CONDITION

Acute kidney failure

Learn how acute kidney failure, also called acute kidney injury, affects kidney function, what can cause it, how it is treated, and when to seek urgent care.

WHAT IT IS
Sudden decline in kidney function

BODY SYSTEM
Kidneys and urinary system

MAIN SYMPTOMS
Much less urine, swelling, shortness of breath, nausea

WHAT CAUSES IT
Reduced blood flow, kidney injury, urinary blockage

HOW IT IS DIAGNOSED
Blood creatinine tests and urine output monitoring

MAIN TREATMENT
Treating the cause and correcting complications

CAN IT BE CURED?
Sometimes - kidney function may fully recover

IS IT AN EMERGENCY?
Sometimes - severe breathlessness or marked confusion

LONG-TERM OUTLOOK
Variable recovery with increased chronic kidney disease risk

Overview

Acute kidney failure is a sudden decline in how well the kidneys work. Health professionals now usually call it acute kidney injury , or AKI . The term "injury" is used because kidney function may decline without the kidneys stopping completely.

The kidneys remove waste and extra water from the blood. They also help control blood pressure and the levels of minerals such as potassium and sodium. When kidney function declines quickly, waste, fluid, and minerals can build up.

AKI may develop within hours or over several days. It can occur during a serious illness, after major surgery, because of dehydration or bleeding, after exposure to certain medicines, or when urine flow is blocked. Some people have mild AKI that is found only through blood tests. Others become seriously ill and need hospital care.

Many people recover some or all of their kidney function when the cause is treated promptly. However, AKI can increase the risk of future kidney problems, including chronic kidney disease. It can also affect the heart, lungs, and other organs. For these reasons, a suspected sudden change in kidney function needs timely medical assessment.

Symptoms

AKI does not always cause noticeable symptoms. A person may continue producing a normal amount of urine even while kidney function is getting worse.

Possible symptoms include:

These symptoms can have many causes and do not confirm AKI. A blood test is usually needed to evaluate kidney function.

Contact a healthcare professional promptly if you are passing much less urine than usual, especially during vomiting, diarrhea, fever, infection, or another illness. The same applies if swelling or unexplained weakness develops after starting a medicine or following a medical procedure.

Seek emergency care for severe shortness of breath, chest pain, fainting, a seizure, marked confusion, or an inability to wake normally. Passing almost no urine along with severe illness, breathing difficulty, or rapidly worsening swelling also needs emergency assessment.

- Producing much less urine than usual
- Swelling in the legs, ankles, feet, hands, or face
- Shortness of breath, especially if fluid builds up in the lungs
- Nausea, vomiting, or loss of appetite
- Unusual tiredness, weakness, or difficulty concentrating
- Confusion or drowsiness
- Chest pressure or an irregular heartbeat
- Dark urine, blood in the urine, or foamy urine, depending on the cause

Causes and risk factors

Doctors often group the causes of AKI according to where the problem begins.

One common cause is reduced blood flow to the kidneys. This can happen with severe

dehydration, major blood loss, very low blood pressure, a serious infection such as sepsis, heart failure, or advanced liver disease. If reduced blood flow continues, kidney tissue may become damaged.

AKI can also result from direct injury or inflammation within the kidneys. Possible causes include severe infections, inflammation of the kidneys' filtering units, inflammation caused by a reaction to a medicine, and damage related to major surgery or critical illness. A severe muscle injury can release a protein called myoglobin, which may damage the kidneys. This condition is known as rhabdomyolysis.

A blockage in urine flow can create pressure that harms the kidneys. Causes may include kidney stones, an enlarged prostate, blood clots, scar tissue, or a tumor affecting the urinary tract. A blockage affecting both kidneys, or the only working kidney, is especially important to identify quickly.

Medicines may contribute to AKI in certain situations. Examples include nonsteroidal anti-inflammatory drugs like ibuprofen or naproxen , or NSAIDs, such as ibuprofen and naproxen; some antibiotics like amoxicillin or doxycycline ; and some medicines used for blood pressure or fluid control. A medicine that is usually appropriate may become a concern during severe dehydration or another acute illness. Do not stop a prescribed medicine without professional advice unless you have been given a specific plan for doing so.

Iodinated contrast, which is sometimes used for CT scans and other imaging, may be associated with AKI in susceptible people. The risk depends on factors such as current kidney function, illness severity, hydration, and the type of procedure. Clinicians weigh these issues against the benefit of obtaining needed imaging.

Factors that can increase the chance of AKI include:

Having a risk factor does not mean that AKI will occur.

- Existing chronic kidney disease
- Older age or frailty
- Diabetes, heart failure, or liver disease
- Severe infection, major burns, or significant blood loss
- Major surgery or treatment in an intensive care unit
- Urinary tract obstruction
- Use of several medicines that affect kidney blood flow or fluid balance

Diagnosis

Diagnosis begins with a review of symptoms, recent illnesses, fluid losses, medical procedures, and medicines. The clinician may check blood pressure, hydration, swelling, breathing, and signs of infection or urinary blockage.

A blood test measures creatinine , a waste product normally removed by the kidneys. A rising creatinine level can show that kidney filtration has declined. Comparing the result with an earlier level is useful because a normal value differs from person to person.

Standard clinical criteria define AKI by a specific rise in creatinine over a short period or by persistently low urine output. Creatinine may not rise immediately after kidney function changes, so repeat testing may be needed. An estimated glomerular filtration rate, or eGFR, is less reliable when kidney function is changing rapidly.

Other blood tests may measure potassium, sodium, bicarbonate, and urea. These tests help identify complications such as high potassium or excess acid in the blood.

A urine sample can be checked for blood, protein, infection, or other findings that point toward a cause. Clinicians may measure urine output over several hours. An ultrasound can look for blocked urine flow and assess the kidneys and bladder. Other imaging may be used when stones or another specific problem are suspected.

In less common cases, a kidney specialist may recommend a biopsy. This involves removing a small kidney tissue sample for examination and is generally reserved for situations in which the cause remains unclear or a particular inflammatory disease is suspected.

Doctors also consider whether the decline is new, long-standing, or a combination of AKI and chronic kidney disease.

Treatment and management

Treatment depends on the cause, severity, and complications. Many people with significant AKI need hospital monitoring, although some mild cases can be managed with close outpatient follow-up.

If dehydration or blood loss has reduced kidney blood flow, carefully managed fluids may help. Fluids are not appropriate for everyone. A person with heart failure or fluid already building up in the lungs may need a different approach.

Clinicians review all prescription medicines, over-the-counter products, and supplements. They may temporarily hold, change, or adjust medicines based on kidney function and the person's condition. Medicines are not always permanently discontinued. Some important

treatments may need to be restarted after recovery.

Treatment may also include:

Diuretics like furosemide or hydrochlorothiazide , sometimes called water pills, may help remove excess fluid in selected patients. They do not directly repair kidney tissue or reliably shorten AKI.

Nutrition advice depends on laboratory results and overall health. Some people may need temporary changes in salt, potassium, fluid, or protein intake. Restricting these without guidance can lead to poor nutrition, so individualized advice from the care team or a renal dietitian is preferable.

Dialysis may be needed when the kidneys cannot safely control fluid, potassium, acid levels, or waste products. Dialysis filters the blood through a machine. It may also be considered when complications do not respond to other treatment or when certain toxins must be removed. Dialysis for AKI is often temporary, but recovery cannot be predicted with certainty at the beginning.

While recovering, avoid starting NSAIDs, herbal remedies, or supplements without discussing them with a clinician or pharmacist. "Natural" products can still affect kidney function or interact with medicines.

- Managing an infection or another underlying illness
- Relieving a urinary blockage with a catheter or procedure
- Treating severe inflammation or an immune system disorder under specialist care
- Correcting dangerous potassium, acid, or fluid levels
- Monitoring weight, urine output, blood pressure, and repeat blood tests

Complications

AKI can disrupt several body systems. High potassium may interfere with the heart's rhythm. Excess fluid can cause swelling, raise blood pressure, or collect in the lungs. Acid and waste products may build up, leading to nausea, drowsiness, confusion, or other symptoms.

Severe AKI can affect the heart, brain, and immune system. Critically ill people may need intensive monitoring and support for more than one organ.

Kidney function may return to its previous level, recover only partly, or remain reduced. People who have had AKI have a higher risk of another episode and of developing or worsening chronic kidney disease. A smaller number continue to need dialysis after the acute illness.

The outcome depends on the cause, the severity of the injury, previous kidney health, and the person's overall medical condition.

Follow up

Recovery may occur over days, weeks, or longer. Feeling better does not always mean kidney function has returned to its previous level, so repeat blood and urine tests are important.

After hospital discharge or outpatient treatment, follow-up may include checks of creatinine, electrolytes, blood pressure, urine protein, body weight, and swelling. The timing depends on how severe the AKI was and whether kidney function was improving at discharge. Earlier testing is often needed after a significant episode.

Kidney Disease: Improving Global Outcomes guidance advises assessing patients about three months after AKI for recovery, new chronic kidney disease, or worsening of existing kidney disease. This does not replace earlier follow-up when it is clinically needed.

Ask the care team which medicines should be restarted, avoided, or monitored. Some medicines that were paused during AKI remain useful for long-term heart, blood pressure, or kidney care once it is safe to resume them.

Routine follow-up should also include a plan for future illnesses. Ask what to do if vomiting, diarrhea, fever, or poor fluid intake develops. Seek prompt advice for a clear drop in urine output, increasing swelling, persistent vomiting, or worsening weakness. Severe breathing difficulty, chest pain, fainting, seizure, or marked confusion requires emergency care.

Sources

- Kidney Disease: Improving Global Outcomes Acute Kidney Injury Work Group. KDIGO Clinical Practice Guideline for Acute Kidney Injury . Kidney International Supplements . 2012;2(1):1-138.
- National Institute for Health and Care Excellence. Acute kidney injury: prevention, detection and management . NICE Guideline NG148. Published December 2019.
- Kellum JA, Romagnani P, Ashuntantang G, Ronco C, Zarbock A, Anders HJ. Acute kidney injury . Nature Reviews Disease Primers . 2021;7:52.
- National Kidney Foundation. Acute Kidney Injury . Patient education resource.
- National Health Service. Acute kidney injury . NHS conditions guidance.