CONDITION

Diabetic ketoacidosis

Diabetic ketoacidosis is a dangerous buildup of acidic ketones caused by too little insulin.

WHAT IT IS
Acute buildup of acidic ketones from severe insulin shortage

BODY SYSTEM
Hormones and metabolism

MAIN SYMPTOMS
Thirst, frequent urination, vomiting, deep breathing

WHAT CAUSES IT
Severe insulin shortage, often triggered by illness

HOW IT IS DIAGNOSED
Blood ketones, glucose, electrolytes, and acidity tests

MAIN TREATMENT
Hospital fluids, insulin, electrolytes, and trigger treatment

CAN IT BE CURED?
Yes - treatment reverses the acute crisis

IS IT AN EMERGENCY?
Yes - suspected DKA needs immediate hospital treatment

LONG-TERM OUTLOOK
Recovery common after prompt treatment; recurrence possible

Overview

Diabetic ketoacidosis, usually called DKA, is a serious short-term complication of diabetes. It happens when the body does not have enough insulin.

Insulin helps glucose, a type of sugar, move from the blood into cells for energy. Without enough insulin, the body begins breaking down fat very quickly. This produces chemicals called ketones. Ketones are acidic, and large amounts can make the blood dangerously acidic.

DKA also causes dehydration and changes in important minerals called electrolytes. These include potassium and sodium, which help the heart, muscles, and nerves work properly.

DKA is most common in people with type 1 diabetes, but it can also affect people with type 2 diabetes. It may be the first sign that someone has diabetes.

DKA is a medical emergency. It cannot be safely managed with routine diabetes care alone.

Hospital treatment replaces fluids and insulin, corrects electrolyte problems, and addresses the trigger.

Symptoms

Symptoms can develop over several hours, although the timing is not the same for everyone. Early symptoms often come from rising blood glucose and dehydration.

Possible symptoms include:

Children may become tired, irritable, dehydrated, or unusually sleepy. Bed-wetting in a previously dry child can be an early sign of diabetes, although it does not by itself mean that DKA is present.

Blood glucose is usually high during DKA, but not always. Some medicines and situations can cause euglycemic DKA , meaning DKA with glucose that is only mildly raised or within the expected range. Vomiting, deep breathing, and feeling severely unwell should not be dismissed because a glucose reading is lower than expected.

- Feeling very thirsty and urinating often
- Dry mouth, weakness, or unusual tiredness
- Nausea, vomiting, or stomach pain
- Fast, deep, or laboured breathing
- Breath that smells fruity or similar to nail-polish remover
- Headache, difficulty concentrating, confusion, or drowsiness
- Weight loss, especially when diabetes has not yet been diagnosed

Causes and risk factors

DKA develops when there is not enough effective insulin for the body's needs. This may happen because insulin was missed, interrupted, or not yet started. It can also happen when illness causes the body to need more insulin than usual.

Common triggers include:

Sodium-glucose cotransporter-2 inhibitors, usually called SGLT2 inhibitors, are medicines used for type 2 diabetes, heart failure, or kidney disease. They can rarely be associated with DKA, sometimes without very high blood glucose. Risk may rise during fasting, dehydration, surgery, severe illness, or a large reduction in insulin.

Emotional distress, fear of weight gain, eating disorders, treatment costs, and problems using diabetes equipment can also contribute to missed insulin. These situations deserve practical and supportive care, not blame.

- A new, previously unrecognised diagnosis of diabetes
- Missed insulin or difficulty obtaining or taking it
- A blocked, leaking, disconnected, or failed insulin pump or infusion set
- Infections, including chest, urinary, skin, or stomach infections
- Major physical stress, such as surgery, injury, pancreatitis, heart attack, or stroke
- Pregnancy, which can change insulin needs
- Some medicines, including corticosteroids and certain diabetes medicines

Diagnosis

DKA is diagnosed with blood tests and an assessment of your symptoms and medical history.

The main findings are:

Blood tests also measure electrolytes and kidney function. These results help the hospital team understand the severity of dehydration and decide how closely potassium and other minerals need to be monitored.

A blood ketone test is generally more useful during suspected DKA than a urine ketone test. Urine results can lag behind changes in the blood, so they may remain positive even while treatment is working.

Other tests may be used to find the trigger. These can include infection testing, an electrocardiogram to check the heart, or imaging when symptoms suggest another medical problem.

DKA can overlap with hyperosmolar hyperglycemic state, or HHS. HHS is another emergency involving severe dehydration and very high blood glucose. Hospital testing helps distinguish the conditions and identify when features of both are present.

- Raised ketones, especially the ketone called beta-hydroxybutyrate
- Increased acidity in the blood
- Diabetes or a raised blood glucose level

Treatment and management

DKA is treated in a hospital. Care usually includes regular checks of blood glucose, ketones, acidity, electrolytes, urine output, and vital signs.

The main treatments are:

Treatment is adjusted using repeated blood tests. Blood glucose may improve before the ketoacidosis has resolved, so treatment continues until the ketone and acidity measurements show that the crisis has ended.

After DKA has resolved, the hospital team helps with the change back to under-the-skin insulin or the usual diabetes treatment plan. Before discharge, there may also be a review of sick-day care, ketone testing, insulin access, injection technique, or pump equipment.

- Fluids: Intravenous fluids replace water and salts lost through frequent urination and vomiting.
- Insulin: Insulin stops excess ketone production and helps glucose move into cells.
- Electrolytes: Potassium and other minerals are monitored and replaced when needed.
- Glucose: Glucose may be added to intravenous fluids as blood glucose falls. This allows insulin to continue until the ketones and blood acidity have improved.
- Treatment of the trigger: This may include treatment for an infection, replacement of failed pump equipment, or care for another illness.

Complications

Without treatment, DKA can lead to severe dehydration, loss of consciousness, and failure of vital organs. Prompt treatment greatly reduces these risks.

Possible complications of DKA or its treatment include:

Cerebral edema is uncommon but is a recognised concern, especially in children and young people. Hospital teams watch for headache, worsening confusion, changes in behaviour, reduced alertness, or other neurological symptoms.

Monitoring is important because fluids, insulin, glucose, and electrolytes must be balanced as the body recovers.

- Low potassium, which can affect muscles and heart rhythm
- Acute kidney injury caused by dehydration and poor blood flow
- Low blood glucose during insulin treatment

- Fluid buildup in the lungs
- Blood clots related to severe dehydration
- Cerebral edema, meaning swelling of the brain

Prevention

Not every episode of DKA can be prevented. It may develop before diabetes has been diagnosed or during an unexpected serious illness. However, many episodes can be avoided or identified earlier.

If you use insulin, do not stop it during illness unless a clinician who knows your situation gives you specific instructions. Even when you are eating less, the body usually still needs insulin. Follow your personal sick-day plan for glucose checks, ketone testing, fluids, food, and insulin.

Useful preventive steps include:

If you take an SGLT2 inhibitor, ask for clear instructions about illness, fasting, and planned procedures. Do not make an unplanned long-term change to prescribed medicine, but seek urgent advice if symptoms suggest DKA even when glucose is not very high.

Family members, school staff, or caregivers may also need to know where ketone supplies are kept and what the action plan says.

- Keeping insulin and diabetes supplies available
- Checking glucose more often during illness
- Testing ketones when advised by your diabetes plan
- Acting promptly on pump alarms or unexplained high glucose
- Knowing how to give backup insulin if a pump fails
- Getting help early if vomiting prevents fluids or treatment
- Reviewing repeated DKA episodes without blame

Living with it and what to expect

DKA is an acute crisis rather than a permanent state. With hospital treatment, ketone production and blood acidity can often be corrected over hours to days. Recovery time is influenced by the severity of DKA and the illness that triggered it.

You may feel tired, weak, thirsty, or less hungry for a while after leaving hospital. A follow-up

appointment can check your glucose pattern, insulin plan, equipment, and recovery from the underlying trigger.

Having DKA once does not mean it will definitely happen again. Recurrence is more likely if the underlying problem remains, such as unreliable access to insulin, repeated pump failures, difficulty following a treatment plan, or an untreated eating disorder.

For some people, DKA leads to a new diagnosis of type 1 or type 2 diabetes. The long-term outlook then mainly reflects the type of diabetes and how it is managed. Diabetes education, reliable access to supplies, and emotional support can help you return to school, work, exercise, and other usual activities.

Repeated DKA admissions are a reason for additional support. This may include diabetes education, mental health care, help with medicine costs, or a review of whether the current devices and treatment routine suit your daily life.

When to get medical help

Seek emergency medical help now if you or someone with diabetes has signs of possible DKA, particularly:

Do not drive yourself if you are confused, very drowsy, or severely unwell. Call emergency services.

Follow your sick-day plan and seek urgent diabetes advice if glucose remains high despite correction treatment, ketones are rising, a pump problem cannot be fixed, or you are unsure how to continue insulin safely.

Routine follow-up is appropriate after recovery to review what triggered the episode and reduce the chance of another one. Contact your usual diabetes service sooner if you are having repeated ketones, frequent pump failures, trouble obtaining insulin, or difficulty taking treatment as planned.

- Fast, deep, or difficult breathing
- Repeated vomiting or inability to keep fluids down
- Confusion, unusual drowsiness, collapse, or difficulty waking
- Fruity-smelling breath with worsening illness
- High ketones or ketones in the emergency range on the testing device
- Symptoms of DKA while taking an SGLT2 inhibitor, even without high glucose

Common questions

Can people with type 2 diabetes get DKA?

Yes. DKA is more closely associated with type 1 diabetes, but people with type 2 diabetes can develop it during severe illness, major insulin shortage, pregnancy, or treatment with an SGLT2 inhibitor.

Is DKA the same as having high blood sugar?

No. High blood glucose can occur without DKA. DKA specifically involves raised ketones and excess acidity in the blood. These require blood testing to confirm.

Can DKA happen with normal blood sugar?

Yes. Euglycemic DKA can occur when glucose is not markedly raised. It is associated with situations such as pregnancy, reduced food intake, and SGLT2 inhibitor use. Symptoms and ketone results remain important.

How quickly can DKA develop?

It can develop within hours, particularly if insulin delivery stops completely, as may happen with a pump failure. In other situations, symptoms build more gradually. Early ketone testing and sick-day action can identify a problem before severe symptoms appear.

Can I treat DKA at home?

Confirmed or suspected DKA needs urgent hospital assessment and treatment. A personal sick-day plan may help manage mild ketones before DKA develops, but vomiting, deep breathing, confusion, worsening ketones, or inability to take fluids requires emergency care.

How long does recovery take?

The metabolic crisis may resolve over hours to days with treatment, but tiredness can continue afterward. Recovery also depends on the trigger, such as an infection or a new diabetes diagnosis.

Sources

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