

Hyperglycemia And Ketoacidosis: What Should You Do If Your Child Has High Blood Sugar?



Managing your child's blood sugar levels can be challenging, but it's very important to keep them healthy. Children with diabetes don't have enough insulin in their body to carry glucose (sugar) to the cells of their body to use for energy. When this glucose isn't used up, it can cause high blood sugar levels (hyperglycemia).

If left untreated, high blood sugar can lead to a life-threatening condition called diabetic ketoacidosis, or DKA. If your child doesn't have the insulin or calories (sugar) to make energy, their body can begin to burn fat for energy. This creates acids in the blood (called ketones), which can make your child sick.

Symptoms of DKA may resemble symptoms of the flu, such as nausea and vomiting. It's important that your child gets treatment for DKA right away, which may include hospitalization.

Here is what you need to know about hyperglycemia and ketones to keep your child safe.

Hyperglycemia And Ketoacidosis: Causes And Symptoms

Hyperglycemia and ketoacidosis may be caused by too little insulin — or they may be caused by other factors such as illness, stress, or poor eating or drinking habits. It's important to know what to look for to keep your child healthy and safe:

Symptoms of hyperglycemia include:

- Frequent hunger
- Frequent thirst
- Frequent urination
- Fatigue
- Headaches
- Blurry vision

Symptoms of ketoacidosis include:

- Ketones are shown to be present with testing
- Nausea and/or vomiting
- Fruity/medicine breath (like fingernail polish remover)
- Dehydration
- Dry mouth
- Deep rapid breathing (similar to after a hard run)
- Fatigue
- Weight loss
- Confusion
- Loss of consciousness

How Do I Test For Ketones?

To test your child's ketone levels:

1. Either place the ketone strip in a stream of urine or collect urine in a cup and dip the ketone strip into the urine.
2. Once you've saturated the strip with urine, wait 15 seconds.

3. Compare the color of the strip to the colors on the ketone strip bottle, which represent different amounts of ketones in the urine — trace, small, moderate, or large. Delayed reading of the strip can cause false results.

Additional Tips About Ketone Strips

- Date the ketone strip bottle when you first open it.
- Replace the ketone strip bottle 6 months after opening.
- Do not store strips in the bathroom, kitchen, or any place with increased moisture and heat.

Ketone Treatment Guidelines

Any time your child is sick or has blood sugars greater than 240 mg/dL, you should check for ketones. You may also want to contact your child's primary care provider (PCP) for further information on their care.

If your child tests positive for ketones, they need extra diabetes care. Anytime ketones are present, they should rest and avoid exercise. They may also need extra insulin, fluids, and carbohydrates to clear ketones and prevent diabetic ketoacidosis (DKA).

Step 1: Provide Insulin Dosing

- If ketones are negative, trace, or small, continue normal insulin dosing.
- If ketones are moderate or large, give your short-acting insulin (Humalog, Novolog or Apidra) every 2 to 3 hours to clear ketones — even if your child is not eating normally. Use the table below to calculate the insulin dose.

Urine ketones	Blood ketones	Amount of insulin to give
Negative, trace, or small	Less than 0.6	Usual insulin dosing
Moderate	0.6-1.5	Multiply your child's insulin dose by 1.1
Large	1.6-3.0	Multiply your child's insulin dose by 1.2
Emergency	Greater than 3.0	Call clinic immediately

Contact the clinic immediately if your child has vomited, if ketones are not improving, or if ketones are worsening after one extra insulin dose (2-3 hour window).

Step 2: Drink Fluids

Drinking fluids is an important step to reducing your child's ketone levels. If your child is not able to drink fluids because of nausea/vomiting, contact our clinic at 402-955-3871 for help.

If your child's blood sugar is greater than 200 and they have positive ketones (any level above negative, have your child drink sugar-free liquids (such as water) until ketones are cleared. Aim for one ounce per hour for every year of age (for example, a 6-year-old would drink 6 ounces of water per hour)

If their blood sugar is less than 200 and they have positive ketones (any level above negative), have them drink sugar-containing fluids (such as Pedialyte, Gatorade, juice, or soda) until their blood sugar is over 200. Aim for one ounce per hour for every year of age (for example, a 6-year-old would drink 6 ounces of water per hour). Once their blood sugar is over 200, switch to sugar-free liquids, such as water.

If you're unable to raise your child's blood sugar above 200 within 30 minutes, call our clinic at 402-955-3871.

Step 3: Recheck Your Child's Blood Sugar

In order to make sure your child's health is improving:

- Recheck your child's blood sugar every 2 to 3 hours
- Have them continue to drink fluids
- Give them insulin every 2 to 3 hours until ketones are clear

Remember:

- Never skip your child's long-acting insulin — even if your child is not eating. If your child is having low blood sugars or you are concerned lows may happen, please call our office at 402-955-3871.

- Even if your child is not eating meals normally, try to use liquid carbohydrate as a substitute for regular meals and give them insulin for carbohydrate and correction dosing.

When to Seek Medical Assistance

Sometimes, your at-home care may not be enough. Call the diabetes clinic at 402-955-3871 if:

- Ketones are not improving or are worsening after one extra insulin dose (2-3 hour window), despite following the above guidelines
- Your child is having low blood sugars with positive ketones
- Your child is less than 5 years old
- Your child is not urinating or drinking
- You don't know how much insulin to give

Contact the diabetes clinic at 402-955-3871 immediately if your child has vomited 2 or more times in the last 24 hours. This could mean your child is in diabetic ketoacidosis (DKA).

Call 9-1-1 immediately if your child:

- Has a fruity, acetone, or medicinal smell in their breath
- Is breathing heavily
- Becomes very tired or is confused

What If My Child Wears An Insulin Pump?

If your child wears an insulin pump, the most common reason for ketones is a pump site failure. If your child uses an insulin pump and ketones are positive (moderate or large), you should:

- Give your child insulin dose with a syringe or pen immediately, following the rules above for insulin dosing and fluid intake.
- Change your child's infusion set (tubing, reservoir, and site). This needs to be done even if you just changed the site as ketones may indicate a failure of the newly inserted site.

If ketones have not improved after the first insulin shot within 2-3 hours, call the clinic at 402-955-3871.

In order to keep your child safe, remember to leave the basal rate on, and avoid giving them insulin any more frequently than every 2 hours.

Ketone Treatment: Frequently Asked Questions

What are ketones?

Ketones are made when your body breaks down fat for energy. They indicate that your body needs more insulin and tend to cause an upset stomach, stomachache, and/or nausea/vomiting.

When should I check my child for ketones?

You should check your child for ketones when they have blood sugars 240 or above or are showing signs of illness, including:

- Not feeling well
- Fever
- Diarrhea
- Abdominal pain
- Nausea
- Vomiting

Why is it important to treat ketones?

Treating your child's ketones helps prevent a life-threatening condition called Diabetic Ketoacidosis (DKA). DKA, which is a buildup of ketones and acid in the body, is caused by too little insulin. It's a very serious medical emergency and can cause death if it goes untreated.

What are other symptoms of Diabetic Ketoacidosis (DKA)?

Other symptoms of DKA include:

- Stomachache

- Nausea
- Vomiting, which is a sign of severe illness and DKA
- Not urinated, which means that your child is dehydrated and needs hospital care

Late symptoms of DKA are a medical emergency. You should call 9-1-1 if your child experiences any of the following:

- Fast and deep breathing
- Exhaustion
- Confusion

Do you still have questions about high blood sugar? Contact the diabetes team at **Children's Diabetes Center**, Children's Hospital & Medical Center at **402-955-3871** to find out more about how to safely manage your child's diabetes with these medications.

Visit us online at www.childrensomaha.org/diabetes