

Infection Prevention Snapshot Guide: Escherichia coli (E.coli)

What is *E. coli*?

There are many different types of *Escherichia coli (E.coli)* bacteria, most of which are carried harmlessly in the gut. These strains of *E.coli* make up a significant and necessary proportion of the natural flora in the gut of people and most animals. On average, a baby is colonised with *E. coli* within 40 hours of birth, through its food, water or by contact with other people.

However, when strains of *E.coli* are outside their normal habitat of the gut, they can cause serious infections, several of which can be fatal. Potentially dangerous *E.coli* can exist temporarily and harmlessly on the skin, predominately between the waist and knees (mainly around the groin and genitalia), but also on other parts of the body, i.e. a person's hands after using the toilet.

This guide focuses on those infections caused primarily as a complication of an underlying medical condition or due to a healthcare intervention. These infections can be particularly damaging as the patients may well have a weaker immune system, given that they are already receiving treatment for another medical condition.

E. coli – Background

Over the last 40 years, *E.coli* strains have become increasingly resistant to many antibiotics including one of the most powerful groups of antibiotics - Carbapenems. Antibiotic-resistant strains can persist in the normal gut flora and are a particular problem in elderly patients who move repeatedly between hospital and the care sector, and are more likely to receive numerous courses of antibiotics.

In 2017 NHS Improvement announced the **Ambition to halve healthcare associated Gram-negative blood stream infections (GNBSI) by March 2021**. This group of infections includes *E.coli*. The evidence presented indicates that nationally, these infections may have contributed to approximately 5,500 NHS patient deaths in 2015. It was predicted this issue alone would cost the NHS £2.3 billion by 2018. *E.coli* BSI have increased year on year in the last five years, representing 55% of all Gram-negative BSI and the trend is continuing upwards. This represents an important safety issue and the reduction of *E.coli* BSI, must be addressed. Furthermore, preventing BSI should have a major impact on reducing the need to prescribe antibiotics, which is a key way of reducing the rise in antibiotic resistance.

Can *E.Coli* be transmitted?

Most people carry harmless strains of *E.Coli* in their intestine. Person-to-person transmission can occur through the oral-faecal route. *E.Coli* can be transmitted to other patients via the hands of healthcare workers, via contaminated equipment and environmental contamination.

What is colonisation?

When a bacteria is naturally found on/in the body without causing symptoms/illness it is called colonisation or carriage. Colonisation can be very short term for example an individual may be exposed to *E.Coli* by touching someone but, these micro-organisms are quickly removed when washing your hands. However, colonisation can sometimes develop into an infection which can range from a UTI to a more serious bloodstream infection (BSI).

Medical conditions or healthcare interventions that can lead to an *E. coli* Bloodstream infection

The information below provides a brief overview of the conditions and health care interventions that can lead to an *E.coli* BSI.

E. coli in the bloodstream is usually a result of acute infection of the kidney, gall bladder or other organs in the abdomen. However, all of the infections listed below can lead to a bloodstream infection.

The number of reported *E.coli* bloodstream infections has increased over recent years to the extent it has become the commonest cause of BSI.

Post-surgical wound infections and abscesses

E.coli is a common cause of infections in surgical wounds, especially those following operations on the abdomen where it is often found mixed with other gut bacteria, but it can also be found in other post-operative sites.

Catheter associated urinary tract infections (CAUTI)

E. coli is the commonest organism associated with infection in patients with urinary catheters. In prevalence surveys, catheter associated urine infections (CAUTI) is generally the commonest Healthcare associated infection (HCAI) recorded.

Intensive Treatment Unit (ITU) infections

E. coli commonly and quickly colonises the mouth and upper respiratory tract of patients undergoing artificial ventilation through an endotracheal tube. From there the organisms can move into the lower respiratory tract to cause ventilator-associated pneumonia.

Sepsis (Septicaemia)

Some *E. coli* BSI develop the severe complication known as Sepsis, or Septicaemia. This trigger's a series of clinical events leading to a high temperature, circulatory collapse with low blood pressure and deranged blood clotting known as disseminated intravascular coagulation (DIC). Sepsis has a high mortality.

Gastrointestinal (diarrhoeal) infections

Although the gut is the main natural habitat of *E. coli*, some strains and types are capable of causing diarrhoeal disease that can be severe and life threatening. The best known of these strains is *E. coli* 0157. This and other similar strains produce toxins that cause bloody diarrhoea and, particularly in young children, can cause renal failure and, occasionally, death. A range of animals (including food animals such as cows and sheep) carry these strains harmlessly, but if transmitted to humans severe disease can occur. There is a range of other *E. coli* strains that cause diarrhoea and they probably constitute the commonest cause of travellers' diarrhoea when people travel abroad and quickly acquire new local strains to which they have no resistance.

Urinary tract infection

E. coli is the commonest cause of urinary tract infections. It is often responsible for acute urinary infections in women. Asymptomatic infection is of concern only in pregnant women and young children, in whom it should be treated. Urinary tract infection is the second commonest reason for antibiotic treatment of patients in general practice (after respiratory tract infections).

What are the signs and symptoms of an *E. coli* Urinary Tract Infection?

- Generally feeling unwell
- Loin pain
- Frequency in passing urine
- Burning sensation when passing urine
- Offensive smell or colour
- Haematuria (blood in the urine)

More severe infections involving the kidneys are often associated with back pain and fever.

- Fever / rigors
- Altered mental state
- Reduced mobility
- Headache
- Pelvic pain

How are *E. coli* Urinary Tract Infections diagnosed?

A urine sample is obtained and sent to the microbiology laboratory for testing.

How are *E. coli* Urinary Tract Infections treated?

Patients who are colonised with *E. coli* do not generally require any treatment. Good personal hygiene, good hand washing with liquid soap with running water, and an increase in fluids often help to prevent colonisation turning into an infection. Only patients who show signs and symptoms of an infection, or have a confirmed infection by culture should be prescribed antibiotic treatment following review by a healthcare professional and in line with known sensitivity and resistance.

Intra-abdominal infections.

E. coli is the commonest cause of acute bile duct and gall bladder infection (Cholangitis and Cholecystitis). It plays a major role when patients have peritonitis or infections after surgery to any part of the abdomen. In all of these infections, *E. coli* is generally mixed with a large number of other intestinal bacteria.

What can be done to prevent healthcare associated *E.coli* infection?

- Always wash your hands or use an antibacterial hand rub after you have had any physical contact with a patient – whether the patient has diarrhoea or not.
- Encourage patients to wash their hands after using the toilet, as well as before and after eating.
- Infected patients should be isolated and healthcare workers caring for them should wear gloves and aprons, especially when dealing with bedpans, etc.
- Avoid prescribing broad-spectrum antibiotics, which affect the natural flora of the gut and select for the resistant strains.

You can help to prevent re-occurring Urinary Tract Infections by:

- Drinking plenty of fluids, in line with the recommended daily intake of 1.5 to 2 litres of fluid throughout the day, especially during hot weather. This can include all fluids except alcohol, for example: water, tea, coffee or juice.
- Wipe yourselves from front (vagina) to back (bottom) when cleaning/washing your-self and after using the toilet. This stops bacteria spreading from your bowel into your bladder.
- Avoid waiting to pass urine. Pass urine as a soon as you need a wee.
- Pass urine after having sex to flush out any bacteria that may be near the opening to the urethra.
- Wash the external vagina area with water before and after sex to wash away any bacteria that may be near the opening to the urethra.
- Implement good hand hygiene after toileting
- Eat a well-balanced diet to prevent constipation

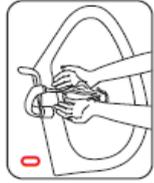
Have you Checked Your Urine? Are You Drinking Enough?

The guide below can be used as a prompt to indicate hydration status and a requirement for additional fluid intake.

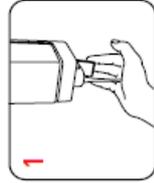
Hydrated Drinking Well	1
	2
	3
Hydrated but Need To Drink a Little More	4
	5
DEHYDRATED Not Drinking Enough DRINK MORE	6
	7
	8

HAND CLEANING TECHNIQUE

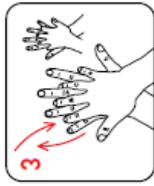
How to handwash WITH SOAP AND WATER



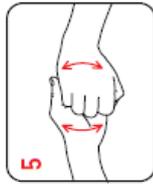
0
Wet hands with water



1
Apply enough soap to cover all hand surfaces



2
Rub hands palm to palm



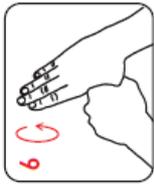
3
Rub back of each hand with the palm of other hand with fingers interlaced



4
Rub palm to palm with fingers interlaced



5
Rub with backs of fingers to opposing palms with fingers interlaced



6
Rub each thumb clasped in opposite hand using rotational movement

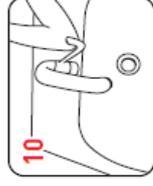


7
Rub tips of fingers in opposite palm in a circular motion

8
Rub each wrist with opposite hand



9
Rinse hands with water



10
Use elbow to turn off tap



11
Dry thoroughly with a single-use towel



12
Your hands are now safe

40-60 sec