

Uncomplicated UTI and Cystitis

Simple bladder infection in a healthy woman gets three days of nitrofurantoin or TMP-SMX. No scan. If fever or back pain shows up, it is pyelonephritis and needs stronger treatment.

THE ONE-LINE TRUTH

Bacteria climb into the bladder and stick to the lining, making you pee a lot, rush to the bathroom, and feel burning pain when you go.

The chain — how it unfolds

1. Bacteria (usually *E. coli*) climb from the skin or rectum up the urethra into the bladder. — why: The female urethra is only about 4 centimeters long, so bacteria can reach the bladder quickly—especially after sex (which pushes perineal bacteria toward the urethra) or if you hold urine for hours (which gives bacteria time to multiply instead of being flushed out).
2. Bacteria stick to the bladder lining using tiny hair-like fingers (pili) and start multiplying. — why: *E. coli* pili grab onto sugar molecules (mannose) on the surface of bladder cells like Velcro, so normal urine flow cannot wash them away. Once anchored, each bacterium divides every 20–30 minutes, turning a few germs into millions in hours.
3. The bladder wall becomes red, swollen, and irritated as immune cells rush in to fight. — why: Bladder cells detect bacterial toxins (lipopolysaccharide) and release chemical alarms (cytokines) that open blood vessels and call neutrophils (white blood cells) to the scene. This immune battle causes inflammation, which irritates the nerve endings that sense pain and fullness.
4. You feel burning pain (dysuria), a constant urgent need to pee (urgency), and have to go many times but pass only small amounts (frequency). — why: Inflamed nerves in the bladder wall fire even when the bladder holds just a few drops, tricking your brain into thinking it is full. The burn happens because inflamed tissue releases chemicals (prostaglandins, bradykinin) that make nerve endings hyper-sensitive, so urine touching raw spots stings like lemon juice on a cut.
5. You get a dull, heavy ache low in your belly just above the pubic bone (suprapubic pain). — why: The swollen, inflamed bladder presses outward against the lower abdominal wall, and the constant squeezing to push out urine strains the bladder muscle, which aches like any overworked muscle.

6. Your urine may look cloudy or smell bad, and a dipstick test shows white blood cells (leukocyte esterase) and bacteria (nitrites). — why: The white blood cells fighting the infection spill into the urine, making it cloudy. Many bacteria (especially *E. coli*) convert nitrate (normally in urine) into nitrite, so a positive nitrite test is a chemical fingerprint of bacterial growth.
7. A short course of antibiotics (nitrofurantoin 100 mg twice daily for five days, or TMP-SMX one double-strength tablet twice daily for three days) kills the bacteria. — why: These antibiotics concentrate in the urine at levels high enough to kill common bladder bacteria. Nitrofurantoin damages bacterial DNA, and TMP-SMX blocks two steps bacteria need to make DNA, so they cannot reproduce and die off. Symptoms usually improve within one to two days, and the infection clears in three to five days.
8. If untreated, bacteria can climb the ureters into the kidneys, causing pyelonephritis (kidney infection) with fever, flank pain, nausea, and risk of bloodstream infection (urosepsis). — why: The ureters have one-way valves that normally keep urine flowing down, but high bladder pressure or aggressive bacteria can push upstream. Once in the kidney, bacteria damage filtering units (nephrons), trigger a bigger immune response (systemic cytokine release), and can enter the bloodstream through inflamed kidney tissue, leading to sepsis, which can be life-threatening.

Spot it — what you see, and why

- Burning or stinging when you pee (dysuria): Bacteria (usually *E. coli* from the bowel) stick to the bladder wall and trigger inflammation. The inflamed lining becomes raw and super sensitive, so when urine — which has salt and waste — touches it, it burns like lemon juice on a scraped knee.
- Needing to pee much more often than usual (frequency): The irritated bladder wall sends urgent signals to the brain even when the bladder is barely full. It's like a fire alarm going off when there's only a tiny wisp of smoke — the bladder thinks it's full when it's not.
- Feeling a sudden, strong urge to pee that you can't hold (urgency): Inflammation makes the bladder muscle jumpy and twitchy. It squeezes hard and fast, giving you only seconds to get to the bathroom instead of the usual minutes of warning.
- Pain or pressure low in your belly, just above the pubic bone (suprapubic discomfort): The bladder sits right behind the pubic bone. When it's swollen and inflamed from the infection, it presses outward like a bruised balloon, causing a dull ache or heavy feeling in that spot.
- Cloudy or bad-smelling urine: White blood cells and bacteria pour into the urine as the body fights the infection. The cloudy look comes from those cells, and the smell comes from bacterial waste products breaking down urea into ammonia-like chemicals.

- Blood in the urine, making it pink or red (hematuria): The inflamed bladder lining is so irritated that tiny blood vessels near the surface break open, leaking red blood cells into the urine. It looks alarming but is common in simple bladder infections and usually clears once the infection is treated.

Red flags — act now

- 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

Treat it — in this order

1. Nitrofurantoin 100 mg by mouth twice a day for 5 days → This antibiotic gets concentrated in the urine and poisons the machinery *E. coli* uses to make energy. The bacteria die, the bladder lining stops being irritated, and symptoms clear within 1–2 days. It's first-line because resistance is very low (usually <5%) and it works fast.
2. Trimethoprim-sulfamethoxazole (TMP-SMX) 160/800 mg (one double-strength tablet) by mouth twice a day for 3 days → This combination blocks two steps bacteria need to build DNA and folic acid (a vitamin-like molecule). *E. coli* can't multiply and dies off. It works faster than nitrofurantoin—3 days instead of 5—but only use it if local *E. coli* resistance is under 20%, because resistance is climbing in many areas.
3. Fosfomycin 3 grams (one single-dose packet) mixed in water, taken by mouth once → Fosfomycin punches holes in the bacterial cell wall so *E. coli* can't hold its shape and bursts. One dose reaches high levels in the bladder and stays there for days. It's ideal when you need one-and-done dosing or when other antibiotics are not tolerated.
4. Phenazopyridine (Pyridium) 100–200 mg by mouth three times a day for up to 2 days → This is a pain reliever that coats the bladder lining and soothes the burning. It makes you more comfortable while the antibiotic kills the bacteria. Your pee will turn bright orange—that's normal and harmless.

5. Drink plenty of water and urinate after sexual activity → Extra water dilutes the urine so bacteria can't concentrate and multiply as easily. Peeing after sex flushes out bacteria that got pushed toward the bladder opening during intercourse. Both lower the chance of a new infection starting.

Your top priorities at the bedside

1. Check vital signs including temperature and blood pressure before giving medicine — why: Fever over 100.4°F or low blood pressure may indicate kidney infection or sepsis (bloodstream infection), which needs immediate doctor evaluation and possibly hospital admission instead of outpatient treatment
2. Teach the patient to take the full antibiotic course even when symptoms improve after 1 to 2 days — why: Stopping antibiotics early allows surviving bacteria to multiply again and develop resistance (ability to survive the medicine), causing the infection to return stronger
3. Instruct the patient to drink 6 to 8 glasses of water daily during treatment — why: Extra fluid creates more urine flow that physically washes bacteria out of the bladder and dilutes (waters down) bacterial toxins that irritate the bladder lining