

## Patient information from the BMJ Group

# Urinary tract infections in children

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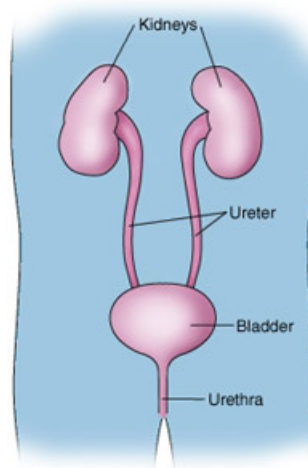
## Urinary tract infections in children

If your child has a fever or is unwell for no obvious reason, they could have a urinary tract infection. These infections can be easily treated, but they are not always easy to spot. A urinary tract infection can damage your child's kidneys, so it's important to see your doctor.

We've brought together the best research about urinary tract infections in children 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 your child.

## What is a urinary tract infection?

A urinary tract infection is caused by germs (bacteria) growing in your child's bladder or the tubes that carry urine. Sometimes bacteria infect the kidneys. An infection can make your child slightly ill or very ill.



Bacteria can travel up the urethra to the bladder and the kidneys.

Children can get an **infection** anywhere along their **urinary tract**.

The urinary tract is made up of:

- The **kidneys**

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- The **bladder**
- The tubes that carry urine from the kidneys to the bladder (called the **ureters**)
- The tube that carries urine from the bladder to the outside (called the **urethra**).

If **bacteria** infect a part of your child's urinary tract, they irritate it. So your child can have symptoms such as discomfort when urinating. <sup>[1]</sup>

Your child's urinary tract is usually free of bacteria. <sup>[2]</sup> But bacteria on the skin around your child's **rectum** or genitals can sometimes travel up the urethra to the bladder and the kidneys. Girls, for example, can get infected by wiping from back to front after a bowel movement, instead of from front to back.

Some children have an abnormal urinary tract, which can make them more likely to get infections there. <sup>[1]</sup> One problem is called **vesicoureteral reflux**, or **reflux** for short. Normally urine flows from the kidneys to the bladder and then to the outside. But in children with reflux, some urine also **flows backwards** from the bladder towards the kidneys. Your doctor might order tests using **ultrasound scans** and **x-rays** to check for reflux. These tests can also tell if your child has a **blockage** in their urinary tract that might be stopping the flow of urine.

If your child has a weak **immune system** (the parts of the body that help to fight infection), they may be more at risk of infections of their urinary tract.

A urinary tract infection of the urethra and bladder is sometimes called **cystitis**. An infection that affects the kidneys is called **pyelonephritis**.

Kidney infections are much more serious than bladder infections and can cause permanent kidney damage. <sup>[3]</sup> Your child might get a high temperature, vomiting, and stomach pain. They will need hospital treatment straight away.

### What are the symptoms of a urinary tract infection?

You might not be able to tell if your child has a urinary tract infection, especially if your child is young and can't describe how they feel. But if your child has a fever or feels unwell for no clear reason, a urinary tract infection could be the cause.

Your child might have a urinary tract infection if they are: <sup>[4]</sup> <sup>[1]</sup>

- Feeling ill for more than a day without having a runny nose or other obvious signs of an illness
- Having a fever
- Feeling irritable or not eating

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- Feeling sick, vomiting, or having **diarrhoea**
- Passing urine that smells unusual or looks cloudy
- Urinating often.

Your child might also:

- Cry or say it hurts to urinate
- Produce only a few drops of urine at a time
- Not be able to control their urine, which can leak onto clothing or bedding.

Older children might also complain of pain in their abdomen. <sup>[4]</sup> <sup>[3]</sup>

If your child is seriously ill, they could have a **kidney** infection, known as **pyelonephritis**. <sup>[3]</sup> Their symptoms would include a **high temperature**, vomiting, and pain and tenderness in their abdomen. Pyelonephritis is the most severe type of urinary tract infection and might need treatment in hospital straight away.

You can find out for certain whether your child has a urinary tract infection only by **seeing your doctor**. <sup>[1]</sup> If your doctor thinks your child might have a urinary tract infection, they will probably test a sample of your child's urine for **bacteria**.

How your doctor will collect a sample of urine depends on how old your child is. Older children can easily urinate into a container. But if your child is not toilet-trained, a nurse can attach a plastic collection bag over their genital area with adhesive tape. You can then put on their nappy as normal. Occasionally, the doctor or nurse will put a small tube into your child's **urethra** and collect the urine directly from their **bladder**.

If your child has had a kidney infection, your doctor might order tests using **ultrasound scans** and **x-rays**. They do this to check for an abnormality in your child's urinary tract that could be causing urine to flow back towards their kidneys (a problem called **reflux**).

### How common are urinary tract infections?

Urinary tract infections are more common in girls than in boys.

About 8 in 100 girls get a urinary tract infection by the time they are 7 years old. <sup>[5]</sup> The figure for boys is 2 in 100. By the age of 16, about 11 in 100 girls and 4 in 100 boys have had an infection. <sup>[6]</sup>

Up to the age of 6 months, boys are more likely to get a urinary tract infection. <sup>[7]</sup> But girls are much more likely than boys to get a urinary tract infection after the age of 6 months.

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## What treatments work for urinary tract infections?

Urinary tract infections are easily treated with antibiotics. But your child might need further treatment if your doctor thinks your child is likely to get another infection that could damage their kidneys.

- If your doctor thinks your child has got a urinary tract infection, they will probably start your child on **antibiotics** straight away, even before they get results of tests to check for **bacteria** (germs) in your child's urine.
- Your child should start to feel better in a day or two. But it's important to give your child antibiotics for **as long as your doctor recommends**, even if your child feels better.
- If your child has had several infections your doctor might recommend giving them a low dose of antibiotics for several months to reduce the risk of more infections. <sup>[4]</sup>
- If your child has an abnormality in their urinary tract that makes them more likely to get infections, your doctor might recommend giving them antibiotics for a long time to help prevent infections and **kidney** damage. If the problem is severe, your doctor might suggest surgery.
- If your child has reflux (an abnormality causing urine to flow back towards their kidneys), they might grow out of it. Only a few children need surgery to correct this problem.

We've looked at the best research and given a rating for each treatment according to how well it works.

### Treatment Group 1

## Treatments for urinary tract infections in children

### Treatments that are likely to work

- [Antibiotics](#)
- [Intravenous \(IV\) antibiotics](#)

### Treatments that are unlikely to work

- [Long-term antibiotics to prevent infections](#)
- [Surgery to prevent infections](#)

# Urinary tract infections in children

## What will happen to my child?

Urinary tract infections are treated with antibiotics. Your child should start to feel better after a day or two of taking the antibiotics.

It's important to make sure your child takes the antibiotics **for as long as your doctor recommends**. Otherwise, there's a risk that your child will get another urinary tract infection. Some children get other problems from having a urinary tract infection, as they get older.

Children are more likely to get another urinary tract infection if they have their first infection before they are 1 year old. The research shows that:<sup>[8]</sup>

- About 8 in 10 girls and 7 in 10 boys who get an infection before they are 1 year old get another one
- About 4 in 10 girls and boys who get an infection after they are 1 year old get another infection.

Urinary tract infections can sometimes scar the **kidneys**. Between 5 in 100 and 15 in 100 children get kidney scarring within one or two years of their first infection.<sup>[9] [10]</sup> Certain things seem to increase your child's risk of kidney scarring. These include:

- Having more infections (the more infections your child has, the greater their risk of scarring)<sup>[11]</sup>
- Having infections of the kidneys (**pyelonephritis**) rather than infections of the **bladder** or ureters (the tubes going from the kidneys to the bladder)<sup>[12]</sup>
- Having an abnormality in the urinary tract that causes urine to flow back to the kidneys (a problem called **reflux**).<sup>[10] [13]</sup> **Reflux often goes away by itself after a while**. One study found that more than one-third of the children no longer had reflux four years later.<sup>[14]</sup> In another study, 4 in 10 children had grown out of their reflux within one year.<sup>[15]</sup>

Scarring seems more likely to happen in younger children (under 2 years) who get a urinary tract infection. It becomes less of a problem in children who get urinary tract infections when they are older.<sup>[16] [17]</sup>

Kidneys that are damaged by infection might not grow well and work as they should. As children with scarred kidneys get older, they are more likely to have kidney infections and other problems, such as **high blood pressure**.<sup>[18]</sup> For this reason, **it's important that your child is examined after an infection** to check for any problems, especially if the infection involved their kidneys.

### Treatments:

#### Antibiotics

In this section

Antibiotics are likely to help your child recover from a urinary tract infection and reduce the risk of kidney damage.

Very few studies have compared antibiotics with a dummy treatment (a **placebo**) for children with urinary tract infections. That's because it would be unfair and possibly dangerous to give children with a urinary tract infection a placebo rather than a treatment that could help them.

If your doctor thinks your child has got a urinary tract infection, they will probably start your child on antibiotics straight away. Your doctor will probably do this even before they know for certain whether your child has got an infection. That's because delaying treatment can increase the risk of kidney scarring.<sup>[19]</sup> To learn more about kidney scarring, see [What will happen to my child?](#)

There are many types of antibiotics and each works in different ways. Your doctor will probably prescribe one of the following:<sup>[4]</sup> <sup>[20]</sup>

- Cefalexin (brand names Ceporex and Keflex)
- Co-amoxiclav (brand name Augmentin)
- Nitrofurantoin (brand names Furandantin and Macrobid)
- Trimethoprim.

Younger children can swallow liquid antibiotics. Older children can take tablets.

Research shows that taking antibiotics for two days to four days can work just as well as taking them for seven days to 10 days.<sup>[21]</sup> <sup>[22]</sup> But it's important that your child finishes all of the antibiotics that your doctor has prescribed, even if they are feeling better. If they don't, the antibiotics might not work so well for your child in the future (this is called **antibiotic resistance**).

Your child is more likely to get side effects if they take antibiotics for a longer time. But these side effects are usually mild.<sup>[23]</sup> Your child might get an upset stomach, **diarrhoea**, or a rash. What side effects your child gets can depend on the antibiotic they take. If your child does get side effects, you should speak to your doctor.

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#### Intravenous (IV) antibiotics

In this section

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If your child is seriously ill, they might have to go to hospital to have antibiotics put directly into their bloodstream. These are known as **intravenous (IV) antibiotics**. They are put into a **vein** in your child's arm or hand.

Most children don't need intravenous antibiotics. Several studies show that taking antibiotics as a liquid or as **tablets** for 14 days works just as well as having intravenous antibiotics for three days and then taking antibiotics as a liquid or as tablets. <sup>[24] [25] [26]</sup>

But if your child has **severe reflux** (a problem with their urinary tract that causes urine to flow backwards towards their kidneys), they might get less kidney scarring if they have intravenous antibiotics first. <sup>[24]</sup>

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## Long-term antibiotics to prevent infections

In this section

If your child has **reflux** (a problem in their urinary tract that causes urine to flow back towards their kidneys), they are at risk of getting more urinary tract infections. So they might need to take antibiotics for a long time.

Four summaries of the research suggested that taking a low dose of antibiotics every day for several months **is unlikely to make much difference in your child's risk of getting more infections**. <sup>[27] [28] [29] [30]</sup> In these studies, the children took antibiotics for between 10 weeks and 18 months.

Your doctor might prescribe a daily dose of:

- nitrofurantoin
- trimethoprim.

Your child can take these antibiotics as a liquid or a tablet.

One summary of the research (a **systematic review**) and one good-quality study found that nitrofurantoin worked better than trimethoprim. <sup>[27] [31]</sup> But more children who took nitrofurantoin stopped the treatment because of side effects such as feeling sick, vomiting, and getting stomach aches. <sup>[27]</sup> Another study found that children taking antibiotics for a long time were more likely to have **bacteria** that became resistant to treatment (this means the bacteria weren't killed off by the antibiotics). <sup>[32]</sup>

There hasn't been any research to tell us how long your child should take antibiotics to prevent urinary tract infections. Also, we need more research to look into how well antibiotics work and how safe it is to take them for a long time.

If your child has not had a urinary tract infection before, and doesn't have reflux, they probably won't need to take long-term antibiotics. <sup>[33]</sup>

### Surgery to prevent infections

In this section

If your child has an abnormality in their urinary tract, their doctor might recommend having an operation. The most common problem is **reflux** (an abnormality that causes urine to flow back towards the kidneys).

The aim of surgery is to prevent further infections and kidney scarring. But several studies of urinary tract infections didn't find that having surgery works any better than taking [antibiotics long term](#).<sup>[34] [35] [14] [36]</sup> (To learn more about kidney scarring, see [What will happen to my child?](#) )

If your child's problem isn't serious, it is unlikely that they will get kidney scarring anyway. So surgery is probably unnecessary for them.<sup>[35] [37]</sup> Also, reflux often gets better on its own.<sup>[14] [15]</sup> Up to 4 in 10 children **grow out of their reflux** without having surgery.<sup>[14] [15]</sup>

But if your child has got **severe reflux**, your doctor might recommend surgery. This is because the reflux is less likely to get better on its own.<sup>[38] [39]</sup> Your doctor might also think about surgery if antibiotics don't stop your child getting infections.

In the operation to correct reflux, surgeons change the way the tubes from the kidneys (the ureters) attach to the **bladder**. This should stop your child's urine flowing back up towards their kidneys.

But the operation can have side effects. About 7 in 100 children get a blockage in their urinary tract after the operation.<sup>[40]</sup> This type of blockage can lead to kidney scarring in about 8 in 10 children.<sup>[41]</sup>

Surgeons can also use a new type of **keyhole surgery** (also called laparoscopic surgery) to correct the problem of reflux without making a surgical cut. The surgeon uses a tube with a light on the end (called an endoscope) to look into your child's bladder through their **urethra**. Then the surgeon injects a gel into the wall of your child's bladder near the ureters. The gel creates a small bulge that stops the urine flowing backwards.

One study found that injecting gel didn't work better than taking antibiotics at preventing more infections.<sup>[15]</sup> The success rate with this type of operation is not as good as with standard surgery. But your child will probably recover faster and be able to go home the same day.

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### Further informations:

#### Glossary:

infection



# Urinary tract infections in children

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.

## **kidney**

Your kidneys are organs that filter your blood to make urine. You have two kidneys, on either side of your body. They are underneath your ribcage, near your back.

## **bladder**

Your bladder is the hollow organ at the top of your pelvis that stores urine. It is similar to a balloon, only with stronger walls. It fills up with urine until you go to the toilet.

## **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.

## **rectum**

The rectum is the last 15 to 20 centimetres (six to eight inches) of the large intestine, ending with the anus (where you empty your bowels from).

## **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.

## **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.

## **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.

## **diarrhoea**

Diarrhoea is when you have loose, watery stools and you need to go to the toilet far more often than usual. Doctors say you have diarrhoea if you need to go to the toilet more than three times a day.

## **high temperature**

A high temperature is a general sign that there is an infection or inflammation in your body. Temperatures vary, but anything over about 38 degrees Celsius (100 degrees Fahrenheit) is considered high.

## **urethra**

Your urethra is the tube that carries urine from your bladder out of your body. In a man, the urethra runs through the inside of the penis. In a woman, the urethra is shorter and opens onto the top of the vagina.

## **high blood pressure**

Your blood pressure is considered to be high when it is above the accepted normal range. The usual limit for normal blood pressure is 140/90. If either the first (systolic) number is above 140 or the lower (diastolic) number is above 90, a person is considered to have high blood pressure. Doctors sometimes call high blood pressure 'hypertension'.

## **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.

## **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.

## **veins**

Veins are blood vessels that carry blood back to your heart after your blood has delivered oxygen and food to the tissues.

## **systematic reviews**

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A systematic review is a thorough look through published research on a particular topic. Only studies that have been carried out to a high standard are included. A systematic review may or may not include a meta-analysis, which is when the results from individual studies are put together.

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