



Educate Your Patients about Kidney Stones

A REFERENCE GUIDE FOR HEALTHCARE PROFESSIONALS

Kidney stones

Kidney stones can be a serious problem. A kidney stone is a hard object that is made from chemicals in the urine. There are five types of kidney stones:

- **Calcium oxalate:** Most common, created when calcium combines with oxalate in the urine.
- **Calcium phosphate:** Can be associated with hyperparathyroidism and renal tubular acidosis.
- **Uric acid:** Can be associated with a diet high in animal protein.
- **Struvite:** Less common, caused by infections in the upper urinary tract.
- **Cystine:** Rare and tend to run in families with a history of cystinuria.

People who had a kidney stone are at higher risk of having another stone. Kidney stones may also increase the risk of kidney disease.

Symptoms

A stone that is small enough can pass through the ureter with no symptoms. However, if the stone is large enough, it may stay in the kidney or travel down the urinary tract into the ureter. Stones that don't move may cause significant pain, urinary outflow obstruction, or other health problems.

Possible symptoms include severe pain on either side of the lower back, more vague pain or stomach ache that doesn't go away, blood in the urine, nausea or vomiting, fever and chills, or urine that smells bad or looks cloudy. Speak with a healthcare professional if you feel any of these symptoms.

Risk factors

Risk factors can include a family or personal history of kidney stones, diets high in protein, salt, or sugar, obesity, or digestive diseases or surgeries. Dehydration (Excessive sweating or not drinking enough water) can also increase your risk for kidney stones.

Diagnosis

Diagnosis of a kidney stone starts with a medical history, physical examination, and certain tests:

- **Imaging tests** are used to find out exact shape and size of the stone. This can be done with a high resolution CT scan. Other imaging options may include a KUB x-ray, or an intravenous pyelogram. **Urine and blood tests** measure the levels of calcium, phosphorus and uric acid in the blood will be measured. The stone can also analyzed after it comes out. This can be used to find out possible causes and help plan for prevention of future stones.

Treatment

Initial treatment options can include drinking more water and medications either for pain or to help the stone pass. Depending on the type of stone, these medicines can include allopurinol (for uric acid stones), antibiotics (for struvite stones), thiazide diuretics (water pills), phosphate solutions, sodium bicarbonate, citrate, or tamsulosin (to relax the ureter and help the stone pass). If these treatments do not work then medical procedures may be needed to break down larger stones or remove them. **Shock Wave Lithotripsy** uses high energy shock waves to break stones into smaller pieces for passing. **Ureteroscopy** uses a small scope to remove the stone. **Percutaneous Nephrolithotomy** removes the stone surgically from the back.

Prevention

- Drinking enough water each day is important in maintaining overall health. Eight to ten glasses a day is a common recommendation for daily hydration. Fluid restrictions might also apply if you have advanced kidney disease, so speak with a healthcare professional about the right amount.
- Beware of activities associated with excessive sweating.
- Eat a healthy diet and maintain a healthy weight.
- Manage blood pressure and sodium intake.
- Citrate might also be used to help prevent certain stones if urine citrate is low and urine pH levels are too low (or too acidic).
 - Citrus juices contain citrate (citric acid), but large amounts might be needed. Also, be careful of sugar. Lemon juice concentrate (4 oz per day) mixed with water can be considered. The citrate content of most fruits and vegetables contains both alkali (less acidic) citrate and citric acid, however, only the alkali citrate is excreted in the urine to raise urine citrate and pH levels.
 - Alkali citrate can be prescribed and is available over-the-counter. It can come in a pill, liquid or powder. Alkali citrate is given with a mineral(s), such as sodium, potassium or magnesium to help prevent stone formation. The aim is to increase urine citrate (for prevention of calcium stones) and increase urine pH (or make urine less acidic or more alkaline, for prevention of uric acid and cystine stones). The goal is to keep pH in balance.
 - People should remember to speak with a doctor or other healthcare professional about which treatment options are right for them, including over-the-counter products and home remedies. People with kidney disease should also be aware that they may be asked to watch their intake of sodium, potassium or other minerals. Recommendations may depend on the stage of kidney disease, or other factors
- Other preventive steps can depend on the type of stone.
 - **Calcium oxalate and calcium phosphate:** Thiazide diuretics can decrease urinary calcium excretion. Consuming the recommended daily allowance of calcium is important for patients with calcium oxalate stones since calcium binds up oxalate in the gut, decreasing available urinary oxalate.
 - **Uric acid:** To reduce uric acid stones, cut down on high-purine foods such as red meat, organ meats, and shellfish. Sodium bicarbonate can also be used to alkalinize the urine (or make it less acidic).
 - **Cystine:** These stones are less able to form in urine that is less acidic. Eating more fruits and vegetables can help make the urine less acidic. Eating meat can lead to urine that has more acid, which can increase the risk for cystine stones.
 - **Struvite:** Thought to be caused by certain bacterial infections (urinary tract infections, or UTI). Antibiotics or other medicines might be used after stone removal.