



Diabetic Ketoacidosis (DKA)

How DKA is treated and prevented

This handout explains the causes and treatment for DKA. It will also help you learn how to prevent your child from having DKA again.

What is diabetic ketoacidosis?

DKA is a condition that occurs if your child has high blood glucose (sugar) levels and a buildup of ketones (acids) in the blood. DKA is serious and if it is not treated can lead to loss of consciousness (coma). DKA can also lead to brain swelling (cerebral edema). This swelling can cause changes in your child's mental status such as headaches and confusion.

Without enough insulin, the sugar cannot be carried out of the blood and into the cells. This causes the blood sugar to rise. High blood sugar levels cause your child to urinate more often. This leads to a lack of fluids in your child's body called dehydration.

Increased urination can cause a loss of potassium. Potassium is a salt that, along with sodium, helps your child's body to maintain healthy functioning.

When there is not enough insulin in the body, it is unable to use glucose (sugar) for energy. The body will start breaking down fat for energy. The breakdown of body fats causes the body to produce ketones. This production of ketones causes the body to become acidic.

What causes DKA?

Here are a few factors or triggers that can cause your child to have DKA:

- An infection or illness
- Missed insulin injections
- Not getting enough insulin
- A new diagnosis of diabetes (this may be the first sign that your child has diabetes)

What are the warning signs of DKA?

- Frequent urination or thirst
- Dry mouth
- Fruity odor on the breath
- General weakness
- Stomach pain
- Vomiting
- Loss of appetite
- Confusion
- Trouble breathing
- Moderate to large amounts of ketones in blood or urine

What tests will my child have?

Your child will have some or all of these tests to find out if they have DKA and what triggered it:

- **Blood tests:** These are done to check your child's level of blood sugar, blood acid, potassium, sodium and other electrolytes (minerals that help keep the body's fluid levels balanced).
- **Urinalysis:** A urine sample is taken to determine the presence and amount of ketones in the urine.
- **Chest x-ray and blood, respiratory and urine cultures:** These tests may be used to look for conditions or the source of infections that may have triggered the DKA.
- **CT scan:** This radiological test detects any signs of brain swelling (cerebral edema). A rare complication of DKA is cerebral edema.

What is the treatment for DKA?

The goal of treatment is to gradually lower your child's blood glucose levels and get the electrolyte levels back to normal. Your child's treatment will include:

- Fluid given through an IV in their vein (intravenous). This will help fix the dehydration and acid levels.
- Insulin to lower the blood sugar levels and to prevent more ketones from forming. At first, the insulin will be given as a continuous drip through an existing IV.
- Close monitoring of their vital signs, including heart rate, respiratory rate, blood pressure and oxygen saturation (how much oxygen the blood is carrying). Your child's level of alertness (consciousness) will also be closely watched.
- Frequent blood draws to look at glucose, electrolyte and blood acid levels. Often, this blood can be drawn from an IV that has already been placed or from a finger stick.

When will my child be able to eat?

- When your child is first being treated, they will not be allowed to eat or drink.
- Once your child's blood sugars, electrolytes and blood acid levels get closer to normal, they will be allowed to drink and eventually eat.
- When your child's blood acid and electrolytes have improved, the insulin will be changed from a continuous drip to subcutaneous (beneath the skin) injections. This change may occur while in the ICU (intensive care unit) or after your child is moved to their hospital room.

To Learn More

- Endocrinology
206-987-2640
- PICU (Pediatric Intensive Care Unit)
206-987-2040
- www.seattlechildrens.org

Free Interpreter Services

- In the hospital, ask your child's nurse.
- From outside the hospital, call the toll-free Family Interpreting Line 1-866-583-1527. Tell the interpreter the name or extension you need.
- For Deaf and hard of hearing callers 206-987-2280 (TTY).

What can I do to prevent my child from having DKA?

- Do not miss any insulin injections.
- Check urine or blood ketones when your child has any illness or when their blood sugar is over 250mg/dL 2 times in a row.
- Check your child's blood sugars every 2 to 3 hours when they are ill.
- Give your child juice or sugared pop if their blood sugar falls below 200 mg/dL and their urine or blood ketones are still present. This will help to keep the blood sugar up so more insulin can be given to turn off the ketone production.
- Give your child lots of liquids to help wash out the ketones.
- Your child will need to take extra Humalog/NovoLog (insulin) every 2 to 3 hours if their ketones are moderate or large. Review "Guidelines for Managing Diabetes: Diabetes management when sick with an illness including a cold or flu." Talk to your child's doctor if you have any questions.

When should I page the diabetes nurse or doctor on call?

Call 206-987-2000 or 866-987-2000 (toll-free) and ask for the diabetes nurse (Monday to Friday, 8 a.m. to 4:30 p.m.) or the doctor on call (Saturday, Sunday and holidays) if:

- Moderate to large ketones are present and you are unsure of the insulin dose to give
- There are moderate or large ketones plus vomiting, stomach pain, nausea, deep breathing, lethargy (very sleepy) or confusion
- Your child has vomited more than 2 times and can't keep anything down
- You are giving your child extra Humalog/NovoLog and ketones are not clearing
- You have questions about insulin dosages if your child is not eating well

If you have questions or concerns about the care of your child's diabetes, you will have a chance to talk with a diabetes nurse before you leave the hospital.

Sources:

- HP Chase, Understanding Insulin-Dependent Diabetes, Barbara Davis Center for Childhood Diabetes, 2006.
- http://www.emedicinehealth.com/diabetic_ketoacidosis/article_em.htm