

- If the child is in diapers, cotton balls can be placed in the diaper and the strip can then be pressed on the wet cotton ball.
- Compare the test area closely with the color chart. Hold the strip close to the color block and match the colors carefully. The timing is very important.
- Ketostix: Read the ketones at exactly 15 seconds after dipping the strip.

blood ketone meter: Precision Xtra

For toddlers who aren't potty trained, and older kids in the middle of the night, Precision Xtra could be a good option. Follow up with your care team to see if it will be a good fit for your child.

what to do if ketones are positive

1. Notify the diabetes nurses or physician if ketones are moderate to large. More insulin may be needed due to the illness and ketones.
2. Have your child rest or play quietly. They should avoid exercise until ketones are gone. Exercise can make ketones worse.
3. Encourage fluid intake, especially water.
4. Recheck urine until ketones are negative.
5. Give insulin as ordered by physician or by your ketone correction scale. If you do not have a ketone correction scale, please contact your provider.
6. Record the result of the ketones in your blood sugar record. You can use the following letters or numbers to record the result:

ketone results	blood ketone results	what to write in record
Negative	0.0-0.6	N or 0
Trace	N/A	T or 5
Small	0.7-1.0	S or 15
Moderate	1.1-1.5	M or 40
Large	Above 1.5	L or 80
Large-Large	N/A	LL or 160

insulin and injections

Insulin is a hormone made by the beta cells in the pancreas. Insulin allows sugar to go from the bloodstream into the body's cells so it can be used for energy. Insulin lowers blood sugar.

insulin facts

- A person cannot survive without insulin. Insulin is needed in the body 24 hours a day, even if you are not eating.
- People with type 1 diabetes make little or no insulin. So, they need multiple insulin injections in a day. This is because there is not a single insulin which can completely control the blood sugars throughout the day. Therefore, an injection will be needed with each meal and at bedtime.
- People with type 2 diabetes may still produce insulin, but are unable to use it well. Some may need insulin to help control blood sugar levels.
- At this time, insulin does not come in a pill. But, this is being researched.

storage of insulin

Unopened vials or insulin pens should be stored in the refrigerator. **Do not freeze.** Once opened, the vial or insulin pen can be left at room temperature.

what you need to know about your insulin

In the United States, insulin is synthetically made in a laboratory and is most like human insulin.

What you need to know about your child's insulin:

1. Name of each insulin.
2. Types of your insulin(s).
3. Doses: Insulin is measured in units.
4. Always have an extra supply of each insulin available.

insulin types				
Name	Onset of action	Peak action	Working time	Appearance
Rapid acting				
Admelog	10-15 minutes	1-2 hours	3-5 hours	Clear
Apidra	10-15 minutes	1 hour	2-4 hours	Clear
Humalog	10-15 minutes	1-2 hours	3-5 hours	Clear
Novolog	10-15 minutes	1-2 hours	3-5 hours	Clear
Faster acting				
Fiasp	5-15 minutes	30-60 minutes	2-5 hours	Clear
Long acting*				
Basaglar/Lantus	1-2 hours	None	Up to 24 hours	Clear
Levemir	1-2 hours	None	Up to 24 hours	Clear
Tresiba	1 hour	None	Up to 42 hours	Clear

*Long acting insulins are also known as basal insulins

basal-bolus insulin regimen basics

Basaglar or Lantus insulins - Long-lasting insulins

These are basal or “background” insulins. These insulins control the blood sugar when you're not eating.

- Basal insulins need to be given daily. For kids school age or older, this will be at bedtime. For younger kids, this may be in the morning.
- Basal insulins are to be given at the same time each day.
- The dose will be determined by your physician and will increase as your child grows.
Example: A 2-year-old will have a much smaller dose than a 16-year-old.
- Eating causes blood sugar to rise. Basal insulins are not able to keep the blood sugar at the ideal level due to the sugar from the food. So, a second insulin is needed. We suggest Novolog or Humalog.

Novolog or Humalog insulins – Short-acting insulins (SAI)

These are rapid-acting insulins used at mealtimes and at times when blood sugar is too high.

- Novolog and Humalog insulins are basically the same type insulin. But, they are made by different companies. Your insurance will determine which insulin is preferred for your child. Based on this, the appropriate insulin will be prescribed by your provider.
- Each short-acting insulin meal dose will be based upon the following:
 - Blood sugar just before the meal
 - Amount of carbohydrates (carbs) eaten at the meal. This is called carb dose.
 - Once given, SAI starts lowering the blood sugar in 15 minutes.
 - Short-acting insulin works strongest or peaks 1-2 hours after being given. This is the time at which SAI lowers the blood sugar the most. Due to this peak, SAI should not be given for a high blood sugar sooner than 2 hours from the last SAI dose. This would put your child at risk for low blood sugar.
- The dose for a high blood sugar is known as the correction dose.
 - You will be given a target range for your child's blood sugars (example: 80–150).
 - When a blood sugar is above the target range, extra short-acting insulin will need to be given to correct the blood sugar down to the target range.



We recognize that patients could be on different short-acting insulins. So, we will use SAI in all examples and instructions.

Example target range and correction dose for child who is school age or older

For a younger child, the correction scale will be weaker, meaning less insulin will be needed to correct the blood sugar to the target range.

answer

Joe's blood sugar before lunch was 230. Joe will need to take **2 units of Novolog** to correct the blood sugar down from 230 to the target range of 80–150.

Joe's target blood sugar range is 80-150	
Correction Scale	
Blood Sugar	Units of Novolog
150-200	1
201-250	2
251-300	3
301-350	4
351-400	5
Above 400	6

carb dose

The short-acting insulin dose for carbs is determined by the carb-to-insulin ratio. The ratio(s) will be determined by your doctor.

The following are examples of different ratios that may be prescribed:

- Example A: Your child has a carb-to-insulin ratio of 10 grams of carbs to one unit of SAI. This means that your child will take 1 unit of SAI for every 10 grams of carbs eaten.
 - Your child eats 30 grams of carbs. $30 \div 10 = 3$ units
 - This means that your child needs 3 units of SAI for eating 30 grams of carbs.
- Example B: The carb to insulin ratio is 15 grams of carbs to one unit of SAI.
 - Your child eats 46 grams of carbs. $46 \div 15 = 3.067$
 - Round to the nearest $\frac{1}{2}$ unit. The dose would be 3 units.
- Example C: The carb to insulin ratio is 20 grams of carbs to one unit of SAI.
 - Your child eats 68 grams of carbs. $68 \div 20 = 3.4$
 - Round to the nearest $\frac{1}{2}$ unit. The dose would be 3.5 units.

formula to determine the total meal dose

Correction dose + Carb Dose = Total # of units of short-acting insulin (SAI)

Correction Scale	
Blood Sugar	Units of short-acting insulin
150-200	1
201-250	2
251-300	3
301-350	4
351-400	5
Above 400	6

Correction dose = 2 units of SAI

example:

First, determine the correction dose. The pre-lunch blood sugar was 244 and 71 grams of carbs were eaten. The ratio for this meal is 10 grams: 1 unit SAI

Next, determine the carb dose.

71 grams of carb eaten \div 10 (ratio) = 7.1 (round to nearest $\frac{1}{2}$ unit) = 7 unit carb dose

Finally, determine the total # of units of SAI needed for

lunch. 2 units (correction dose) + 7 units (carb dose) = 9 units (total units of SAI needed for lunch)

other examples

Pre-lunch blood sugar is 287 and 59 grams of carbs were eaten.



- Correction dose: 287 blood sugar range = 3 units (from correction scale)
- Carb dose: $59 \div 10 = 5.9$ (round to nearest $\frac{1}{2}$) 6 units
- Total units of SAI: 3 units + 6 units = 9 units

Pre-dinner blood sugar is 144 and 85 carbs were eaten.

- Correction dose: 144 blood sugar range = 0 units (from correction scale)
- Carb dose: $85 \div 10 = 8.5$ (round to nearest $\frac{1}{2}$) 8.5 units
- Total units of SAI: 0 units + 8.5 units = 8.5 units

other factors to consider for determining the short-acting insulin dose

If activity is after a meal, you may pre-treat by giving less insulin (round down). If activity is several hours after the meal, you may pre-treat by giving an additional 15 gram carb snack. No additional insulin would be needed with the snack.

What will your child's activity level be after the meal?		
Activity level	Example of activity	Round up or down?
Inactive	Being in school	 Round the dose up
Active	Playing outside	 Round down, or even pre-treat for activity



schedule for meal times

Short-acting insulin meal doses can be given either right before or after the meal. Physicians will determine their doses.

- **Older children (8 years and older) pre-meal:** School age or older will need to give the short-acting insulin just prior to the meal.
 - By giving the short-acting insulin just prior to the meal, the blood sugars will not go as high after eating. This results in better blood sugar control.
- **Younger children (under 8 years old) post-meal:** For younger children, short-acting insulin needs to be given right after the meal.
 - Younger children are given their insulin right after eating due to the child not being able to tell what they are going to eat specifically. If the short-acting insulin was given before and the child does not eat the full carb amount, this will put them at risk of low blood sugars.
 - Once younger children are able to tell what they are going to eat at meals, the short-acting insulin dose should be given before the meals.



Check blood sugar



Count carbs



Determine total short-acting insulin dose

Correction dose + Carb dose = Total short-acting insulin dose

insulin syringes or shots

using syringes

Insulin must be given with insulin syringes. These syringes are made specifically for giving insulin. Using other types of syringes may result in the wrong amount of insulin being given.

- There are three (3) sizes of insulin syringes. The smaller syringes are marked in either one unit or ½ unit amounts.
- Note: The needle size (gauge) for all the syringes is the same. They just differ in the amount of insulin they hold.

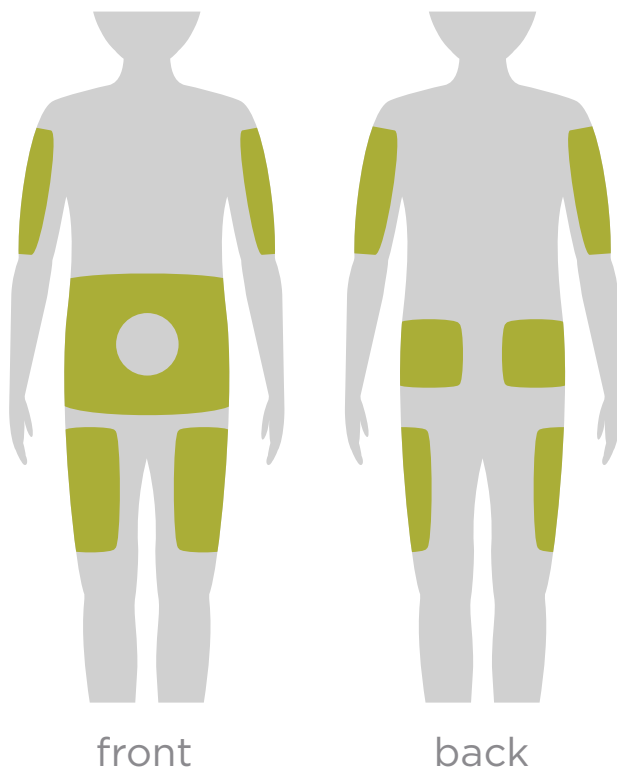
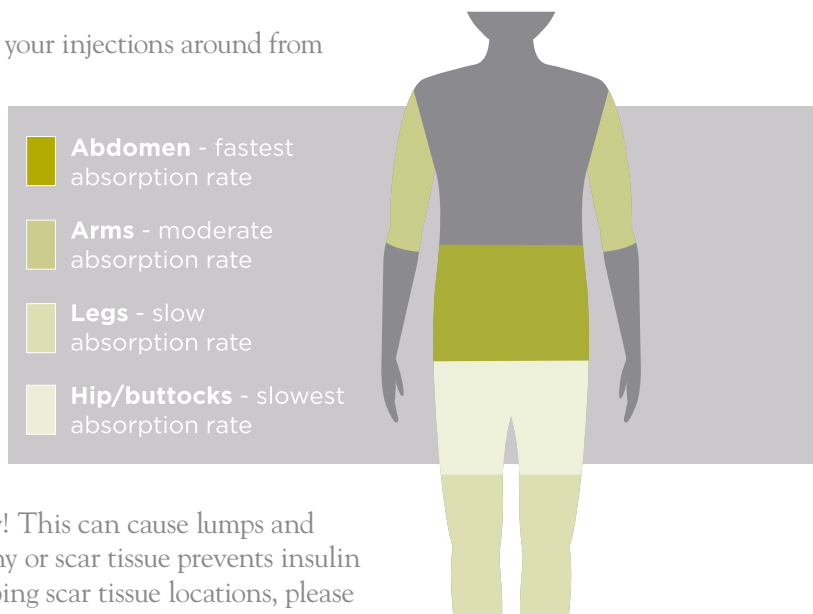
Syringe	can hold up to ...	units they come in...
3/10 cc syringe	30 units	Half or whole units
½ cc syringe	50 units	Whole units
1 cc syringe	100 units	A line is 2 units.

- Insulin syringes that are prescribed have either short or mini needle length. Make sure that the pharmacy provides insulin syringes with the correct needle length.

rotation of insulin injections

Insulin is injected into the fatty areas just under the skin in areas such as the arms, abdomen, thighs, and buttocks. Injections for these areas of the body are known as “subcutaneous” injections.

- Rotating sites means following a pattern as you move your injections around from site to site. Every person’s pattern may be different.
- Insulin enters the blood:
 - Fastest from the abdomen
 - A little slower from the arms
 - Even more slowly from the legs
 - Most slowly from the hip/buttocks
 - Note: You may want to use an area at a certain time because of its absorption rate.
- Do not give your injection in the same spot every day! This can cause lumps and hard places under the skin (hypertrophy). Hypertrophy or scar tissue prevents insulin from being absorbed correctly. If your child is developing scar tissue locations, please contact your doctor for recommendations.
- We recommend using all sites in one location, keeping injections approximately ½ inch apart. Jumping from site to site makes it difficult to remember where the last injection was given. You may choose to have all your morning injections in the belly, all afternoon in the arm and all bedtime injections in the hip or leg.
- Don’t inject too closely to scars, bruises, belly buttons or moles. Stay away from the inner thighs. Rubbing between the legs can make the injection site sore.
- Use the entire site area for injections, such as the top and outer aspect of the leg.



- b. Make sure there is enough insulin for your dose.
 - c. Check insulin pen for any discoloration and cloudiness. If you see either, discard and get a new pen from the refrigerator.
2. Take the cap off the insulin pen.
 3. Wipe the seal with an alcohol swab.
 4. Peel the foil of the pen needle off, and turn clockwise until it does not go any more.
 5. Remove the clear cap. Be sure to save it.
 6. Remove the green part and throw it away.
 7. Prime the pen by dialing the insulin pen with 1-2 units of insulin. Hold the pen up so that the insulin needle is pointed to the ceiling. Press the bottom of the pen until you see insulin come out. As long as you see insulin come out of the pen, the pen is primed. If you do not see insulin come out, prime again and press the pen again.
 8. Clean the skin with alcohol. Inject the insulin and press the bottom of the pen all the way until the dial returns to 0. Once this occurs, start your count. For insulin pens it is usually a 6-10 second hold. A good rule of thumb is 8 seconds. Insulin pens are a longer hold because the insulin comes out in a drip fashion.
 9. After the injection is complete, remove the pen from the skin.
 10. Place the clear cap over the insulin pen and turn counter clockwise until the pen needle comes off. Discard the pen needle in the sharps container or coffee can that is being used as the sharps container.

disposing of sharps at home

Like anything else we throw out, lancets, syringes, and pen needles need to be thrown out properly. If they end up in a place they shouldn't, like a beach or loose in the trash, they could accidentally hurt someone!

steps for disposal

1. After you've checked your blood sugar or given an insulin shot, put your lancet, syringe, or pen needle directly into a strong plastic or metal container with a tight cap or lid. Do not bend, break or put the cap back on your needle. You might hurt yourself!
2. When the container is full, tightly secure the lid and reinforce it with heavy-duty tape before throwing it in the trash. Mark it "Sharps." Be sure not to put it in the recycling bin!

container do's

- The best containers to use are those that:
- Are made of strong plastic or metal, so needles can't poke through.
- Have a small opening on top with a cap or lid.
- Examples: Bleach bottles, liquid detergent bottles, coffee cans.

container don'ts

- Don't use glass containers or lightweight plastic containers.
- Don't use any container that will be returned to a store.
- If you use a container that can be recycled, be sure it doesn't end up in the recycling bin by mistake.