending insulin into their body.

What should my plan be if the pump fails?

1. Give regular or rapid acting insulin every 2 hours using your child's carb and correction doses. Some rapid acting insulins are Apidra, Humalog and Novolog.



2. If your child is going to be off the pump overnight, give them a shot of long acting insulin at bedtime. Some long acting insulins are Lantus, Levemir and NPH.

To find your child's dose, you need to know their total 24-hour basal insulin dose. This is most often 15 to 40 units. But it is sometimes more and sometimes less. This may be less the younger your child is.

Divide the long acting insulin dose in half. Give half of it at bedtime. Then give the other half the next morning—unless they will be starting back on the pump.

If your child is starting back on the pump during the day, do not give the morning long acting insulin dose with a shot. As a fallback, giving 10 units of long acting insulin at bedtime is enough to avoid serious problems in most cases.

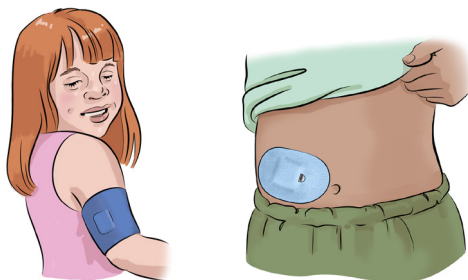
3. Do not expect this technique to keep your child's blood sugar levels under good control. The goal is to keep your child safe until you restart their pump.
4. Ask your child's diabetes team for a pump failure plan so they can tell you how much long acting insulin you would need to give them. Also ask them to give you a copy of your child's pump settings so you would know how to set up a new pump.



What do I do if the pump falls off?

You can:

1. Get something, like Skin Tac™, that makes the skin stickier so it holds the tape on better. You can get this at the pharmacy.
2. Put a large bandage over the infusion set to hold it more tightly.



What if my child starts to have an allergy to the tape?

If your child has an allergy to the tape, their skin will irritate and turn red. Also, it may be hot to the touch.

If your child is starting to have an allergy to the tape, there are ways to help. Sometimes you can put a spray under the site that helps. Other times you can put a different bandage under the tape. Ask your child's diabetes team for help.

How do I know if the infusion site gets infected?

These signs are normal:

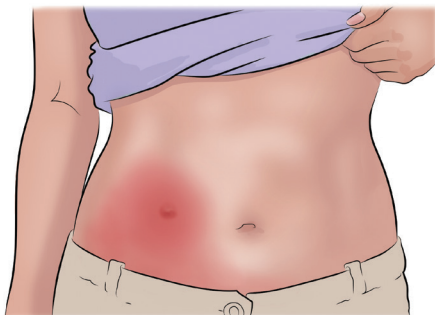
- The site may look a little red.
 - You may see a little lump the size of a pea at the point where the set went under the skin.
- These little bumps are “pump lumps” and go away over time. Do not use this area until the lumps go away.

These are signs of infection:

- Your child's skin is very red or tender.
- Your child's skin is warm to the touch.
- Your child's skin may hurt.
- Pus may come out.

If your child has any of these signs of infection, call your child's diabetes team right away and get them checked out.

This is what an infection from a pump infusion set can look like:



What do we do if the infusion site gets infected?

A common problem with the pump can be an infection at the infusion site. It is one of the most common reasons why people stop using a pump.

If your child has an infection, you will need to take off and throw away the reservoir and infusion set. You will need to use another infusion site until the infection has healed.

Sometimes your child will need treatment with antibiotics. This can mean pills or ointment or both.

If you think your child has a site infection call your child's diabetes team right away and get checked out.

What if my child keeps getting site infections?

If your child keeps getting site infections, check how you are cleaning the site and changing the infusion set. If you are correct in how you are cleaning the site, apply a topical antiseptic to the site before you insert the set. This kind of antiseptic is an antimicrobial agent that can kill, inhibit or reduce the number of microorganisms where you want to place the infusion set. It can help control infections.

Any pharmacy will have what you need to help prevent infections.

If your child is prone to site infections, use a triple antibiotic process. This means that you:

- 1. Wash** the area with an antibacterial soap and let it dry.
- 2. Clean** the area with an antibacterial solution and let it dry.
- 3. Apply** an antiseptic and adhesive wipe to the area and let it dry.

Your child's diabetes team can recommend some products.

How often should I check their site for signs of infection?

Look at the site for any signs of infection every day and every time you take the pump off to put a new one on.

SECTION 5: Conclusion

Am I ready to use an insulin pump?

We hope that the information we have shared has helped you start to learn the details of how to use an insulin pump. It is up to you to decide if you want to try using one.

The control of my child's diabetes is in my hands!

That's right. No matter what you decide regarding the pump, the control of your diabetes is in your hands. You can control it with shots or a pump. When you control it, you can avoid many of the serious problems that can happen if your sugars stay too high for too long.

What is the next step?

The next step can be to talk with your diabetes team to see if the pump is right for you.

Ask to see a pump to hold and check it out. In most cases insurance covers one or two types of pumps. So be sure to ask to see that type of pump if you have insurance.

How else can I learn about pumps?

A great way to learn about pumps is from people who use them. Your diabetes team may be able to suggest people you can talk to. Or you can look on-line to see what other people write about pumps.

Should I rush into this?

In most cases, there is no rush to start using a pump. So, you can spend time thinking about it.

If my child and I start on the pump are we stuck with it?

Remember that you can get a pump and try it. Then you could change your mind and go back to shots. It is not permanent.

If you do get one, you should try it for a few months to see how you adjust to it. The first few weeks of wearing it may be hard because it is new. Then after you have worn it for a while you will begin to see if you like it or not.

Either way, I'm committed to taking care of my child's diabetes.

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

Keep up the good work!

Basic steps for wearing pumps with tubing

List of the basic steps of wearing pumps with tubing

- 1.** Get all the supplies you will need and put them in one place. This includes your child's insulin. Make sure the place is clean and dry. Also, make sure it has good lighting so you can see.
- 2.** Make sure you have a trash basket nearby so you can throw out what you are finished with.
- 3.** Wash your and your child's hands.
- 4.** If your child is already wearing a pump, suspend, and remove the cannula from under the skin. Also remove the tubing, and reservoir from the pump and throw it out.
- 5.** Program the pump to know you are making a site change, so it can go through the steps to start a new infusion set (rewind piston).
- 6.** Fill the reservoir with 2 to 3 days of insulin. Clear any air bubbles.
- 7.** Connect the reservoir to the tubing. Clear any air bubbles.
- 8.** Put the reservoir in the pump and fill the tubing. Make sure you see drops at the end of the needle and that there are no air bubbles in the tubing. Never fill the tubing while connected to the pump.
- 9.** Prepare and load the insertion device. Please note: every insertion device is different.
- 10.** Find a site on your child's body where you will put your new infusion set.
- 11.** Clean that site with alcohol.
- 11.** Insert the infusion set with the cannula. Remove the needle guard. Put the inserter on the site on your child's body that you just cleaned. Press down and then pull up to remove the insertion needle. Make sure the tape is secure against skin. The cannula is now under the skin, and under the tape.
- 12.** Before you start your insulin pump, fill the empty cannula.
- 13.** Restart your child's pump. Make sure it is giving your child insulin. Check blood sugar 2 hours after starting a new infusion set to make sure your child is getting insulin.

Basic steps for wearing pumps without tubing

List of the basic steps for wearing pumps without tubing

- 1.** Get all the supplies you will need and put them in one place. This includes your insulin. Make sure the place is clean and dry. Also, make sure it has good lighting so you can see.
- 2.** Make sure you have a trash basket nearby so you can throw out what you are finished with.
- 3.** Wash your and your child's hands.
- 4.** If your child is already wearing a pod, the Personal Diabetes Manager (PDM) will beep and alert you to change your child's pod at day 3. Hit "action" on the PDM and select "activate new pod". Please note: the PDM will guide you through all the steps.
- 5.** If you need a new pod packet, remove the pod from packet and put together a syringe and needle.
- 6.** Fill the syringe with 2 to 3 days of insulin. Clear any air bubbles.
- 7.** Take the syringe and insert it in the small hole on the pod. Press down and fill the pod with insulin. Wait until you hear two beeps. Remove the syringe. Then screw off the needle and throw it away. Press "next" on the PDM and it will prime itself.
- 8.** Remove the old pod and throw it out. Press "next" on the PDM. Then press "Yes, activate a new pod now".
- 9.** Find a site on your child's body where you will put your new pod.
- 10.** Clean that site with alcohol.
- 11.** Remove the needle cap. Take the tape cover off the back of the pod and hold the pod by the sides. Stick the pod on your child's skin. Pat down the tape on your child's skin.
- 12.** Press "next" on the PDM and it will tell you to press start to insert the cannula. You can pinch your child's skin to get a good angle. You will hear a beep, then the PDM will quickly insert the cannula.
- 13.** Look through the pod window to check the cannula. Check the infusion set to make sure the cannula is inserted. If inserted right, hit "yes" on the PDM. Now you are set to go.

APPENDIX 1 — Resources

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

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

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

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

Organizations

AMERICAN ASSOCIATION OF DIABETES EDUCATORS (AADE)

(800) 338-3633

www.aadenet.org

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

AMERICAN DIABETES ASSOCIATION (ADA)

(800) 342-2383

www.diabetes.org

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

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

ACADEMY OF NUTRITION AND DIETETICS

(800) 877-1600

www.eatright.org

This is a site for information about food and nutrition.

CHILDREN WITH DIABETES

www.childrenwithdiabetes.com

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

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

CLINICAL RESEARCH STUDIES WEBSITE

clinicaltrials.gov

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

DIABETES MINE

www.healthline.com/diabetesmine

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

DIABETES SISTERS

www.diabetessisters.org

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

DIABETIC DANICA

www.facebook.com/DiabeticDanica

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

DIABTRIBE

www.diatrIBE.org

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

GLU

www.myglu.org

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

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

JDRF

www.jdrf.org

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

TRIAL NET

www.diabetestrialnet.org

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

TUDIABETES

www.tudiabetes.org

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

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

CARBOHYDRATE (CARB) COUNTING AND NUTRITION RESOURCES

CALORIE KING

www.calorieking.com

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

CARBS AND CALS

www.carbsandcals.com

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

THE DIABETES CARBOHYDRATE AND FAT GRAM GUIDE

(The American Diabetes Association)

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

THE DOCTOR'S POCKET CALORIE, FAT & CARBOHYDRATE COUNTER

(949) 642-1993

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

FIGWEE

www.figwee.com

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

NUTRITION IN THE FAST LANE

(Franklin Publishing)

(800) 643-1993

www.fastfoodfacts.com

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

NUTRITION AND DIABETES

(International Diabetes Center)

(888) 637-2675

www.idcpublishing.com

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

INSULIN PUMP COMPANIES

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

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

ACCU-CHECK PUMPS: ROCHE DIAGNOSTICS

(800) 280-7801

www.accu-checkinsulinpumps.com

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

ANIMAS PUMPS: ANIMAS CORPORATION

(877) 937-7867

www.animas.com

These pumps include the Animas Ping and Animas Vibe.

OMNIPOD PUMPS: INSULET CORPORATION

(800) 591-3455

www.myomnipod.com

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

MINIMED PUMPS: MEDTRONICS, INC.

(800) 646-4633

www.medtronicdiabetes.com/home

This is the site for all the MiniMed Medtronic devices.

TSLIM PUMPS: TANDEM DIABETES CARE

(858) 366-6900

www.tandemdiabetes.com

This site describes the features of the TSlim pump.

INSULIN AND INSULIN PENS

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

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

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

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

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

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

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

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

RAPID ACTING INSULIN

Apidra (Glulisine) made by Sanofi

www.apidra.com

These come in vials and pens.

Humalog (Lispro) made by Lilly Pharmaceuticals

www.humalog.com/index.aspx

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

Novolog (Aspart) made by Novo Nordisk

www.novolog.com

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

LONG ACTING INSULIN

Biosimilar Glargine

www.basaglar.com

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

U100 Lantus or Glargine insulin

www.lantus.com

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

U300 Lantus or Glargine insulin

www.toujeo.com

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

Levemir or Detemir insulin

www.levemir.com

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

Tresiba or Degludec insulin

www.tresiba.com

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

Glucagon Pens

www.lillyglucagon.com

This is the site for the Lilly brand of glucagon.

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

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

DIABETES SUPPLIES AND MEDICATIONS

CASES FOR INSULIN

www.frioinsulincoolingcase.com

These cases keep insulin cool and are easy to carry.

www.myabetic.com

These are carrying cases for insulin and supplies.

GLUCOSE TABLETS

www.dex4.com

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

PEN NEEDLES

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

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

PEN NEEDLES AND INSULIN SYRINGES

www.bd.com/diabetes

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

WEBSITE FOR COMPARING THE LOCAL COSTS OF MEDICATIONS

www.GoodRX.com

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

APPENDIX 2 – Glossary of Diabetes Terms

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

A1c

This is also:

- HbA1c
- Hemoglobin A1c
- Glycosylated hemoglobin

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

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

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

Antibodies

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

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

Aspart

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

Apidra

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

Autoimmune disease

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

Basaglar

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

Basal insulin

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

Basal insulins are:

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

Basal rate

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

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

Beta cells or β -cells

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

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

Blood glucose (BG) or Blood sugar

Blood glucose is also blood sugar.

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

Bloodstream

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

Blood sugar level

This means how much sugar is in the blood.

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

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

Blood sugar meter

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

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

Blood sugar monitoring

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

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

Bolus

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

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

The insulins for this are:

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

Cannula

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

Carbohydrate or Carb

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

1. Carbs
2. Fats
3. Proteins

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

Carb bolus

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

Carb counting

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

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

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

Catheter

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

Cells

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

Certified diabetes educator (CDE)

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

Continuous subcutaneous insulin infusion (CSII) or Insulin pump

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

Coma

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

Continuous glucose monitor (CGM)

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

Correction bolus

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

Correction factor or Insulin sensitivity factor

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

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

Dehydration

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

Delayed-onset hypoglycemia

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

Diabetes team

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

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

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

Diabetic coma

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

Diabetic ketoacidosis (DKA) or Ketoacidosis

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

Dietitian

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

Degludec

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

Detemir

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

Endocrinologist

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

Exchange lists

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

Extended bolus

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

Fasting

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

Fasting plasma glucose (FPG) test

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

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

Fats

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

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

Fiber

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

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

Food bolus

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

Glargine

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

Glucagon—the hormone

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

Glucagon—the medication

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

Glucagon emergency kit

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

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

Glucose

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

Glucose tablets

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

Glulisine

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

Glycemic index (GI)

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

Glycogen

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

Gram

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

Hormone

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

Insulin and glucagon are hormones.

Humulin [N]

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

Humulin [R]

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

Humalog

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

Hyperglycemia or High blood sugar

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

Hypoglycemia or Low blood sugar or Insulin reaction

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

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

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

Infusion set

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

Infusion site or Insertion site

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

Injection or Shot

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

Injection sites

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

Injection site rotation and Infusion site rotation

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

Insertion set

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

Insulin

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

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

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

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

Insulin adjustments

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

Insulin pen

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

There are two kinds of insulin pens:

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

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

Insulin pump

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

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

Insulin Regular

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

Insulin sensitivity

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

Insulin-to-carb ratio

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

Intermediate-acting insulin

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

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

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

Islets of Langerhans

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

Ketoacidosis—See Diabetic ketoacidosis

Ketones

The body releases these acids when body fat breaks down.

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

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

Lancet

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

Lipodystrophy

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

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

Lantus

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

Levemir

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

Lispro

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

Long-acting insulin

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

See basal insulin to learn more.

Long-acting insulins are:

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

Medical insurance or health insurance

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

Multiple daily injections (MDI)

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

Novolin [N]

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

Novolin [R]

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

NPH

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

Occlusion

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

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

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

Pancreas

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

Pharmacist

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

Pre-mixed insulin

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

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

Proteins

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

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

Rapid-acting insulin

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

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

Rapid acting insulins are:

Generic name	Brand name
Lispro	Humalog
Aspart	Novolog
Glulisine	Apidra

Reservoir, syringe, cartridge

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

Self-management

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

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

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

Sensitivity factor

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

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

Sharps container

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

Self-monitoring of blood glucose (SMBG)

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

Short-acting insulin

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

Starch

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

Sugar

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

Sugar alcohol

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

Syringe

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

Team management

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

Total daily dose (TDD)

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

Tresiba

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

Toujeo

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

Type 1 Diabetes

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

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

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

The ways to treat it are:

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

Units of insulin

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

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