

Patient information from the BMJ Group

Kidney infection

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Kidney infection

Having a kidney infection can make you feel very ill, but if you don't have any other health problems and you get the right treatment, you should make a quick recovery. Kidney infections can affect men and women of all ages, but they're most common in women.

Most of the research has looked at women who aren't pregnant, so this information is mostly relevant to them. Pregnant women may need to be treated in hospital.

Although most of the research has looked at women, treatment is similar for men and women.

We've brought together the best research about kidney infections and weighed up the evidence about how to treat them. You can use our information to talk to your doctor and decide which treatments are best for you.

What is a kidney infection?

Your kidneys are the organs in your body that make urine. You have two of them, each one about the size of a fist. They sit near the middle of your back, just below your ribs. They filter water and waste products out of your blood to make urine.

Urine drains from your kidneys down tubes called **ureters**. You have two ureters, one for each kidney. Both ureters empty into your bladder. Urine is stored in your bladder until you go to the toilet. When you urinate, urine passes out of your body from the bladder through a tube called the **urethra**.

The part of your body that makes and gets rid of urine is called your **urinary tract**. Your urinary tract includes your kidneys, ureters, bladder, and urethra.

You can get an **infection** in your urinary tract when tiny organisms, usually **bacteria**, get into your urethra and start to multiply.^[1]

An infection that stays in your urethra is called **urethritis**. If it spreads to your bladder, it's called **cystitis**. Doctors sometimes call infections in your bladder or urethra **lower urinary tract infections**.

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An infection in the lower part of your urinary tract may spread up your ureters to infect one or both kidneys. The medical name for a kidney infection is **pyelonephritis**. Doctors sometimes call kidney infections **upper urinary tract infections**.

If a doctor just says "urinary tract infection" or "UTI", they probably mean urethritis or cystitis. To read more, see our information on [Cystitis](#) .

There are two main types of kidney infections: uncomplicated and complicated. ^[2] ^[3] ^[4]

- An **uncomplicated kidney infection** occurs when a person with a normal urinary tract and a healthy **immune system** gets infected with a common type of bacteria. This type of kidney infection is most common in women aged 18 to 40.
- A **complicated kidney infection** happens when the infection is more serious for some reason. It might be caused by bacteria that aren't as easy to kill with drugs. Or you could have another medical condition that makes your kidney infection worse, or means your body can't fight it off as well as it should.

To learn more, see [Types of kidney infection](#) .

Kidney infection: why me?

Anyone can get a kidney infection, but there may be things about you and your life that make it more likely. These are called risk factors. For women, the risk factors for kidney infections are the same as the risk factors for bladder infections (cystitis). Risk factors for women include: ^[5]

- Having sex (including oral sex or anal sex) often. We don't know exactly why sex increases your risk of infection, but it probably makes it more likely that bacteria can get into your body from the area around your genitals ^[5]
- Using a spermicide for contraception. Spermicide kills some of the protective bacteria that live in your vagina ^[5]
- Having a new sex partner in the last year
- Having had a urinary tract infection, such as cystitis, in the last year
- Having a mother with a history of urinary infections
- Having **diabetes**
- Leaking urine, for example, when you cough or sneeze. To read more, see our information on [Stress incontinence](#) .

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Types of kidney infection

There are two main types of kidney infections. ^[6] ^[7] ^[8]

- **Uncomplicated kidney infections.** This is when a person with a normal urinary tract and a healthy immune system gets infected with a common type of bacteria. This type of kidney infection is most common in women aged 18 to 40.
- **Complicated kidney infections.** This is when the infection is more serious for some reason. It might be caused by bacteria that aren't as easy to kill with drugs. Or you could have another medical condition that makes your kidney infection worse, or means your body can't fight it off as well as it should.

You may be more likely to get a complicated kidney infection if you:

- Are over 60
- Have a blockage or another problem with your urinary tract
- Have kidneys that don't work properly
- Have a kidney stone
- Already need a **catheter** (a tube to drain urine from your bladder)
- Have a problem that affects your immune system. Your immune system is made up of all the parts of your body that help fight disease
- Have recently had your bladder and urethra examined with an instrument called a **cystoscope**
- Are pregnant
- Get infected by less common bacteria that are difficult to treat with antibiotics .

Men are more likely than women to get complicated kidney infections. That's partly because they have prostate glands, which can swell and block the flow of urine.

If you have a complicated kidney infection, you're likely to feel more ill than you would with an uncomplicated infection. ^[8] You may need to be treated in hospital.

Most kidney infections are **acute**. This means they come on suddenly and go away after treatment. But some people get a **chronic** kidney infection. Chronic is a word doctors use to describe a condition you have for a long time. It doesn't mean that a condition is any more serious. People usually get a chronic kidney infection only if they also have another medical problem with their kidneys. ^[9]

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The bacteria that cause kidney infections nearly always reach the kidneys by travelling up from the urethra and the bladder. Sometimes, the infection reaches the kidneys through the bloodstream. But this is rare in healthy people. ^[7]

More than 8 in 10 uncomplicated kidney infections are caused by bacteria called *Escherichia coli*, or *E. coli* for short. ^[6]

E. coli also causes more than half of all complicated kidney infections. People with this type of infection often have strains of *E. coli* that are more difficult to treat with antibiotics. ^[10]

What are the symptoms of a kidney infection?

Most people with kidney infections look and feel very ill. The symptoms usually come on suddenly over a few hours or one day.

The main symptoms are: ^[11] ^[12]

- A high temperature
- Chills and shivering
- Pain and tenderness in one of your sides, or in both sides
- Feeling sick or vomiting
- Diarrhoea
- Back pain.

Your kidneys make urine and help to pass it out of your body. So a kidney infection may mean you need to urinate often. You may also get pain when you urinate or pain in your pelvis.

Your urine may also look cloudy or be a different colour. It may smell bad or just smell stronger than usual. ^[13]

Older people with kidney infections sometimes have different symptoms. These could be: ^[14]

- A high temperature without any other symptoms
- Confusion and sluggishness
- Loss of appetite.

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About 33 in 100 older people with a kidney infection don't get a high temperature. About 20 in 100 have symptoms that mainly affect their bowels or their lungs.^[11]

Some people with a kidney infection get very few symptoms or even none at all. This is known as a **silent kidney infection**.^[11]

Infections in other parts of your body that deal with urine, such as your bladder or urethra, can also cause pain when you urinate or make you need to urinate more often. These parts of your body are called your **lower urinary tract**. It's possible to get a kidney infection and just have the symptoms of an infection in your lower urinary tract.

Some researchers think that up to 30 in 100 people who seem to have an infection in the lower part of their urinary tract actually have a silent kidney infection.^{[11] [15] [16]}

You are more likely to have a silent kidney infection if you:^[11]

- Have **diabetes**
- Are taking drugs that weaken your **immune system**
- Have had a kidney transplant
- Are pregnant
- Had urinary tract infections before you were 12
- Have had three or more urinary tract infections in the last year.

The symptoms of a kidney infection can be similar to those of other illnesses. For example, [pelvic inflammatory disease](#), an **inflamed** gall bladder, [appendicitis](#), and [kidney stones](#) can all cause similar symptoms.^[11] To check if you really have a kidney infection, your doctor may ask you for a urine sample. Your urine can then be tested for signs of infection.

You will be asked to wash your genital area and collect a sample of urine halfway through urinating.^[17] This way of collecting urine helps stop **bacteria** on the skin around your genital area from getting into the sample and confusing the test results.

There are two parts to the urine test:

- First, your urine is checked with a dipstick to look for pus.^[11] Pus is a thick white or yellowish fluid that can form where you have an infection. It's made up of dead body tissue, bacteria, and **white blood cells**
- Next, any bacteria found in your urine are grown in a laboratory and tested to see which drug works best against them.^{[11] [18]}

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These may be the only tests that you need. If you have to be treated in hospital, you'll probably also have a blood test to check whether the infection has spread to your bloodstream. ^[11]

Some people need further tests, such as an x-ray , ultrasound , or CT scan . Your doctor might want to check if you have a blockage or another problem with your bladder or the tubes that carry urine. You may need more tests if: ^[18]

- Your doctor isn't sure that you have a kidney infection
- You're very ill or have a weakened immune system
- You don't get better with antibiotics
- Your doctor thinks the infection has led to another health problem (a complication, such as scarring or pus in your kidneys).

How common are kidney infections?

We don't know exactly how many people get kidney infections. There hasn't been much research.

Each year in the UK, about 5 in 1,000 people see their GP with signs of a kidney infection. ^[19]

Kidney infections affect people of all ages. But some people are more likely to get infections than others.

- In babies up to 1 year old, kidney infections are most common in boys. But after that, girls are 10 times more likely to get them than boys. ^[20]
- In adults, kidney infections are more common in women up to the age of 65. After this age, men catch up, because prostate problems increase older men's risk of kidney infections. ^[21]
- Pregnant women are particularly likely to get kidney infections. About 1 or 2 in 100 pregnant women get a kidney infection. ^[22]

What treatments work for kidney infections?

The usual treatment for a kidney infection is a drug called an antibiotic. There are lots of different antibiotics.

- Antibiotics work by killing bacteria . They can be given as tablets or a drip into a vein (also called an intravenous infusion or IV). Most people take a course of tablets at home.

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- If you have a more severe kidney infection, you may need to go into hospital. You'll probably be put on an antibiotic drip and you may have tablets as well.
- There are lots of different antibiotics. The ones that have been tested for kidney infections all seem to work about as well as each other. However, some types of bacteria have become **resistant** to some antibiotics. This means that these drugs no longer kill some kinds of bacteria.
- If you're pregnant, a kidney infection can cause you to go into labour too soon. You'll probably need treatment in hospital.
- There hasn't been much research on which painkillers work best for people with kidney infections. Drugs like ibuprofen (nonsteroidal anti-inflammatory drugs, or NSAIDs) aren't usually recommended because they can have harmful effects on your kidneys. To read more, see [Painkillers for people with a kidney infection](#) . Your doctor may recommend paracetamol instead.

We've looked at the best research and given a rating for each treatment according to how well it works. Most of the research looks at kidney infections in women who aren't pregnant, so that's what we talk about here. But the same treatments are used for men with kidney infections.

The research also looks mainly at women with **uncomplicated kidney infections**. An uncomplicated infection occurs when a person with a normal urinary tract and a healthy immune system gets infected with a common type of bacteria. To read more, see [Types of kidney infection](#) .

Treatment Group 1

Treatments for kidney infections

Treatments that are likely to work

- [Antibiotic tablets](#)
- [Antibiotics given by a drip in hospital](#)

Treatments that need further study

- [Having an antibiotic drip and antibiotic tablets together](#)

What will happen to me?

We can't say exactly what will happen if you have a kidney infection. Some people get better quickly with treatment. But these infections can be serious. Some people need treatment in hospital.

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What will happen to you depends on several things. These include: ^[23] ^[24]

- How bad your **infection** is
- How old you are
- Whether you have other health problems
- Whether you get the right medicine
- Whether treatment works for you.

If your doctor thinks you have a kidney infection, you'll probably need to give a urine sample. This can be tested to find out what kind of **bacteria** are causing your symptoms. Your doctor can then prescribe the type of drug that's best at killing those bacteria. To read more about giving a urine sample, see [What are the symptoms of a kidney infection?](#)

Your treatment also depends on whether your kidney infection is complicated or uncomplicated. If your infection is complicated, it means it's more serious for some reason. You might have another medical condition that makes your infection worse, for example.

Being treated at home

If you have an uncomplicated infection, you'll probably be treated at home. If you get the right treatment, you should be feeling much better within a few days. You'll probably be completely cured after two weeks. ^[25]

About 9 in 10 people with an uncomplicated infection can be treated at home. But your doctor needs to make sure that you: ^[23]

- Can take drugs as tablets (and that you don't need to be given drugs as a drip). For example, if you're being sick a lot you might not be able to take tablets
- Have good support at home.

If you're treated at home, you'll probably be advised to take paracetamol to reduce pain and fever. To read more, see [Painkillers for people with a kidney infection](#) . You'll also be advised to drink plenty of fluids.

You'll need to see a doctor for check-ups. Let your doctor know if you are not getting better, or are getting worse, after a few days. ^[26]

Being treated in hospital

You'll need to be treated in hospital if: ^[27]

- You're being sick a lot and can't keep fluids down

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- You're no better after three days or you're getting worse
- You have signs of sepsis. Sepsis is a dangerous problem caused by bacteria getting into your bloodstream
- Your doctor isn't sure your symptoms are caused by a kidney infection
- Your **urinary tract** is blocked. Your urinary tract includes your kidneys, bladder, and the tubes that carry urine.

You may need to go to hospital if you:

- Are over 60
- Are pregnant
- Have another health problem that affects your urinary tract
- Have an **immune system** that's been weakened and can't fight disease as well as it should. This could be because of **diabetes**, cancer, or an organ transplant
- Think you would find it difficult to get to follow-up appointments
- Don't have good support at home.

Women with a kidney infection are about five times more likely than men to need treatment in hospital. ^[23]

If you're treated in hospital, you'll probably be given antibiotics as a drip into a vein (also called an **intravenous infusion** or IV). Drugs given as a drip work quickly because they go straight into your bloodstream. Once you're feeling better, usually after two or three days, you'll probably move on to antibiotic tablets. ^[28]

How long will I need treatment?

Most people need to take antibiotics for about two weeks. But if you have a mild infection, taking them for one week may be enough. ^[28] If you have a [complicated kidney infection](#), you may need to take antibiotics for as long as three weeks. ^[24] It's very important to finish the course of tablets, even if you feel better before you've finished taking them.

You should have another urine test one or two weeks after you finish taking antibiotics. This is to make sure that you're not infected any more. ^[23]

Sometimes antibiotic treatment doesn't work. This may happen if: ^[23]

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- The bacteria that are causing the infection have become **resistant** to the particular drug you've been given. This means the bacteria have changed and can't be killed by that drug. You'll need to be given another drug
- You have a kidney stone. You may need an operation to remove it.

What complications could I get?

Although most people get better completely with treatment, some go on to have complications. These can include: ^[29]

- A build-up of pus in your kidney, called an **abscess**. You may need an operation to remove the pus
- **Sepsis**. This is a serious illness caused by bacteria getting into your bloodstream. The bacteria make poisonous chemicals which can make you very ill. If you get sepsis, you'll need intensive care in hospital and antibiotics given through a drip
- **Sudden kidney failure**. This is when your kidneys stop working. It's a serious problem, and you'll need intensive care in hospital, but it usually gets better. While your kidneys aren't working, you may need a treatment called **dialysis**. Dialysis uses a machine to filter your blood and remove waste and fluids in the same way your kidneys would.

Some people get repeated kidney infections. This can lead to scarring and permanent damage to the kidney. ^[30] These infections usually happen less often with time, but your doctor may recommend that you take a small dose of an antibiotic every day to prevent them. ^[26]

It's rare for a kidney infection to be bad enough to die of, but it can happen. Men are more likely to die from a kidney infection than women. About 16 men die for every 1,000 who have a kidney infection. For women, it's only about 7 in 1,000. ^[31]

Treatments:

Antibiotic tablets

In this section

Antibiotics are the standard treatment for kidney infections. If you have an uncomplicated kidney infection and you're well enough not to need treatment in hospital, you'll be given antibiotic tablets to take at home. An uncomplicated infection occurs when a person with a normal urinary tract and a healthy **immune system** gets infected with a common type of bacteria. To read more, see [Types of kidney infection](#) .

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You'll probably be given tablets for one or two weeks, depending on how severe your infection is. ^[34] Some doctors recommend that you take antibiotics for at least 10 days. ^[35]

Medical studies often compare a treatment with a dummy treatment (a **placebo**). However, these types of study can't be done for people with kidney infections. Antibiotics have been used for a long time and doctors know they work. So it would be unfair not to give some people antibiotics, just to do a study.

However, researchers have looked at how well the different antibiotics work compared with each other. Two reviews of the research compared several antibiotics and found they all worked about as well as each other. ^[36] ^[37]

Some of the antibiotic tablets that have been studied for people with kidney infections are:

- Amoxicillin (brand name Amoxil)
- Ampicillin (Penbritin)
- Ciprofloxacin (Ciproxin)
- Co-amoxiclav (Augmentin)
- Co-trimoxazole, a combination of two antibiotics: trimethoprim and sulfamethoxazole (Septrin)
- Cefaclor (Distaclor)
- Levofloxacin (Tavanic)
- Pivmecillinam (Selexid)
- Trimethoprim

Some doctors prefer not to use ampicillin or amoxicillin because the bacteria that cause kidney infections are becoming increasingly **resistant** to them. This means that these drugs no longer kill some kinds of bacteria. Some guidelines do not recommend the antibiotic trimethoprim for similar reasons. ^[38]

How resistant bacteria are to particular antibiotics varies from place to place. In some areas, doctors are also advised not to prescribe co-trimoxazole unless they've done tests to make sure the bacteria causing the infection aren't resistant to it. ^[34] ^[39]

There hasn't been any research to say whether taking antibiotics as tablets works better than [antibiotic drips](#), or how long you need to take antibiotics.

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You should always finish your course of treatment, even if you're feeling better before you've finished taking them.

Antibiotics can cause side effects.^[40] Some people get diarrhoea, but antibiotics can also cause more serious problems. Older people are especially at risk.

Antibiotics given by a drip in hospital

In this section

If you have an uncomplicated kidney infection and you're treated in hospital, you may be given antibiotics through a drip (also called an intravenous infusion or IV). An uncomplicated infection occurs when a person with a normal urinary tract and a healthy immune system gets infected with a common type of bacteria. To read more, see [Types of kidney infection](#) .

Antibiotic drugs kill bacteria. Giving drugs through a drip means they work quickly, because they go straight into your bloodstream.

Medical studies often compare a drug with a dummy treatment (a placebo). But it wouldn't be fair to do this for people with kidney infections, because antibiotics have been used for a long time and doctors know they work.

Some studies have compared different antibiotics with each other. Most women in the study got better after being treated with antibiotics. But it isn't clear which ones are best.^[41] Choosing an antibiotic is complicated by the fact that many strains of bacteria have become resistant to certain antibiotics. That means some antibiotics won't work against some types of infection. That's likely to vary in different parts of the country. Doctors are advised by their local health authorities about which antibiotics to use in which areas.

There hasn't been any research to say whether antibiotic drips work better than [tablets](#) , or how long you need to take antibiotics.

Antibiotics may have side effects. Side effects differ for different antibiotics.^[42]

Having an antibiotic drip and antibiotic tablets

In this section

There hasn't been enough research to say whether having antibiotics as both tablets and a [drip](#) works better than having [tablets](#) on their own.

However, it's quite common to have antibiotics as a drip to start with, then switch to having tablets. Your doctor may suggest that you switch, based on how well you're recovering.

Further informations:

Painkillers for people with a kidney infection

Kidney infections can be painful, and your doctor may suggest you take painkillers to help. If you're in a lot of pain, make sure you tell your doctor. He or she can prescribe a stronger painkiller or a higher dose.

Paracetamol

Paracetamol reduces pain and fever. You can buy it from a pharmacy. Your doctor may recommend it if you're being treated for a kidney infection at home. But there hasn't been any research saying how much it helps people with a kidney infection.

Taking too much paracetamol can cause serious liver damage.^[32] Be careful not to take more than the recommended dose printed on the packet.

Nonsteroidal anti-inflammatory drugs

Nonsteroidal anti-inflammatory drugs (NSAIDs) are drugs that reduce pain and inflammation. Aspirin and ibuprofen (brand name Nurofen) are both NSAIDs. You can buy these drugs from a pharmacy or get larger doses on prescription from your doctor.

There isn't any good research on how well NSAIDs work for people with kidney infections. However, a side effect of NSAIDs is that they sometimes cause kidney damage. If you have a kidney infection, your doctor may recommend that you avoid these drugs or only take a low dose.^[33]

Urinary analgesics

Drugs called urinary analgesics reduce pain caused by urinary tract infections. These tablets relax the muscles of the urinary tract.

Three types of drugs are used: flavoxate (brand name Urispas), pargeverine, and phenazopyridone. Only flavoxate is available in the UK. It's usually used for people with a type of incontinence called urge incontinence.

There isn't any good research to say whether these drugs work to relieve pain caused by kidney infections.

Glossary:

infection

You get an infection when bacteria, a fungus, or a virus get into a part of your body where it shouldn't be. For example, an infection in your nose and airways causes the common cold. An infection in your skin can cause rashes such as athlete's foot. The organisms that cause infections are so tiny that you can't see them without a microscope.

bacteria

Bacteria are tiny organisms. There are lots of different types. Some are harmful and can cause disease. But some bacteria live in your body without causing any harm.

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immune system

Your immune system is made up of the parts of your body that fight infection. When bacteria or viruses get into your body, it's your immune system that kills them. Antibodies and white blood cells are part of your immune system. They travel in your blood and attack bacteria, viruses and other things that could damage your body.

diabetes

Diabetes is a condition that causes too much sugar (glucose) to circulate in the blood. It happens when the body stops making a hormone called insulin (type 1 diabetes) or when insulin stops working (type 2 diabetes).

antibiotics

These medicines are used to help your immune system fight infection. There are a number of different types of antibiotics that work in different ways to get rid of bacteria, parasites, and other infectious agents. Antibiotics do not work against viruses.

prostate

The prostate is a small, solid gland that's about the size of a walnut. Only men have a prostate. The prostate makes the milky fluid that comes out of a man's penis when he has an orgasm. The fluid from the prostate helps keep sperm healthy and also helps them swim freely.

inflammation

Inflammation is when your skin or some other part of your body becomes red, swollen, hot, and sore. Inflammation happens because your body is trying to protect you from germs, from something that's in your body and could harm you (like a splinter) or from things that cause allergies (these things are called allergens). Inflammation is one of the ways in which your body heals an infection or an injury.

white blood cells

White blood cells are the cells in your blood that help your body fight infections. They are part of your immune system. The other cells in your blood, red blood cells, carry oxygen around your body.

X-ray

X-rays are pictures taken of the inside of your body. They are made by passing small amounts of radiation through your body and then onto film.

ultrasound

Ultrasound is a tool doctors use to create images of the inside of your body. An ultrasound machine sends out high-frequency sound waves, which are directed at an area of your body. The waves reflect off parts of your body to create a picture. Ultrasound is often used to see a developing baby inside a woman's womb.

CT scan

A CT scan is a type of X-ray. It takes several detailed pictures of the inside of your body from different angles. CT stands for computed tomography. It is also called a CAT scan (computed axial tomography).

intravenous infusion

When a medicine or a fluid, such as blood, is fed directly into a vein, it's called an intravenous infusion (or IV). To give you an intravenous infusion, a nurse, technician or a doctor places a narrow plastic tube into a vein (usually in your arm) using a needle. The needle is then removed and the fluid is infused (or dripped) through the tube into the vein.

placebo

A placebo is a 'pretend' or dummy treatment that contains no active substances. A placebo is often given to half the people taking part in medical research trials, for comparison with the 'real' treatment. It is made to look and taste identical to the drug treatment being tested, so that people in the studies do not know if they are getting the placebo or the 'real' treatment. Researchers often talk about the 'placebo effect'. This is where patients feel better after having a placebo treatment because they expect to feel better. Tests may indicate that they actually are better. In the same way, people can also get side effects after having a placebo treatment. Drug treatments can also have a 'placebo effect'. This is why, to get a true picture of how well a drug works, it is important to compare it against a placebo treatment.

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