

CKD • Chronic Kidney Disease

A plain-English guide for you and your family

WHAT IS HAPPENING

Your kidneys are two bean-shaped organs that sit in your back, just below your ribs. They clean your blood every minute of every day. They pull out waste and extra water and send it out as urine. They also save things your body needs, like salt and sugar, and send them back into your blood. Your kidneys do even more: they make a hormone called erythropoietin (which tells your bones to make red blood cells) and they turn vitamin D into its active form (which helps your bones stay strong). They keep your blood balanced — not too acidic, not too watery, and not loaded with toxins. Chronic kidney disease means your kidneys are damaged and losing their power to do these jobs. The damage builds up slowly, often without any symptoms at first. The most common causes are diabetes (high blood sugar damages the tiny filters in the kidneys) and high blood pressure (high pressure inside the kidney blood vessels scars the tissue). Other causes include repeated infections, kidney stones that block urine flow, inherited cyst diseases, and autoimmune diseases that attack the filters. Once enough kidney tissue is lost, the remaining nephrons (the tiny working units inside each kidney) get overworked and start to fail faster. As your kidney function drops, waste builds up in your blood, red blood cell production falls, bones weaken, and fluid and salt pile up in your body. The goal of treatment is to slow the damage, manage the problems that come from weak kidneys, and get ready for dialysis (a machine that cleans your blood) or a kidney transplant if the kidneys fail completely.

What you might feel

- Creatinine level in the blood rises slowly over months or years
- Estimated glomerular filtration rate (eGFR) drops slowly over time
- Urine shows rising amounts of albumin (protein) compared to creatinine
- The person becomes anemic (low red blood cell count)
- Blood pressure goes up and is hard to control
- No symptoms at all in the early stages
- Fatigue and weakness that gets worse over time
- Intense itching all over the skin

- Loss of appetite, nausea, and sometimes vomiting
- Swelling in the ankles, feet, or around the eyes

Call the doctor right away if...

- Sudden sharp drop in urine output or no urine at all for several hours
- Severe swelling all over the body, trouble breathing, or fluid in the lungs (pulmonary swelling (edema))
- Confusion, seizures, or uncontrollable muscle twitching (signs that waste toxins are reaching dangerous levels in the blood)
- Chest pain or irregular heartbeat (potassium may be dangerously high, which can stop the heart)
- Blood in the urine that appears suddenly or gets much worse quickly

What the care team will do

- Check potassium level immediately and get a 12-lead ECG if the patient reports chest pain, palpitations, muscle weakness, or tingling, or if potassium is above 5.5 mEq/L.
- Measure strict intake and output every shift, weigh the patient daily at the same time with the same clothing, and assess for pitting swelling (edema) in ankles, sacrum, and lungs (crackles on listening with a stethoscope (auscultation)).
- Hold NSAIDs (ibuprofen, naproxen, ketorolac) and review the medication list to stop or adjust nephrotoxic drugs (drugs that poison the kidneys) like aminoglycosides, vancomycin, and contrast dye.
- Check blood pressure every 4 hours and ensure ACE inhibitor (such as lisinopril) or ARB (such as losartan) is given daily, aiming to keep BP below 130/80 mmHg.
- Review the latest hemoglobin, and if below 10 g/dL, check iron studies (ferritin and transferrin saturation) before giving erythropoiesis-stimulating agent (ESA) or iron supplementation.
- Check serum phosphate, calcium, and parathyroid hormone (PTH) levels, and give phosphate binders (such as calcium acetate or sevelamer) with meals if phosphate is above 5.5 mg/dL.
- Teach the patient to limit dietary potassium (avoid bananas, oranges, tomatoes, potatoes, beans) and phosphorus (avoid dairy, nuts, cola drinks, processed meats) and refer to a renal dietitian.
- Assess the patient's understanding of CKD progression and discuss advance care planning, including options for hemodialysis, peritoneal dialysis, kidney transplant, or conservative management without dialysis.

Medicines you may be given — and why

Lisinopril or Enalapril (ACE inhibitor)

Your kidney has tiny filters called glomeruli. When you have CKD, pressure builds up inside these filters and protein leaks through. This drug blocks a chemical in your blood called angiotensin II that squeezes the blood vessels going OUT of the filter. When you block that squeeze, the pressure inside the filter drops and less protein leaks out. It also lowers your overall blood pressure, which protects your heart and slows down kidney damage.

Losartan or Valsartan (ARB)

This drug does the same job as an ACE inhibitor but by a different route. Instead of stopping your body from making angiotensin II, it blocks the spots (receptors) where angiotensin II would normally grab on. So even though angiotensin II is still in your blood, it can't squeeze the blood vessels. The result is the same: pressure inside the kidney filter drops, less protein leaks out, and your blood pressure goes down.

Empagliflozin or Dapagliflozin (SGLT2 inhibitor)

Your kidney normally filters sugar out of your blood, then sucks most of it back in so you don't lose it in urine. A protein called SGLT2 does that sucking-back job in the first part of the kidney tube. This drug blocks SGLT2, so sugar (and a little salt and water) spills into your urine instead. Losing that sugar lowers blood sugar if you have diabetes. But even if you don't have diabetes, this drug protects your kidney by lowering the workload on the filters, reducing inflammation, and helping your heart pump better. Studies show it slows CKD in both diabetic and non-diabetic patients.

Atorvastatin or Rosuvastatin (statin)

CKD raises your risk of heart attack and stroke because it increases inflammation and causes cholesterol to build up in artery walls. Your liver makes cholesterol using an enzyme called HMG-CoA reductase. This drug blocks that enzyme, so your liver makes less cholesterol. Your liver then pulls more cholesterol out of your blood to make up for it, which lowers the cholesterol floating around that can clog arteries. Statins also calm down inflammation in blood vessel walls.

Calcium carbonate or Sevelamer (phosphate binder)

As CKD gets worse, your kidney can't get rid of phosphorus (a mineral from food) as well. Phosphorus builds up in your blood and pulls calcium out of your bones, making them weak. High phosphorus also causes calcium and phosphorus to form crystals that deposit in your blood vessels and heart, making them stiff. Phosphate binders are pills you take with meals.

They grab onto phosphorus in your stomach so it sticks to the pill and leaves in your poop instead of entering your blood.

Cinacalcet (calcimimetic)

When phosphorus goes up and calcium goes down because of CKD, your parathyroid glands (four tiny glands in your neck) sense the problem and pump out parathyroid hormone (PTH). PTH pulls calcium out of your bones to raise blood calcium, but this weakens your bones and makes blood vessel calcification worse. This drug tricks your parathyroid glands into thinking calcium is higher than it really is, so they make less PTH. Lower PTH means less calcium pulled from bone and lower phosphorus and calcium in your blood.

Calcitriol or Paricalcitol (active vitamin D)

Your kidney normally turns regular vitamin D into its active form (calcitriol). Active vitamin D helps your intestines absorb calcium from food and tells your parathyroid glands to calm down and make less PTH. When your kidneys fail, they can't make enough active vitamin D, so calcium drops and PTH goes up, weakening bones. This drug is already-active vitamin D, so it can do the job even though your kidneys can't activate it anymore.

Ferrous sulfate or Iron sucrose (iron supplement)

Your bone marrow needs iron to make hemoglobin, the part of red blood cells that carries oxygen. In CKD, you often don't absorb enough iron from food, and inflammation locks iron inside storage cells so your marrow can't use it. Taking iron (by mouth or through an IV) gives your marrow the building blocks it needs to make more red blood cells and raise your hemoglobin.

Epoetin alfa or Darbepoetin alfa (ESA)

Your kidney makes a hormone called erythropoietin (EPO) that travels to your bone marrow and tells it to make red blood cells. In CKD, your damaged kidney makes less EPO, so your marrow slows down and you become anemic (low red blood cell count). This drug is man-made EPO. It gives your marrow the signal it's missing, so it speeds up and makes more red cells. Your hemoglobin (oxygen-carrying protein) goes up, and you feel less tired and short of breath.

Sodium bicarbonate (baking soda tablets)

Your kidney normally removes acid that your body makes every day from breaking down protein. In CKD, the kidney can't get rid of acid as well, so acid builds up in your blood (metabolic too much acid in the blood (acidosis)). This makes you feel tired, weakens your bones, and makes kidney disease progress faster. Sodium bicarbonate is a base (the opposite of acid). When you take it, it neutralizes the extra acid in your blood, bringing your blood pH back toward normal.

Diuretics (furosemide, bumetanide, or metolazone)

When your kidney can't remove enough salt and water, fluid builds up in your body — you see swelling in your legs, ankles, or lungs (shortness of breath). Diuretics are 'water pills' that tell your kidney to dump more salt and water into your urine. This shrinks the fluid overload, lowers blood pressure, and makes breathing easier. Loop diuretics (like furosemide) work in the loop of Henle (a deeper part of the kidney tube) and are stronger. Thiazide-type diuretics (like metolazone) work in a different part of the tube and are sometimes added if loop diuretics alone aren't enough.

Patiromer or Sodium zirconium cyclosilicate (potassium binder)

In CKD, your kidney can't remove potassium well, and some CKD medications (ACE inhibitors, ARBs, spironolactone) raise potassium even more. High potassium (hyperkalemia) is dangerous — it can stop your heart. These drugs are powders you mix with water and drink. They travel to your colon (large intestine), grab onto potassium there, and carry it out in your stool. This lowers the potassium in your blood so you can safely keep taking the protective kidney medicines.

Where this information comes from

- KDIGO 2024 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease
- National Kidney Foundation (NKF)
- American Society of Nephrology (ASN)
- CDC Chronic Kidney Disease Initiative

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