



Supplementary Figure 1



Acute Kidney Injury Clinic

What is acute kidney injury (AKI)?

Acute kidney injury (AKI) is a sudden episode of kidney failure or kidney damage that happens within a few hours or a few days. AKI causes a build-up of waste products in your blood and makes it hard for your kidneys to keep the right balance of fluid in your body. AKI can also affect other organs such as the brain, heart, and lungs. Acute kidney injury is common in patients who are in the hospital, in intensive care units, and especially in older adults.

What are the signs and symptoms of acute kidney injury?

Signs and symptoms of acute kidney injury differ depending on the cause and may include:

- Too little urine leaving the body
- Swelling in legs, ankles, and around the eyes
- Fatigue or tiredness
- Shortness of breath
- Confusion
- Nausea
- Seizures or coma in severe cases
- Chest pain or pressure

In some cases, AKI causes no symptoms and is only found through other tests done by your healthcare provider.

What causes acute kidney injury?

Acute kidney injury can have many different causes. AKI can be caused by the following:

Decreased blood flow

Some diseases and conditions can slow blood flow to your kidneys and cause AKI. These diseases and conditions include:

- Low blood pressure (called "hypotension") or shock
- Blood or fluid loss (such as bleeding, severe diarrhea)
- Heart attack, heart failure, and other conditions leading to decreased heart function
- Organ failure (e.g., heart, liver)
- Overuse of pain medicines called "NSAIDs", which are used to reduce swelling or relieve pain from headaches, colds, flu, and other ailments. Examples include ibuprofen, ketoprofen, and naproxen.
- Severe allergic reactions
- Burns
- Injury
- Major surgery

Direct Damage to the Kidneys

Some disease and conditions can damage your kidneys and lead to AKI. Some examples include:

- A type of severe, life-threatening infection called "sepsis"
- A type of cancer called "multiple myeloma"
- A rare condition that causes inflammation and scarring to your blood vessels, making them stiff, weak, and narrow (called "vasculitis")
- An allergic reaction to certain types of drugs (called "interstitial nephritis")
- A group of diseases (called "scleroderma") that affect the connective tissue that supports your internal organs



Acute Kidney Injury Clinic

• Conditions that cause inflammation or damage to the kidney tubules, to the small blood vessels in the kidneys, or to the filtering units in the kidneys (such as “tubular necrosis,” “glomerulonephritis,” “vasculitis” or “thrombotic microangiopathy”).

Blockage of the urinary tract

In some people, conditions or diseases can block the passage of urine out of the body and can lead to AKI. Blockage can be caused by:

- Bladder, prostate, or cervical cancer
- Enlarged prostate
- Problems with the nervous system that affect the bladder and urination
- Kidney stones
- Blood clots in the urinary tract

What tests are done to find out if I have acute kidney injury?

Depending on the cause of your acute kidney injury, your healthcare provider will run different tests if he or she suspects that you may have AKI. It is important that AKI is found as soon as possible because it can lead to chronic kidney disease, or even kidney failure requiring dialysis. It may also lead to heart disease or death.

The following tests may be done:

- Measuring urine output: Your healthcare provider will track how much urine you pass each day to help find the severity and cause of your AKI
- Urine tests: Your healthcare provider will look at your urine (urinalysis) to find signs of kidney failure such as protein in the urine
- Blood tests: Blood tests will help find levels of creatinine, urea nitrogen phosphorus and potassium in order to look at kidney function
- GFR: Your blood test will also help determine your GFR (glomerular filtration rate) to estimate the decrease in kidney function
- Imaging tests: Imaging tests, such as ultrasound, may help your doctor see your kidneys and look for anything abnormal
- Kidney biopsy: In some situations, your healthcare provider will do a procedure where a tiny piece of your kidney is removed with a special needle, and looked at under a microscope

What is the treatment for acute kidney injury?

Treatment for AKI usually requires you to stay in a hospital. Most people with AKI are already in the hospital for another reason. How long you will stay in the hospital depends on the cause of your AKI and how quickly your kidneys recover. In more serious cases, dialysis may be needed to help replace kidney function until your kidneys recover. The main goal of your healthcare provider is to treat what is causing your acute kidney injury. Your healthcare provider will work to treat all of your symptoms and complications until your kidneys recover.

After having AKI, your chances are higher for other health problems (such as kidney disease, stroke, heart disease) or having AKI again in the future. The chances for developing kidney disease and kidney failure increase every time AKI occurs. To protect yourself, you should follow up with your healthcare provider to keep track of your kidney function and recovery. The best ways to lower your chances of having kidney damage and to save kidney function are to prevent acute kidney injury or to find and treat it as early as possible.

Dr. Javier A. Neyra has contributed to this text for the National Kidney Foundation A to Z Health Guide on Acute Kidney Injury. Please visit the web page <https://www.kidney.org/atoz/content/AcuteKidneyInjury> for more information.

Supplementary Figure 2