

# Drug-resistant bacteria in patients' urine or stools raise risk of drug-resistant sepsis

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People who have recently been found to have drug-resistant bacteria in their urine or stool samples have a greatly increased risk of developing a bloodstream infection that is also resistant to certain antibiotics, according to a study presented at the 27th European Congress of Clinical Microbiology and Infectious Diseases (ECCMID).

Sepsis affects an estimated 30 million people worldwide each year. Without quick treatment, it can lead to multiple organ failure and death. Treating [sepsis](#) can be even more difficult if the [bacteria](#) responsible are resistant to antibiotics.

Presenting the research, Dr Joakim Isendahl from the Karolinska Institutet, Sweden told the congress that in some cases bacteria may be spreading from the bowel or urinary tract into the bloodstream, while in others the bacteria found in patients' urine or [stool samples](#) could be transferring their ability to resist antibiotics to other bacteria in the body, which then can cause sepsis.

The study of 66,000 people showed that the risk of drug-resistant sepsis is highest soon after [drug-resistant bacteria](#) have been detected in a patient's urine or stool, and that this risk diminishes over time. The researchers say their finding could help doctors diagnose drug-resistant sepsis and inform treatment choices.

The research focused on certain bacteria, such as *Escherichia coli*, that produce enzymes called extended spectrum  $\beta$ -lactamases. These enzymes allow bacteria to break down a variety of antibiotics including penicillin and third-generation cephalosporins. These drug-[resistant bacteria](#) are known as extended-spectrum  $\beta$ -lactamase-producing Enterobacteriaceae, or EPE.

Researchers studied all subjects who were found to have these types of bacteria in their urine or stool samples in Sweden between 2007 and 2012, more than 22,000 in total. They compared them

with an equivalent group of 44,000 people who had no diagnosis of EPE. They followed the subjects for six years to find out if they subsequently developed a bloodstream [infection](#).

The data revealed that people whose bowels had been colonised previously by EPE were 57 times more likely to develop an EPE infection of the bloodstream, compared to the [general population](#). For those with a previous finding of EPE in their urine, the risk was 113 times higher than the general population. Over the six-year study period, 2% of those with EPE in the bowel and 4% of those with a [urinary tract](#) infection went on to have a bloodstream infection with EPE. This compares to 0.02% in the general population.

Sepsis is treated with antibiotic drugs injected directly into the blood. One important drug group for sepsis treatment is called carbapenems. Carbapenems are often referred to as 'last-resort' drugs because they are some of the few that are effective against the increasing number of drug-resistant bacteria. Although these are life-saving treatments, experts have warned that over-use will lead to bacteria also developing resistance to carbapenems.

Dr Isendahl presented the work, which he is carrying out as part of his PhD at the unit of infectious diseases, Karolinska Institutet, Sweden. He is also a junior doctor at Skåne University Hospital. He explained: "Although [bloodstream infections](#) are rare, their consequences are dire and treatment must be given as quickly as possible.

"Knowing if a patient has had a previous finding of EPE, and how long ago it was, helps inform doctors on when last-resort drugs are essential, but also on when they are not needed. This is important since prudent use is imperative to keep them effective.

"We found that the riskiest time was in the days and weeks after the bacteria were found in the urine or

stool sample, but there is still an increased risk up to three years later."

The study was conducted with Swedish data because all cases of EPE must be reported to the Swedish Public Health Agency. However, the researchers say their result may apply elsewhere where similar levels of EPE are found, such as other countries in northern Europe.

The researchers did not look in detail at which types of resistant bacteria were involved in the infections. Dr Isendahl said more work is needed to see if it is the same drug-resistant bacteria found in urine or stool samples that also go on to cause sepsis, or if the drug resistance is being passed to different bacteria before infecting the blood stream: "We know that certain EPEs, such as a subtype of *E. coli* called ST131, are prone to colonise the bowel and then go on to cause bloodstream infections. But it is also likely that some relatively harmless bacteria can pass on their antibiotic resistance to other more [dangerous bacteria](#) within our bodies, and it's these that go on to cause the sepsis."

**More information:** Abstract no: EP0430, Gram-negative bacteraemia: risk factors, prophylaxis and treatment, 13:30, Sunday 23 April, ePoster Arena 6

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