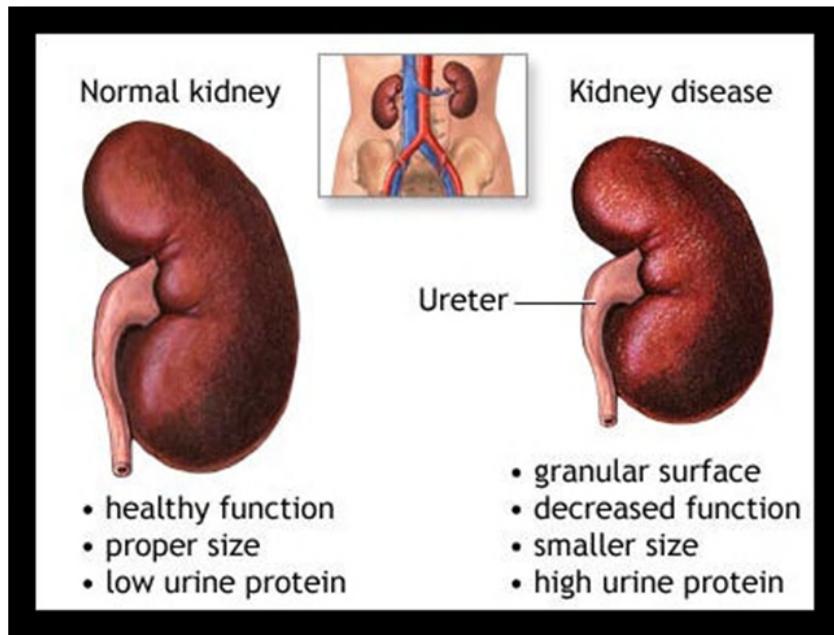


Acute Kidney Failure



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Acute (sudden) kidney failure is the sudden loss of the ability of the kidneys to remove waste and concentrate urine without losing electrolytes.

Alternative Names

Kidney failure; Renal failure; Renal failure - acute; ARF; Kidney injury - acute

Acute Kidney Failure Causes

Causes of acute kidney failure (also called acute kidney injury [AKI]) fall into one of the following categories:

- **Prerenal:** Problems affecting the flow of blood before it reaches the kidneys
- **Postrenal:** Problems affecting the movement of urine out of the kidneys
- **Renal:** Problems with the kidney itself that prevent proper filtration of blood or production of urine

Prerenal failure

Prerenal failure is the most common type of acute renal failure (60% to 70% of all cases). The kidneys do not receive enough blood to filter. Prerenal failure can be caused by the following conditions:

- **Dehydration:** From vomiting, diarrhea, water pills, or blood loss

- **Disruption of blood flow to the kidneys from a variety of causes:**
 - Drastic drop in blood pressure after surgery with blood loss, severe injury or burns, or infection in the bloodstream (sepsis) causing blood vessels to inappropriately relax
 - Blockage or narrowing of a blood vessel carrying blood to the kidneys
 - Heart failure or heart attacks causing low blood flow
 - Liver failure causing changes in hormones that affect blood flow and pressure to the kidney

There is no actual damage to the kidneys early in the process with prerenal failure. With appropriate treatment, the dysfunction usually can be reversed. Prolonged decrease in the blood flow to the kidneys, for whatever reason, can however cause permanent damage to the kidney tissues.

Postrenal failure

Postrenal failure is sometimes referred to as obstructive renal failure, since it is often caused by something blocking elimination of urine produced by the kidneys. It is the rarest cause of acute kidney failure (5% to 10% of all cases). This problem can be reversed, unless the obstruction is present long enough to cause damage to kidney tissue.

Obstruction of one or both ureters can be caused by the following:

- Kidney stone, usually only on one side
- Cancer of the urinary tract organs, kidney cancer or tumor, or structures near the urinary tract that may obstruct the outflow of urine
- Medications

Obstruction at the bladder level can be caused by the following:

- Bladder stone
- Enlarged prostate (the most common cause in men)
- Blood clot
- Bladder cancer
- Neurologic disorders of the bladder impairing its ability to contract

Treatment consists of relieving the obstruction. Once the blockage is removed, the kidneys usually recover in 1 to 2 weeks if there is no kidney infection or other problem.

Renal damage

Primary renal damage is the most complicated cause of renal failure (accounts for 25% to 40% of cases). Renal causes of acute kidney failure include those affecting the filtering function of the kidney, those affecting the blood supply within the kidney, and those affecting the kidney tissue that handles salt and water processing.

Examples of kidney problems that can cause kidney failure include:



- Blood vessel diseases
- Blood clot in a vessel in the kidneys
- Injury to kidney tissue and cells
- Glomerulonephritis
- Acute interstitial nephritis
- Acute tubular necrosis
- Polycystic kidney disease (PKD)

Glomerulonephritis: The glomeruli, the initial filtration system in the kidney, can be damaged by a variety of diseases, including infections. The resulting inflammation impairs kidney function.

- A common example is a complication of strep throat. Streptococcal bacterial infections may damage the glomeruli.
- Glomerular disorder symptoms may include dark-colored urine (like cola or tea) and back pain.
- Other symptoms include producing less urine than usual, blood in the urine, high blood pressure, and body swelling (retaining water).
- Treatment usually consists of medications and, if kidney function fails significantly, dialysis may be needed to remove life-threatening waste products that cannot be excreted.

Acute interstitial nephritis: This is a sudden decline in renal function caused by inflammation of interstitial kidney tissue that primarily handles salt and water balance rather than the filtering of wastes.

- Medications such as antibiotics, anti-inflammatory medicines (for example, aspirin, ibuprofen), and water pills (diuretics) are the most common causes.
- Other causes include infections and immune-related diseases such as lupus, leukemia, lymphoma, and sarcoidosis.
- It is usually reversible if the kidney damage is not severe.
- Treatment consists of withdrawal of offending drugs, treatment of infection, and dialysis in cases of very poor kidney function.

Acute tubular necrosis: The kidney tubules are damaged and do not function normally. Tubular necrosis is usually the end result from the other causes of acute renal failure. The tubules are delicate structures that handle much of the kidney's filtration function. When there is necrosis, the cells that form the tubules become dysfunctional and "die."

- This condition accounts for 90% of cases of primary acute kidney failure.
- Causes include shock (decreased blood supply to the kidneys), drugs (especially antibiotics) and chemotherapy agents, toxins and poisons, and dyes used in certain kinds of X-rays.
- Some people produce much less urine than usual. Other symptoms of acute tubular necrosis include tiredness, swelling, lethargy, nausea, vomiting, abdominal pain, kidney pain, loss of appetite, and rash. Sometimes there are no symptoms.

- Treatment depends on the cause of the damage and may consist of discontinuing problem medications, replenishing body fluids, and improving blood flow to the kidney. A diuretic may be given to increase urine production if the total body water level is too high. Medications may be given to correct blood chemistry imbalances.
- If there is no recovery of the patient's kidneys and these treatments do not sufficiently substitute for the lost kidney function, the patient will need regular dialysis or may be a candidate for kidney transplantation.

Polycystic kidney disease (PKD): This is a genetic disorder characterized by the growth of numerous cysts in the kidneys. PKD can enlarge the kidneys and replace much of the normal structure, resulting in reduced kidney function and leading to kidney failure.

- When PKD causes kidneys to fail, which usually happens after many years, the patient requires dialysis or kidney transplantation.
- About one-half of people with the most common type of PKD progress to kidney failure, also called end-stage renal disease (ESRD).

Acute Kidney Failure Symptoms

The following symptoms may occur with acute kidney failure. Some people have no symptoms, at least in the early stages. The symptoms may be very subtle.

- Decreased urine production
- Body swelling
- Problems concentrating
- Confusion
- Fatigue
- Lethargy
- Nausea, vomiting
- Diarrhea
- Abdominal pain
- Metallic taste in the mouth

Seizures and coma may occur in very severe acute kidney failure.

When to Seek Medical Care

Several signs and symptoms may suggest complications of acute kidney failure. Call the doctor if any of the following symptoms occur:

- Change in energy level or strength or a severe decrease in the ability to do normal activities
- Elevated blood pressure

- Increased water retention (puffiness or swelling) in the legs, around the eyes, or in other parts of the body
- Shortness of breath or change from normal breathing patterns
- Nausea or vomiting
- Decrease in or lack of urination
- Lightheadedness
- Easy bruising
- Itching

See the doctor to monitor and treat chronic conditions such as diabetes, high blood pressure, and high cholesterol.

The following signs and symptoms of a severe complication of acute kidney disease require a visit to a hospital's emergency department:

- Change in level of consciousness (extreme sleepiness or difficulty awakening)
- Fainting
- Chest pain
- Difficulty breathing
- Extremely high blood pressure (hypertension), greater than 180/100
- Severe nausea and vomiting
- Severe bleeding (from any source)
- Severe weakness
- Inability to urinate

Acute Kidney Failure Diagnosis

Many people with acute renal failure notice no symptoms. Even with symptoms, they are nonspecific, meaning they could be caused by many different conditions. A physical examination typically reveals few, if any, abnormal findings.

Kidney failure is often detected from blood or urine tests. These tests might be ordered because the patient is in the hospital for another reason, because they don't feel well and can't tell why, or as part of a routine health screening.

- Levels of urea (blood urea nitrogen [BUN]) and creatinine are high in kidney failure. This is called azotemia.
- Electrolyte levels in the blood may be abnormally high or low because of improper filtering.
- When the duration and severity of kidney failure is severe, the red blood cell count may be low. This is called anemia.

The amount of urine produced over a period of hours may also be measured for quantity and quality or the amount of wastes being excreted. When kidney tissue is injured, protein and desirable substances may be inappropriately excreted in the urine. In some cases, the amount

of urine remaining in the bladder after urination will be measured by inserting a catheter (a thin, rubber tube) that drains the bladder.

- Urine retained in the bladder after urinating suggests postrenal failure, usually due to prostate enlargement in men.
- The urine may be dark, indicating that creatinine and other substances are concentrated.
- The urine will be examined under a microscope to detect signs of specific kidney problems. Some of these signs include blood, pus, and solid materials called casts.
- Electrolyte levels in the urine may help pinpoint the exact cause of the kidney failure.

If the diagnosis is not certain after laboratory tests, an ultrasound of the kidneys and bladder may be done to help reveal signs of specific causes of kidney failure.

In some cases, tissue samples of the kidneys are taken (biopsy) to find the cause of the renal failure.

Acute Kidney Failure Treatment

Treatment of acute renal failure depends partly on the cause and extent of the failure. The patient should be referred to a kidney specialist (nephrologist) for care. The first goal is to pinpoint the exact cause of the kidney failure, as that will partly dictate the treatment. Secondly, the degree to which accumulating wastes and water are affecting the body will impact treatment decisions about medications and the need for dialysis.

Acute Kidney Failure Self-Care at Home

Self-treatment of acute kidney failure is not recommended. Kidney failure can be a very serious condition that requires medical care.

- It may be possible to receive some or all treatment at home. Treatment in some cases can be administered by a home health nurse under the supervision of a physician.
- In cases in which recovery of kidney function is incomplete, dialysis, a process by which the blood is cleared of wastes and excess water, is used. Dialysis, when needed for acute renal failure, is performed at a hospital or dialysis center. Home dialysis may be appropriate in cases in which kidney failure is permanent and dialysis is needed indefinitely.
- Patients with kidney diseases will usually be required to follow a renal diet (kidney diet), that is often low in protein and potassium.

Acute Kidney Failure Medical Treatment

Treatment is focused on removing the cause of the kidney failure.



Medications and other products the patient ingests will be reviewed. Any that might harm the kidneys will be eliminated or the dose reduced.

Other treatments will be offered, with the following goals:

- Correct dehydration: Intravenous fluids, with electrolyte replacement if needed
- Fluid restriction: For those types of kidney failure in which excess fluid is not appropriately eliminated by the kidneys
- Increase blood flow to the kidney: Usually related to improving heart function or increasing blood pressure
- Correct chemical (electrolyte) abnormalities: Keeps other body systems working properly

If the patient's kidneys do not respond to treatment, and adequate kidney function does not return, they will need to undergo dialysis. Dialysis is done by accessing the blood vessels through the skin (hemodialysis) or by accessing the abdominal cavity through the lining that encases the abdominal organs (peritoneal dialysis).

- With hemodialysis, the patient is connected to a machine by a tube running from a conduit created surgically between a large artery and vein. Blood is circulated through the dialysis machine (artificial kidney), which removes toxins and wastes. The blood is then returned to the patient's body.
- Most people require hemodialysis three times per week.

With peritoneal dialysis, wastes and excess water from the bloodstream cross into the abdominal cavity (peritoneal space) and are eliminated from the body by coursing through a catheter that is surgically implanted (through the skin) into the peritoneal cavity.

Most people with acute kidney failure improve when the cause of the kidney failure is removed or treated and don't require dialysis. Normal kidney function is usually restored, though in some cases, residual damage only allows partial restoration of the kidney function. Such patients may not require dialysis but may need medicines to supplement lost kidney function.

Acute Kidney Failure Medications

The patient may be given medicines to treat the cause of the acute renal failure or to prevent complications.

- Antibiotics: To prevent or treat infections
- Diuretics (water pills): Quickly increase urine output
 - Examples include: Lasix (furosemide), Bumex (bumetanide)
 - Other medications: To get rid of extra fluid and prevent electrolyte imbalances
 - Kayexalate (polystyrene sulfonate) is used to decrease buildup of potassium
 - Sodium bicarbonate is used to decrease acid buildup

Acute Kidney Failure Prevention

Yearly physical exams by the doctor include blood tests and urinalysis to monitor kidney and urinary tract health.

Drink enough fluids to keep the kidneys functioning properly.

Avoid taking substances or medications that can poison or damage kidney tissues. Ask the doctor about substances to avoid.

Persons at risk for chronic kidney disease may need more frequent testing for kidney function and other problems that occur with declining kidney function. Difficulties urinating or blood in the urine should prompt a visit to the physician as soon as possible.

Acute Kidney Failure Prognosis

Recovery from acute kidney failure depends on what caused the disease. If the cause does not stem from damage to kidney tissue itself, the prognosis is good and the patient will probably make a full recovery. Partial recovery of renal function may occur in situations in which the injury does not completely resolve. In general, the more ill a patient is during the onset of renal failure, the worse the outcome. Severe cases of acute renal failure can result in death.

On long-term follow-up (1 to 10 years), approximately 12.5% of survivors of acute renal failure require dialysis and 19% to 31% of them have chronic kidney disease.

The in-hospital mortality (death) rate for acute kidney failure is 40% to 50%.

The mortality rate in patients in intensive care (ICU) settings with acute kidney failure that requires dialysis is 70% to 80%.

Reference:

<http://www.emedicinehealth.com>

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