

Uncomplicated UTI and Cystitis

A plain-English guide for you and your family

WHAT IS HAPPENING

Your bladder is a stretchy bag that holds urine until you are ready to go. Normally it flushes bacteria out before they can stick, and the lining makes a slippery shield so germs slide away. But sometimes bacteria (usually *E. coli* from your own gut) climb backward up the tube you pee from (the urethra) into the bladder. Once inside, they latch onto the bladder wall and multiply. Your immune system floods the area with white blood cells to fight, and that battle swells and irritates the bladder lining. Now every drop of urine stings like acid, you feel like you have to go every five minutes even when almost nothing comes out, and you get a heavy ache low in your belly just above your pubic bone. The good news: a short course of the right antibiotic (nitrofurantoin or TMP-SMX for three days) kills the bacteria, the lining heals, and you feel normal again in a few days. The key is to catch it early—if fever or flank pain shows up, the infection may have climbed into your kidneys and you will need a longer, stronger treatment.

What you might feel

- Burning or stinging when you pee (dysuria)
- Needing to pee much more often than usual (frequency)
- Feeling a sudden, strong urge to pee that you can't hold (urgency)
- Pain or pressure low in your belly, just above the pubic bone (suprapubic discomfort)
- Cloudy or bad-smelling urine
- Blood in the urine, making it pink or red (hematuria)
- Fever over 100.4°F (38°C)
- Pain in your back or side, below the ribs (flank pain)
- Nausea or vomiting

Call the doctor right away if...

- Fever above 100.4°F or chills — suggests the infection climbed to the kidneys (pyelonephritis) and needs stronger treatment, sometimes in the hospital

- Flank pain (back or side pain below the ribs) — means kidneys are likely involved, not just the bladder
- Nausea, vomiting, or feeling very sick all over — signs the infection may be severe or spreading to the bloodstream (sepsis)
- Symptoms in a pregnant woman — UTIs during pregnancy can harm the baby and progress fast; always treat promptly
- Symptoms in a man, a child, or someone with diabetes or a weak immune system — these groups get complicated infections more easily and need closer evaluation

What the care team will do

- Check vital signs including temperature and blood pressure before giving medicine
- Teach the patient to take the full antibiotic course even when symptoms improve after 1 to 2 days
- Instruct the patient to drink 6 to 8 glasses of water daily during treatment
- Teach the patient to urinate within 30 minutes after sexual activity
- Tell the patient to call back if symptoms don't improve within 48 hours or if fever or back pain develops
- Review the patient's current medicines for interactions with nitrofurantoin or trimethoprim-sulfamethoxazole
- Document whether the patient has drug allergies, especially to sulfa medicines or nitrofurantoin
- Advise against using bubble baths, douches, or feminine hygiene sprays during and after treatment

Medicines you may be given — and why

Nitrofurantoin

Nitrofurantoin gets filtered into your urine by the kidneys, where it reaches very high levels. Once in the bladder, it damages the DNA and energy factories (ribosomes and mitochondria) inside bacteria, stopping them from multiplying and killing them. It works best against *E. coli*, the germ that causes most bladder infections. Because it concentrates in the urine—not the blood—it clears bacteria right where they're causing trouble: the bladder lining.

Trimethoprim-sulfamethoxazole (TMP-SMX, co-trimoxazole, Bactrim)

TMP-SMX is two drugs in one pill. Both block different steps in the bacteria's folate (vitamin B9) factory. Bacteria need folate to build DNA and grow. Trimethoprim blocks the enzyme dihydrofolate reductase, and sulfamethoxazole blocks the enzyme dihydropteroate synthase.

Together they create a double blockade, starving the bacteria of folate and stopping them from multiplying. Because human cells get folate from food and don't make it themselves, this combo targets bacteria specifically.

Fosfomycin

Fosfomycin is a single-dose powder you mix with water and drink. It blocks the very first step bacteria use to build their cell wall by jamming the enzyme MurA (UDP-N-acetylglucosamine enolpyruvyl transferase). Without a sturdy cell wall, the bacteria burst and die. Because it works so early in the wall-building process and has a unique structure, bacteria have not developed much resistance to it. The drug concentrates in the urine for 2–3 days after one dose, giving it time to clear the infection.

Cephalexin (first-generation cephalosporin)

Cephalexin is a beta-lactam antibiotic that works like penicillin. It binds to proteins (penicillin-binding proteins, PBPs) on the bacteria's surface and stops them from building the peptidoglycan mesh that makes up the cell wall. Without a strong wall, the bacteria burst. Cephalexin is less effective than nitrofurantoin or TMP-SMX for uncomplicated UTIs—bacteria clear more slowly and recurrence is more common—but it is safe in pregnancy and useful when other drugs can't be used.

Topical (vaginal) estrogen

After menopause, estrogen levels drop. The vaginal and bladder lining gets thinner, drier, and loses its normal protective bacteria (lactobacilli), making it easier for *E. coli* from the bowel to stick to the bladder wall and cause infection. Topical estrogen (cream, ring, or tablet inserted into the vagina) restores local estrogen levels, which thickens the lining, brings back healthy lactobacilli, lowers the pH (makes it more acidic and hostile to *E. coli*), and strengthens the natural barrier. This prevents recurrent UTIs—it does NOT treat an active infection.

Methenamine hippurate or methenamine mandelate

Methenamine is NOT an antibiotic—it's a preventive antiseptic. In acidic urine (pH below 6), methenamine breaks down into formaldehyde, a chemical that kills bacteria by damaging their proteins and DNA. Because formaldehyde forms only in the bladder (not in the blood or gut), it sterilizes the urine without causing antibiotic resistance or harming your body's normal bacteria. It is used to prevent recurrent UTIs in people who get 3 or more infections per year, NOT to treat an active infection.

Where this information comes from

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- IDSA 2011 Guideline on Uncomplicated Cystitis and Pyelonephritis in Women
 - AUA 2023 Guideline on Recurrent Uncomplicated UTI in Women

- CDC – Urinary Tract Infection (UTI) guidance
- UpToDate 2024 – Acute Simple Cystitis in Women

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