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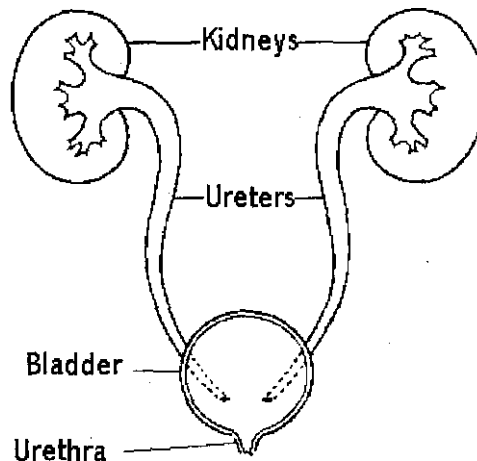
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URINARY TRACT INFECTIONS in WOMEN - A REVIEW

Urinary tract infections are a serious health problem affecting millions of people each year.

Infections of the urinary tract are common -- only respiratory infections occur more often. Each year, **urinary tract infections (UTI's)** account for about 8 million doctor visits. Women are especially prone to UTI's for reasons that are poorly understood. One woman in five develops a UTI during her lifetime.

FEMALE ANATOMY



The urinary system consists of the kidneys, ureters, bladder, and urethra. The kidneys, a pair of fist sized organs, are located below the ribs toward the middle of the back. The kidneys remove liquid waste from the blood in the form of urine, keep a stable balance of salts and other substances in the blood. Narrow tubes called ureters carry urine from the kidneys to the bladder in the lower abdomen. Like a balloon, the bladder's elastic walls relax and expand to store urine and contract and flatten when urine is emptied through the urethra. (Note: In the male, the urine goes through the prostatic portion of the urethra before entering the penile urethra.) The typical adult bladder can store about 1 1/2 cups of urine (12 ounces) but with a great deal of variability from patient to patient.

Adults pass about a quart and a half of urine each day. The amount of urine varies, depending on the fluids and foods a person consumes. The volume formed at night is about half that formed in the daytime. (Note: Although as one ages more urine may be created at night even without taking in fluids. Many older people develop swollen feet or legs during the day. The swelling represents water and salt that it urinated out at night.)

Normal urine is sterile. It contains fluids, salts and waste products, but it is free of bacteria, viruses and fungi. The tissues of the bladder are isolated from urine and toxic substances by a coating that discourages bacteria from attaching and growing on the bladder wall.

What are the causes of urinary tract infections?

Normal urine is sterile. It contains fluids, salts, and waste products, but it is free of bacteria, viruses, and fungi. An infection occurs when microorganisms, usually bacteria **from** the digestive tract, cling to the opening of the urethra and begin to multiply. Most infections arise from one type of bacteria, *Escherichia coli* (**E. coli**), which normally live in the colon.

In most cases, bacteria first begin growing in the urethra. An infection limited to the urethra is called urethritis. From there bacteria often move on to the bladder, causing a bladder infection (cystitis). If the infection is not treated promptly, bacteria may then go up the **ureters** to infect the kidneys (pyelonephritis).

Microorganisms called *Chlamydia* and *Mycoplasma* may also cause UTI's in both men and women, but these infections tend to remain limited to the urethra and reproductive system. Unlike *E. coli*, *Chlamydia* and *Mycoplasma* may be sexually transmitted, and infections require treatment of both partners.

The urinary system is structured in a way that helps ward off infection. The ureters and bladder normally prevent urine from backing up toward the kidneys, and the flow of urine from the bladder helps wash bacteria out of the body. In men, the prostate gland produces secretions that slow bacterial growth. In both sexes, immune defenses also prevent infection. Despite these safeguards, though, infections still occur.

Who is at risk of urinary tract infections?

Some people are more prone to getting a UTI than others. Any abnormality of the urinary tract that obstructs the flow of urine (a kidney stone, for example) sets the stage for **an** infection. An enlarged prostate gland also can slow the flow of urine, thus raising the risk of infection.

A common source of infection is catheters, or tubes, placed in the bladder. A person who cannot void, is unconscious or critically ill, often needs a catheter that stays in place for a long time. Some people, especially the elderly or those with nervous system disorders who lose bladder control, may need a catheter for life. Bacteria on the catheter can infect the bladder, so hospital staff take special care to keep the catheter sterile and remove it as soon as possible.

People with diabetes have a higher risk of a UTI because of changes of the immune system. Any disorder that suppresses the immune system raises the risk of a urinary infection.

UTI's may occur in infants who are born with abnormalities of the urinary tract, which sometimes need to be corrected with surgery. UTI's are rarely seen in boys and young men. In women, though, the rate of UTI's gradually increases with age. Scientists are not sure why women have more urinary infections than men. One factor may be that a woman's urethra is short, allowing bacteria quick access to the bladder. Also, a woman's urethral opening is near sources of bacteria from the anus and vagina. For many women, sexual intercourse seems to trigger an infection, although the reasons for this linkage are unclear.

According to several studies, women who use a diaphragm are more likely to develop a UTI than women who use other forms of birth control. Recently, researchers found that women whose partners use a condom with spermicidal foam also tend to have growth of *E. coli* bacteria in the vagina.

Recurrent Infections

Many women suffer *from* frequent UTI's. Nearly 20 percent of women who have a UTI will have another, and 30 percent of those will have yet another. Of the last group, 80 percent will have recurrences.

Usually, the latest infection stems from a strain or type of bacteria that is different from the infection before it, indicating a separate infection. (Even when several UTI's in a row are due to *E. coli*, slight differences in the bacteria indicate distinct infections.)

Research funded by the National Institutes of Health (NIH) suggests that one factor behind recurrent UTI's may be the ability of bacteria to attach to cells lining the urinary tract. A recent NIH funded study has also shown that women with recurrent UTI's tend to have certain blood types. Some scientists speculate that women with these blood types are more prone to UTI's because the cells lining the vagina and urethra may allow bacteria to attach more easily. Further research will show whether this association is sound and proves useful in identifying women at high risk for UTI's.

Infections in Pregnancy

Pregnant women seem no more prone to UTI's than other women. However, when a UTI does occur, it is more likely to travel to the kidneys. According to some reports, about 2 to 4 percent of pregnant women develop a urinary infection. Scientists think that hormonal changes and shifts in the position of the urinary tract during pregnancy make it easier for bacteria to travel up the ureters to the kidneys. For this reason, many doctors recommend periodic testing of urine.

What are the symptoms of urinary tract infections?

Not everyone with a UTI has symptoms, but most people get at least some. These may include a frequent urge to urinate and a painful, burning feeling in the area of the bladder or urethra during urination. It is not unusual to feel bad, all over-tired, shaky, washed' out -- and to feel pain even when not urinating. Often, women feel an uncomfortable pressure above the pubic bone, and some men experience a fullness in the rectum. It is common for a person with a urinary infection to complain that, despite the urge to urinate, only a small amount of urine is passed. The urine itself may look milky or cloudy, even reddish if blood is present. A fever may mean that the infection has reached the kidneys. Other symptoms of a kidney infection include pain in the back or side below the ribs, nausea, or vomiting.

In children, symptoms of a urinary infection may be overlooked or attributed to another disorder. A UTI should be considered when a child or infant seems irritable, is not eating normally, has an unexplained fever that does not go away, has incontinence or loose bowels, or is not thriving. The child should be seen by a doctor if there are any questions about these symptoms, especially if there is a change in the child's urinary pattern.

How do physicians diagnosis urinary tract infections?

To find out whether you have a UTI, your doctor will test a sample of urine for pus and bacteria. You will be asked to give a "clean catch" urine sample by washing the genital area and collecting a "midstream" sample of urine in a sterile container. (This method of collecting urine helps prevent bacteria around the genital area from getting into the sample and confusing the test results.) Usually, the sample is sent to a laboratory, although some doctors' offices are equipped to do the testing.

In the urinalysis test, the urine is examined for white and red blood cells and bacteria. Then the bacteria are grown in a culture and tested against different antibiotics to see which drug best destroys the

bacteria. This last step is called a sensitivity test.

Some microbes, like Chlamydia and Mycoplasma, can only be detected with special bacterial cultures. A doctor suspects one of these infections when a person has symptoms of a UTI and pus in the urine, but a standard culture fails to grow any bacteria.

When an infection does not clear up with treatment and is traced to the same strain of bacteria, the doctor will order a test that makes images of the urinary tract. One of these tests is an intravenous pyelogram (IVP), which gives x-ray images of the bladder, kidneys, and ureters. An opaque dye visible on x-ray film is injected into a vein, and a series of x-rays are taken. The film shows an outline of the urinary tract, revealing even small changes in the structure of the tract.

If you have recurrent infections, your doctor also may recommend an ultrasound exam, which gives pictures from the echo patterns of soundwaves bounced back from internal organs. Another useful test is cystoscopy. A cystoscope is an instrument made of a hollow tube with several lenses and a light source, which allows the doctor to see inside the bladder from the urethra.

How do we treat urinary tract infections?

UTI's are treated with antibacterial drugs. The choice of drug and length of treatment depends on the patient's history and the urine tests that identify the offending bacteria. The sensitivity test is especially useful in helping the doctor select the most effective drug. The drugs most often used to treat routine, uncomplicated UTI's are trimethoprim (Trimplex), trimethoprim/sulfamethoxazole (Bactrim, Septra, Cotrim), amoxicillin (Amoxil, Trimox, Wymox), nitrofurantoin (Macrochantin, Furadantin), and ampicillin.

Often, a UTI can be cured with 1 or 2 days of treatment if the infection is not complicated by an obstruction or nervous system disorder. Still, many doctors ask their patients to take antibiotics for a week or two to assure that the infection has been cured. Single-dose treatment is not recommended for some groups of patients, for example, those who have delayed treatment or have signs of a kidney infection, patients with diabetes or structural abnormalities, or men who have prostate infections. Longer treatment is also needed by patients with infections caused by Mycoplasma or Chlamydia, which are usually treated with tetracycline, trimethoprim/sulfamethoxazole (TMP/SMZ), or doxycycline. A followup urinalysis helps to confirm that the urinary tract is infection-free. It is important to take the full course of treatment because symptoms may disappear before the infection is fully cleared.

Severely ill patients with kidney infections may be hospitalized until they can take fluids and needed drugs on their own. Kidney infections generally require several weeks of antibiotic treatment. Researchers at the University of Washington found that 2-week therapy with TMP/SMZ was as effective as 6 weeks of treatment with the same drug in women with kidney infections that did not involve an obstruction or nervous system disorder. In such cases, kidney infections rarely lead to kidney damage or kidney failure unless they go untreated.

Various drugs are available to relieve the pain of a UTI. A heating pad or a warm bath may also help. Most doctors suggest that drinking plenty of water helps cleanse the urinary tract of bacteria. For the time being, it is best to avoid coffee, alcohol, and spicy foods. (And one of the best things a smoker can do for his or her bladder is to quit smoking. Smoking is the major known cause of bladder cancer.)

Recurrent Infections in Women

About 4 out of 5 women who have a UTI get another in 18 months. Many women have them even more often. A woman who has frequent recurrences (three or more a year) should ask her doctor about one of

the following treatment options:

- Take low doses of an antibiotic such as **TMP/SMZ** or nitrofurantoin daily for 6 months or longer, (If taken at bedtime, the drug remains in the bladder longer and may be more effective.) NIH-supported research at the University of Washington has shown this therapy to be effective without causing serious side effects.
- Take a single dose of an antibiotic after sexual intercourse.
- Take a short course (1 or 2 days) of antibiotics when symptoms appear.

Dipsticks that change color when an infection is present are now available without prescription. The strips detect nitrite, which is formed when bacteria change nitrate the urine to nitrate. The test can detect about 90 percent of UTI's and may be useful for women who have recurrent infections.

Doctors suggest some additional steps that a woman can take on her own to avoid an infection:

- Drink plenty of water every day. Some doctors suggest drinking cranberry juice, which in large amounts inhibits the growth of some bacteria by acidifying the urine. Vitamin C (Ascorbic Acid) supplements have the same effect.
- Urinate when you feel the need; don't resist the urge to urinate; *Wipe from front to back to prevent bacteria around the anus from entering the vagina or urethra;
- Take showers instead of tub baths;
- Cleanse the genital area before sexual intercourse;
- Avoid using feminine hygiene sprays and scented douches, which may irritate the urethra.

Infections in Pregnancy

A pregnant woman who develops a UTI should be treated promptly to avoid premature delivery of her baby and other risks such as high blood pressure. Some antibiotics are not safe to take during pregnancy. In selecting the best treatments, doctors consider various factors such as the drug's effectiveness, the stage of pregnancy, the mother's health, and potential effects on the fetus.

Complicated Infections

Curing infections that stem from a urinary obstruction or nervous system disorder depends on finding and correcting the underlying problem, sometimes with surgery. If the root cause goes untreated, this group of patients is at risk of kidney damage. Also, such infections tend to arise from a wider range of bacteria, and sometimes from more than one type of bacteria at a time.

UTI's are unusual in men. They usually stem **from** an obstruction -- for example, a urinary stone or enlarged prostate -- or a medical procedure involving a catheter. The first **step** is to identify the infecting organism and the drugs to which it is sensitive. Usually, doctors recommended lengthier therapy in men than in women, in part to prevent infections of the prostate gland. Prostate infections (prostatitis) are harder to cure because antibiotics are unable to penetrate infected prostate tissue effectively. For this reason, men with prostatitis often need long-term treatment with a carefully selected antibiotic.

WHAT IS THE URINARY TRACT?

The urinary tract makes and stores urine, one of your body's liquid waste products. The **kidneys** produce 1.5 to 2 quarts of urine every day by removing waste and water from the blood. The urine travels from the kidneys down two narrow tubes, the ureters. It is then stored in a balloon-like container called the bladder.

In an adult, the bladder can hold 10 to 20 ounces of urine (about as much liquid as in one can of soda).

When the bladder is about half full, you may begin to feel the need to empty it by urinating. Urine is carried out of the body through the urethra, a tube that begins at the bottom of the bladder. The end of the urethra is near the top of the vagina in women. In men the urethra passes through the prostate gland and exits at the tip of the penis.

Normal urine contains no bacteria (sometimes referred to as 'germs'), but bacteria do cover your skin and are present in large numbers in the rectal area and in your bowel movements. Bacteria may, at times, get into the urinary tract (and the urine) and may travel up the urethra into the bladder. When this happens, the bacteria cause infection and inflammation of the bladder. In other words, they multiply, causing irritation, swelling, and pain. Bladder infection, also called cystitis, is the most common urinary tract infection.

If the bacteria travel upward from the bladder through the ureters and reach the kidneys, you may develop a kidney infection, also known as pyelonephritis. Kidney infections are much less common but often more serious than bladder infections.

WHAT ARE THE SIGNS OF A URINARY TRACT INFECTION?

When you have a urinary tract infection, the lining of the bladder and urethra becomes irritated just as the inside of your nose or throat does when you have a cold. The irritation can cause pain in your abdomen and pelvic area and may make you feel the need to constantly empty your bladder.

Your need to urinate may seem urgent; but when you try to do so, you may produce only a few drops of urine. In addition, you may feel a burning sensation as the urine comes out. It may even be hard to control; in fact, some urine may leak onto your clothing. You may notice that the urine has an unpleasant odor or a cloudy look. At times, bladder infections may also cause low back pain, fever, or chills.

Kidney infections produce fever and back pain much more commonly than do bladder infections. If a kidney infection is not treated promptly, the bacteria may spread to the bloodstream and cause a life-threatening infection.

In an infant or young child, the signs of a urinary tract infection may not be clear, especially if the child is too young to tell you just how he or she feels. Instead, the child may be irritable, not eat as much as usual, have a fever or loose bowel movements, or just not seem healthy. If the symptoms last more than a day, they may signal the need to see a doctor.

HOW DO YOU FIND OUT WHETHER YOU HAVE A URINARY TRACT INFECTION?

Only by consulting a doctor can you find out for certain whether you or your child has a urinary tract infection. If you think that such an infection might be present, check with your doctor. If you see blood in the urine, you should see your doctor right away. Because bloody urine is not normally caused by an infection, it may mean that you have a different urinary tract problem.

Your doctor will try to find out whether you have a urinary tract infection by examining samples of your urine under a microscope. If an infection is present, the physician may also perform a urine culture, a process in which bacteria from infected urine are grown in a laboratory. The germs can then be identified and tested to see which drugs will provide the most effective treatment. It often takes a day or two, however, to complete this testing.

HOW ARE THESE INFECTIONS TREATED?

Urinary tract infections are treated with antibiotics (infection-fighting drugs), which are generally taken

by mouth. Your doctor will choose a drug that treats the bacteria most likely to be causing your infection. Once the test results are in, however, the physician may switch you to another antibiotic, one that is more effective against the particular bacteria found in your urine.

The number of days you must take medication and the number of doses you must take each day depend, in part, on the type of infection you have and how severe it is. You usually will have to take the medicine for at least 2 to 3 days and possibly for as long as several weeks. The daily treatment schedule your doctor recommends depends on the specific drug prescribed: It may call for a single dose each day or up to four daily doses.

A few doses of the antibiotic may relieve you of the need to urinate often and most of the pain from a bladder infection. It may be several days, however, before the bladder infection and its symptoms vanish completely. In any case, it is important to take the medicines as prescribed by your doctor and not to stop them simply because the symptoms have gone away. Unless urinary tract infections are fully treated, they frequently return.

When you have a urinary tract infection, you should drink fluids whenever you are thirsty. It is not necessary to drink large amounts, but you should make certain that your body has the liquid it needs.

If the urinary tract infection is severe, it may involve the kidneys. In that case, antibiotic drugs may have to be injected. Hospital treatment with medication given intravenously (injected directly into the bloodstream) is sometimes necessary.

FACTS ABOUT URINARY TRACT INFECTIONS

- Every year, 8 to 10 million visits to doctors occur because of urinary tract infections.
- The bacteria that cause urinary tract infections are treated with bacteria-killing drugs called antibiotics.
- Women are usually more prone to urinary tract infections than men or children are.
- 1 to 2 percent of children develop urinary tract infections.
- Young children have the greatest risk for kidney damage due to urinary tract infections.
- Certain people who get one or more urinary tract infections may need further testing to make sure that they do not have other health problems.

WHY DO YOU GET A URINARY TRACT INFECTION?

Some people, mainly women, develop urinary tract infections because they are prone to such infections the way other people are prone to getting coughs or colds. Urinary tract infections are much less common in men and children than in adult women.

A number of factors may increase a person's risk of getting a urinary tract infection. Some of these factors include:

- having certain diseases (such as diabetes) or an abnormal urinary system
- recently having had a medical instrument inserted into the urethra
- sexual contact

A urinary tract infection in a man or child may be the sign of an abnormal urinary tract. For this reason, when men or children are found to have a urinary tract infection, they may be referred to a urologist (a

specialist in diseases of the urinary system and the male reproductive system) for additional tests and x-rays.

WILL YOU NEED FURTHER TESTS AFTER THE INFECTION IS GONE?

Once your infection has cleared, your doctor may recommend that you have additional tests. The tests are performed to assure that there are no abnormalities in the urinary tract that might result in kidney damage from urinary tract infections. Certain types of patients are most likely to need the tests; these types include:

- young children
- men
- people who have urinary tract infections that are frequent or that won't go away with treatment
- people who have had fever with the infection
- people who have had blood in the urine

WHAT ELSE MAY FEEL LIKE A URINARY TRACT INFECTION?

The symptoms of a urinary tract infection may resemble those of other urinary tract diseases. If no infection can be found or the infection won't go away, your doctor may refer you to a urologist to find out why. Other problems that the urologist may look for are described below:

- Urethritis may be either an inflammation or an infection of the urethra. When infection is present in the urethra, the condition often is due to bacteria passed by sexual contact.
- Interstitial cystitis is a bladder irritation found mainly in adult women; its cause is not known.
- Urinary stones sometimes develop in the bladder, irritating it and causing symptoms similar to those of urinary tract infection. On occasion, the stones have bacteria inside that trigger hard-to-cure infections.
- Bladder tumors (cancerous or noncancerous growths), when present, may irritate the bladder. The symptoms often include a frequent need to urinate and possibly blood in the urine.
- Prostatitis is an inflammation or infection of the male gland, the prostate, which surrounds the urethra just below the bladder. In adult males, prostate disorders may cause symptoms that resemble those of urinary tract infections.

DO URINARY TRACT INFECTIONS HAVE LONG-TERM EFFECTS?

Urinary tract infections in most adults can be successfully treated without causing long-term problems.

Young children have the greatest risk for kidney damage from urinary tract infections. Such damage may lead to poor kidney function, high blood pressure, and other problems. For this reason, it is important that children with urinary tract infections receive prompt treatment and careful checkups.

Pregnant women with a history of repeated urinary tract infections should have their urine tested often. Urinary tract infections during pregnancy can cause serious kidney infections in the mother and possible risks for the baby.

WHAT'S NEW

The most common bacteria to cause urinary tract infections is *E. coli*. Many researchers are studying the possibility of a vaccine against *E. coli* that is given on a monthly basis vaginally. Results are very preliminary but hopeful.

WHAT STEPS CAN YOU TAKE TO HELP PREVENT THESE INFECTIONS?

The following are steps you can take to reduce your risk of getting a urinary tract infection:

- Don't postpone--urinate when you feel the urge.
- Don't rush--take the time when you urinate to empty your bladder completely.
- Respond to your body's signals of thirst by drinking enough water or other liquids every day.
- Urinate **after** having sex. (Of course, using condoms during intercourse--practicing safe sex--is wise for many reasons.)

Consult your doctor at the **first** sign of a problem. Urinary tract infections are very common, and they are easiest to treat if caught before they become severe or spread beyond the bladder.

This information is provided largely by the BLADDER HEALTH COUNCIL c/o American Foundation for Urologic Disease. For more information call 1-800-242-2383.