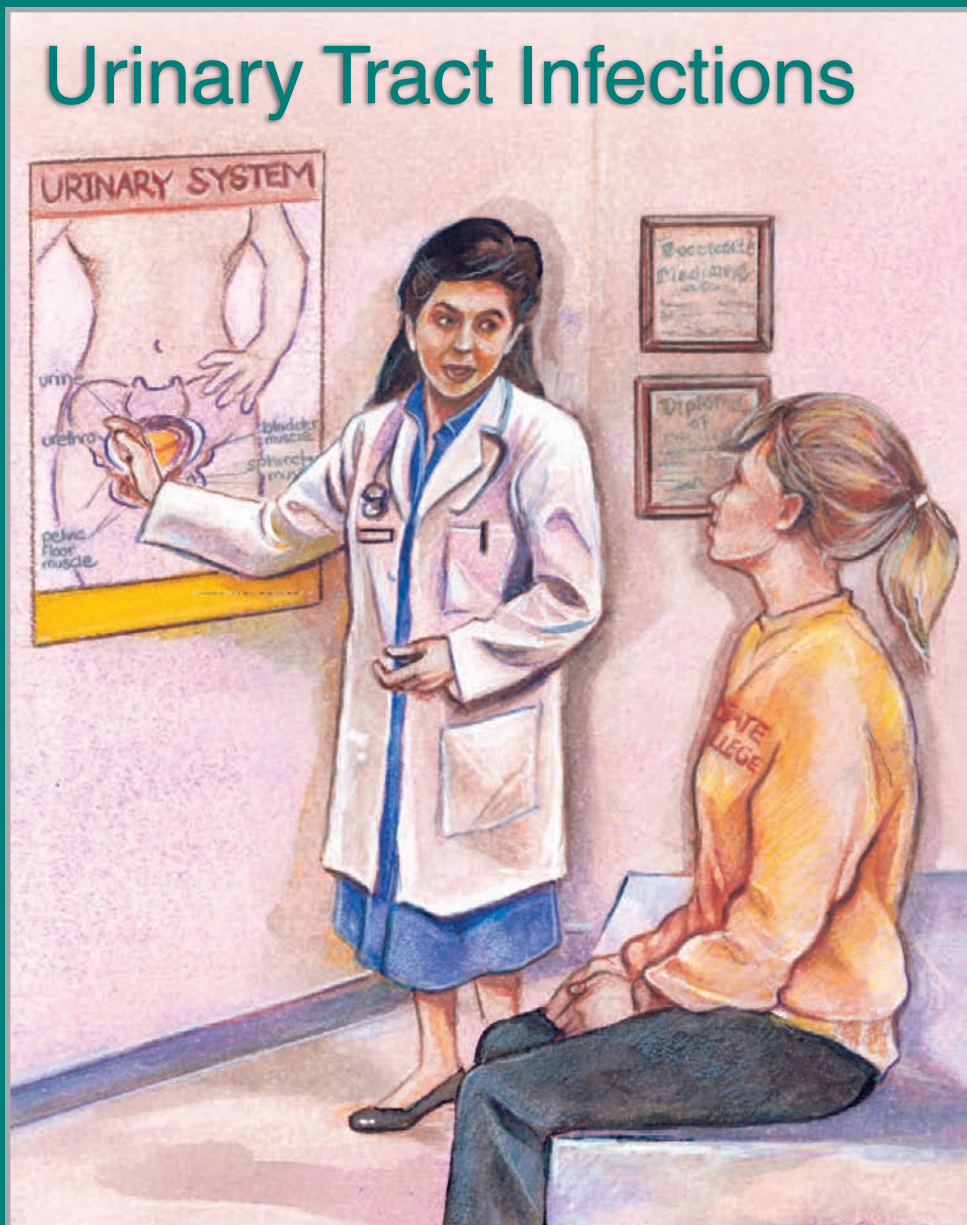


# What I need to know about

# Urinary Tract Infections



National Institute of  
Diabetes and Digestive  
and Kidney Diseases

**ADULT UROLOGY &  
PEDIATRIC  
UROGYNECOLOGY**



# What I need to know about Urinary Tract Infections

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## What is a urinary tract infection (UTI)?

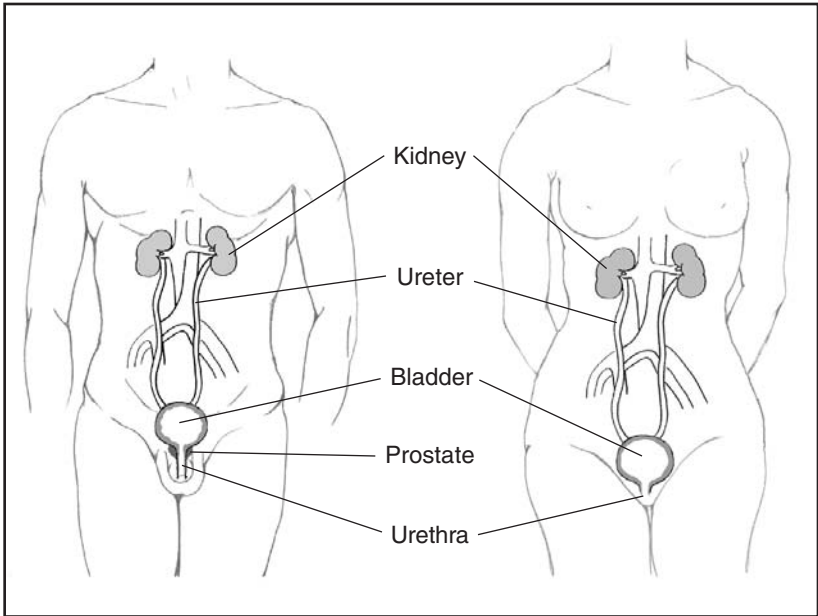
A UTI is an infection in the urinary tract. Infections are caused by microbes—organisms too small to be seen without a microscope. **Bacteria\*** are the most common cause of UTIs. Normally, bacteria that enter the urinary tract are quickly removed by the body before they cause symptoms. But sometimes bacteria overcome the body's natural defenses and cause infection.

## What is the urinary tract?

The **urinary tract** is the body's drainage system for removing wastes and extra water. The urinary tract includes two **kidneys**, two **ureters**, a **bladder**, and a **urethra**. The kidneys are a pair of bean-shaped organs, each about the size of a fist. They are located below the ribs, one on each side of the spine, toward the middle of the back. Every minute, your kidneys filter about 3 ounces of blood, removing wastes and extra water. The wastes and extra water make up the 1 to 2 quarts

\*See page 19 for tips on how to say the words in **bold** type.

of urine you produce each day. The urine travels from the kidneys down two narrow tubes called the ureters. The urine is then stored in a balloonlike organ called the bladder and emptied through the urethra, a tube at the bottom of the bladder.



Male and female urinary tracts

## What causes UTIs?

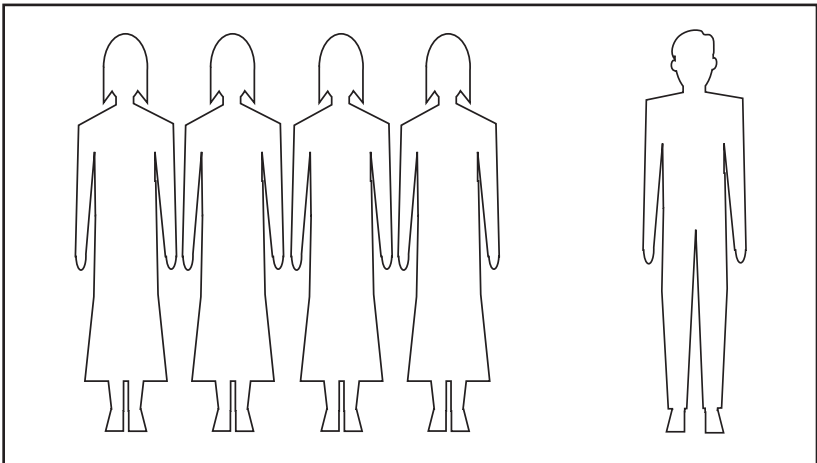
Most UTIs are caused by bacteria that live in the bowel. The bacterium *Escherichia coli* (*E. coli*) causes most UTIs. The urinary tract has several systems to prevent infection. The points where the ureters attach to the bladder act like one-way valves to prevent urine from backing up toward the kidneys, and urination washes microbes out of the body. In men, the **prostate** gland produces secretions that slow bacterial growth. In both sexes, immune defenses also prevent infection. But despite these safeguards, infections still occur.

## Who gets UTIs?

People of any age or sex can get UTIs. But about four times as many women get UTIs as men. Women have a shorter urethra, which makes it easier for bacteria to reach the bladder. Also, the opening of a woman's urethra is near the vagina and anus, where bacteria live. Women who use a diaphragm are also more likely to get UTIs than women who use other forms of birth control.

Others at higher risk for UTIs are people

- with diabetes or problems with the body's natural defense system
- who need a tube to drain their bladder
- with urinary tract abnormalities that block the flow of urine
- with spinal cord injuries or other nerve damage



About four times as many women get UTIs as men.



## Are UTIs serious?

Most UTIs are not serious, but some infections can lead to serious problems. Chronic kidney infections—infections that recur or last a long time—can cause permanent damage, including kidney scars, poor kidney function, high blood pressure, and other problems. Some acute kidney infections—infections that develop suddenly—can be life threatening, especially if the bacteria enter the bloodstream, a condition called septicemia.

## What are the signs and symptoms of a UTI?

You should see your health care provider if you have any of these signs or symptoms:

- a burning feeling when you urinate
- frequent or intense urges to urinate, even when you have little urine to pass
- pain in your back or side below the ribs
- cloudy, dark, bloody, or foul-smelling urine
- fever or chills

## How are UTIs diagnosed?

Health care providers diagnose UTIs by asking about your symptoms and then testing a sample of your urine. Your urine will be checked with a microscope for bacteria and white blood cells, which the body produces to fight infection. Because bacteria can be found in the urine of healthy people, a UTI is diagnosed based both on symptoms and a lab test.



Your urine will be checked with a microscope for bacteria and white blood cells.

If you have repeat infections or are in the hospital, your urine may be cultured. The culture is performed by placing part of the urine sample in a tube or dish with a substance that encourages any bacteria present to grow. Once the bacteria have multiplied, which usually takes 1 to 3 days, they can be identified. Your health care provider may also order a sensitivity test, which tests the bacteria for sensitivity to different antibiotics to see which medicine is best for treating the infection.

If you have repeat infections, your health care provider may also order one or more tests to see if your urinary tract is normal.

**Kidney and bladder ultrasound.** Ultrasound uses a device, called a transducer, that bounces safe, painless sound waves off organs to create an image of their structure. The procedure is performed in a health care provider's office, outpatient center, or hospital by a specially trained technician, and the images are interpreted by a radiologist—a doctor who specializes in medical imaging; anesthesia is not needed. The images can show abnormalities in the kidneys and bladder. However, this test cannot reveal all important urinary abnormalities or measure how well the kidneys work.

**Voiding cystourethrogram.** This test is an x-ray image of the bladder and urethra taken while the bladder is full and during urination, also called voiding. As you lie on the x-ray table, a health care provider inserts the tip of a thin, flexible tube called a catheter through your urethra into your bladder. Your bladder and urethra are filled with a special dye, called contrast medium, to make the structures clearly visible on the x-ray images. The x-rays are taken from various angles while your bladder is full of contrast medium. The catheter is then removed and x-ray images are taken during urination. The procedure is performed in a health care provider's office, outpatient center, or hospital by an x-ray technician. The technician is supervised by a radiologist while the images are taken. The radiologist then interprets the images. Anesthesia is not needed, but light sedation may be used if you need it. This test can show abnormalities of the inside of your urethra and bladder. The test can also determine whether the flow of urine is normal when your bladder empties.

**Computerized tomography (CT) scan.** CT scans use a combination of x rays and computer technology to create three-dimensional (3-D) images. A CT scan may include the injection of contrast medium. CT scans require you to lie on a table that slides into a tunnel-shaped device where the x rays are taken. The procedure is performed in an outpatient center or hospital by an x-ray technician, and the images are interpreted by a radiologist; anesthesia is not needed. CT scans can provide clearer, more detailed images to help the health care provider understand the problem.

**Magnetic resonance imaging (MRI).** MRI machines use radio waves and magnets to produce detailed pictures of your body's internal organs and soft tissues without using x rays. An MRI may include an injection of contrast medium. With most MRI machines, you lie on a table that slides into a tunnel-shaped device that may be open ended or closed at one end; some newer machines are designed to allow you to lie in a more open space. The procedure is performed in an outpatient center or hospital by a specially trained technician, and the images are interpreted by a radiologist; anesthesia is not needed though light sedation may be used if you have a fear of confined spaces. Like CT scans, MRIs can provide clearer, more detailed images.

**Radionuclide scan.** A radionuclide scan is an imaging technique that relies on the detection of small amounts of radiation after injection of radioactive chemicals. Because the dose of the radioactive chemicals is small, the risk of causing damage to cells is low. Special cameras and computers are used to create images of the radioactive chemicals as they pass through your kidneys. Radionuclide scans are performed in a health care provider's office, outpatient center, or hospital by a specially trained technician, and the images are interpreted by a radiologist; anesthesia is not needed. Radioactive chemicals injected into your blood can provide information about your kidney function. Radioactive chemicals can also be put into the fluids used to fill your bladder and urethra for x ray, MRI, and CT imaging.

**Urodynamics.** Urodynamic testing is any procedure that looks at how well your bladder, sphincters, and urethra are storing and releasing urine. Most of these tests are performed in the office of a **urologist**—a doctor who specializes in urinary problems—by a urologist, physician assistant, or nurse practitioner. Some procedures may require light sedation to keep you calm. Most urodynamic tests focus on your bladder’s ability to hold urine and empty steadily and completely. Urodynamic tests can also show whether your bladder is having abnormal contractions that cause leakage. A health care provider may order these tests if there is evidence that you have some kind of nerve damage.

**Cystoscopy.** Cystoscopy is a procedure that uses a tubelike instrument to look inside the urethra and bladder. Cystoscopy is performed by a doctor in a health care provider’s office, outpatient facility, or hospital with local anesthesia. However, in some cases, sedation and regional or general anesthesia are needed. Cystoscopy may be used to look for swelling, redness, and other signs of infection.

## How are UTIs treated?

UTIs are treated with **antibiotics** that can kill the bacteria causing the infection. The antibiotic prescribed will depend on the type of bacteria causing your UTI. Some antibiotics may be ruled out if you have allergies to them. Tell your health care provider if you are allergic to any medicines.

You may need to take antibiotics for a few days or for 7 days or longer. The length of treatment depends on a few factors:

- how severe the infection is
- whether you were given the right antibiotic at first
- whether the bacteria resists the antibiotic
- whether you have repeat infections
- whether you have a urinary tract abnormality that blocks the flow of urine
- whether you are male or female; men may need longer treatment because bacteria can hide deep inside prostate tissue

Follow your health care provider's instructions carefully and completely when taking antibiotics.

Drinking lots of fluids and urinating frequently will speed healing. If needed, you may take various medicines to relieve the pain of a UTI. A heating pad on the back or abdomen may also help.



## Will UTIs come back?

For most people, the answer is no. But about one out of every five young women who have a UTI will have another one. Some women have three or more UTIs a year. Men are less likely than women to have a first UTI. But once a man has a UTI, he is likely to have another because bacteria can hide deep inside prostate tissue. Anyone who has diabetes or a problem that makes it hard to urinate may have repeat infections.

If you have repeat infections, your health care provider may refer you to a urologist. Talk with your health care provider or urologist about special treatment plans. For example, you may need to take antibiotics for a longer period of time to help prevent repeat infections. Some patients with frequent UTIs are given a supply of antibiotics to be started at the first sign of infection. Make sure you understand and follow the instructions your health care provider or urologist gives you.

## How can I prevent repeat UTIs?

In addition to taking antibiotics, changing some of your daily habits and lifestyle choices may help you prevent repeat UTIs.

### **Eating, Diet, and Nutrition**

Drinking lots of fluid can help flush bacteria from your system. Water is best. Most people should try for six to eight, 8-ounce glasses a day. But do not drink this much fluid if you have kidney failure. Check with your health care provider to learn how much fluid is healthy for you.

### **Bathroom Habits**

Urinate often and when you first feel the urge. Bacteria can grow when urine stays in the bladder too long. Urinate shortly after sex to flush away bacteria that might have entered your urethra during sex. Drinking a glass of water will also help flush bacteria away.

After using the toilet, always wipe from front to back. This step is most important after a bowel movement to keep from getting bacteria into the urethra.

## Clothing

Wear cotton underwear and loose-fitting clothes so air can keep the area around the urethra dry. Avoid nylon underwear and tight-fitting jeans, which can trap moisture and help bacteria grow.

## Birth Control

For women, using a **diaphragm** or **spermicide** for birth control can lead to UTIs by increasing bacteria growth. If you have trouble with UTIs, try switching to a new form of birth control.

Unlubricated condoms or spermicidal condoms increase irritation, which may help bacteria grow. Consider switching to lubricated condoms without spermicide or using a nonspermicidal lubricant.

## Points to Remember

- A urinary tract infection (UTI) is an infection in the urinary tract. Infections are caused by microbes—organisms too small to be seen without a microscope.
- The urinary tract is the body's drainage system for removing wastes and extra water.
- Bacteria that live in the digestive tract, in the vagina, or around the urethra are the most common cause of UTIs.

- You should see your health care provider if you have any of these signs or symptoms:
  - a burning feeling when you urinate
  - frequent or intense urges to urinate, even when you have little urine to pass
  - pain in your back or side below the ribs
  - cloudy, dark, bloody, or foul-smelling urine
  - fever or chills
- Health care providers diagnose UTIs by asking about your symptoms and then testing a sample of your urine for bacteria.
- If you have repeat infections or are in the hospital, your urine may be cultured. The culture is performed by placing part of the urine sample in a tube or dish with a substance that encourages any bacteria present to grow.
- If you have repeat infections, your health care provider may also order one or more tests to see if your urinary tract is normal.
  - kidney and bladder ultrasound
  - voiding cystourethrogram
  - computerized tomography (CT) scan

- magnetic resonance imaging (MRI)
  - radionuclide scan
  - urodynamics
  - cystoscopy
- UTIs are treated with antibiotics that can kill the bacteria causing the infection. The antibiotic prescribed will depend on the type of bacteria causing your UTI.
  - About one out of every five young women who have a UTI will have another one. Some women have three or more UTIs a year.
  - Men are less likely than women to have a first UTI. But once a man has a UTI, he is likely to have another because bacteria can hide deep inside prostate tissue.
  - Anyone who has diabetes or a problem that makes it hard to urinate may have repeat infections.
  - Changing some of your daily habits and lifestyle choices may help you prevent repeat UTIs.

## Hope through Research

Scientists supported by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) are working on ways to prevent UTIs using probiotics, good bacteria that help your body fight bad bacteria. One study is looking at a vaginal **suppository** of the probiotic *Lactobacillus* to replenish a woman's natural supply of the protective bacteria. More information about the Intravaginal LACTIN-V for Prevention of Recurrent Urinary Tract Infection Trial, funded under National Institutes of Health clinical trial number NCT00305227, can be found at [www.ClinicalTrials.gov](http://www.ClinicalTrials.gov).

Participants in clinical trials can play a more active role in their own health care, gain access to new research treatments before they are widely available, and help others by contributing to medical research. For information about current studies, visit [www.ClinicalTrials.gov](http://www.ClinicalTrials.gov).

## Pronunciation Guide

**antibiotics** (AN-tee-by-OT-ikss)

**bacteria** (bak-TIHR-ee-uh)

**bladder** (BLAD-ur)

**computerized tomography (CT) scan** (kom-PYOO-tur-eyezd) (toh-MOG-ruh-fee) (scan)

**cystoscopy** (siss-TAHS-kuh-pee)

**diaphragm** (DY-uh-fram)

*Escherichia coli* (esh-uh-RIK-ee-uh) (KOH-ly)

**kidneys** (KID-nee-z)

**prostate** (PROSS-tayt)

**spermicide** (SPURM-ih-syd)

**suppository** (suh-POZ-ih-TOH-ree)

**ultrasound** (UHL-truh-sound)

**ureters** (YOOR-uh-turz)

**urethra** (yoo-REE-thruh)

**urinary tract** (YOOR-ih-NAIR-ee) (trakt)

**urologist** (yoo-ROL-uh-jist)

## For More Information

The National Kidney and Urologic Diseases Information Clearinghouse (NKUDIC) has a fact sheet called *Urinary Tract Infections in Adults* that gives more information about UTIs and a fact sheet called *Cystoscopy and Uteroscopy* that gives more information about cystoscopy.

The following organizations also have fact sheets about UTIs.

### **American Urological Association Foundation**

1000 Corporate Boulevard

Linthicum, MD 21090

Phone: 1-800-828-7866 or 410-689-3700

Fax: 410-689-3998

Email: [auafoundation@auafoundation.org](mailto:auafoundation@auafoundation.org)

Internet: [www.UrologyHealth.org](http://www.UrologyHealth.org)

### **National Kidney Foundation**

30 East 33rd Street

New York, NY 10016

Phone: 1-800-622-9010 or 212-889-2210

Fax: 212-689-9261

Internet: [www.kidney.org](http://www.kidney.org)



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The National Kidney and Urologic Diseases Information Clearinghouse (NKUDIC) is a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The NIDDK is part of the National Institutes of Health of the U.S. Department of Health and Human Services. Established in 1987, the Clearinghouse provides information about diseases of the kidneys and urologic system to people with kidney and urologic disorders and to their families, health care professionals, and the public. The NKUDIC answers inquiries, develops and distributes publications, and works closely with professional and patient organizations and Government agencies to coordinate resources about kidney and urologic diseases.

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This publication is available at [www.urologic.niddk.nih.gov](http://www.urologic.niddk.nih.gov).

This publication may contain information about medications. When prepared, this publication included the most current information available. For updates or for questions about any medications, contact the U.S. Food and Drug Administration toll-free at 1-888-INFO-FDA (1-888-463-6332) or visit [www.fda.gov](http://www.fda.gov). Consult your health care provider for more information.

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