**Science**

E.coli, represented by Erica in this story, is one of the most common causes of bacterial infection in humans. E.coli is most commonly found in the bowel, where it lives without causing infection, apart from a few strains of E.coli which cause gastroenteritis. E.coli are sometimes called coliforms, a colonic form of bacteria. Other bacteria that live in the bowel and are similar to E.coli are also called coliforms, including Klebsiella, Enterobacter and Serratia, for example. E.coli is often antibiotic resistant having plasmids that code for enzymes able to break down antibiotics.

The urinary tract is frequently exposed to colonic bacteria as it is a short distance to the urinary tract from the bowel. Some strains of E.coli, that we call uropathogenic, are uniquely adapted to be able to bind to the urethral epithelial lining and ascend the urinary tract and take advantage of this opportunity. E.coli causes 90% of urinary tract infections.

The most common urinary tract infection cystitis, infection of the urinary bladder. This is often referred to as a water infection by patients. Infection of the bladder normally causes a person to have frequent urination, or frequency and painful urination, or dysuria. It is though also common for people, especially older women, to have E.coli in the urinary tract without having any symptoms. This is called asymptomatic bacteriuria, and does not need antibiotic treatment usually.

In patients with a symptomatic urinary infection e.g. cystitis, who have high concentrations of bacteria in the urine it is possible to test the urine to see if there is evidence of inflammation and bacteria. A dipstick test can be used. The test is dipped into the urine and colour changes suggest the activity of white cells in urine by detecting activity of an enzyme called leucocyte esterase.

Urine samples can also be sent to the microbiology laboratory to look for bacterial growth and which antibiotics will be effective and which antibiotics will be ineffective in treating an infection.

If the wrong antibiotic is used E.coli will survive and the infection will continue.

Urinary infection does not only affect the urinary bladder, but it can also ascend to the kidneys. We call infection of the kidneys pyelonephritis as well. Pyelonephritis causes a patient to have a temperature, pain in the kidneys, and makes them feel unwell. Kidney infection can lead to bacteraemia i.e. bacteria in the blood. We take blood samples from patients which are cultured in the lab, called blood cultures, to investigate this. Blood stream infections are serious infections with a risk of death secondary to sepsis.