

It's holiday time again, but as you get ready to jet off for a well-earned break, don't let a few micro-organisms ruin your holiday!

Travellers' diarrhoea has been defined as 'three or more loose stools in 24 hours with or without at least one symptom of cramps, nausea, fever or vomiting' (Hill & Ryan 2008)

TRAVELLERS' DIARRHOEA

(TD) is the most common illness that affects international travellers. Each year 20–60% of globetrotters, an estimated 10 million people, develop TD. It can be caused by a variety of pathogens – viruses, bacteria and protozoa. These are transmitted by the consumption of contaminated food, water or both. The symptoms usually occur within one week of arriving in a foreign country; however, on occasions they may not develop until sometime later when the traveller has arrived back home. Symptoms are very unpleasant; they include vomiting, diarrhoea, abdominal pain and fever. Although the symptoms are usually self-limiting, clearing up in a couple of days, TD can often wreck a holiday. This article looks at some of the microbes that cause TD and explores how it can be both prevented and controlled.

MICROBES THAT CAUSE TD

The majority of all cases of TD (80%) are caused by bacteria,

boil it,
peel it,
cook it,
wash it or
forget it!

and approximately 40% are due to infections with enterotoxin-forming *Escherichia coli* (EPEC) bacteria. It usually causes mild, self-limiting diarrhoea which lasts for less than 72 hours. Other bacteria that can cause TD are *Campylobacter*, *Shigella* and *Salmonella*. These pathogens often cause bloody diarrhoea known as dysentery.

Bacteria can cause TD in two ways.

- Intact microbial cells infect and attack the cells lining the intestines causing inflammation; this makes it difficult for the body to absorb water and nutrients, leading to diarrhoea
- Some bacteria produce toxins which bind to the cells lining the wall of the intestines, leading to inflammation and diarrhoea.

Travellers' diarrhoea

Viral infections caused by rotaviruses and noroviruses, for example, have only been found in a small proportion of adult cases, but this may be due to lack of investigation. In children they are thought to account for a much higher number of cases (around 70%) of TD.

Protozoan parasites such as *Giardia lamblia* and *Cryptosporidium* frequently cause persisting diarrhoea, i.e. diarrhoea that lasts for more than 14 days.

HOW IS TD TRANSMITTED?

TD is usually transmitted via the faecal–oral route, by ingestion of faecally contaminated food and/or water.

This can occur through:

- water contaminated with faeces not being adequately treated before drinking
- poor hand hygiene after coming into contact with faecal material
- poor kitchen hygiene
- poor or inadequate sanitation

Where food is prepared is thought to affect the risk of contracting TD, for example food prepared in a private home is less risky than food prepared by street vendors.

The area that a person is visiting also affects the likelihood of developing TD. The illness is most common in warm countries where standards of sanitation and hygiene are poor. These are usually countries in the developing world, such as parts of Asia and Africa. Around 30–50% of people travelling from a developed country to a developing country will experience an incident of TD.

However, TD is not confined only to developing

countries. People visiting low-risk countries, such as the USA or those in Western Europe, can still experience TD.

TIPS ON HOW TO PREVENT IT

Food

- Do not eat any uncooked or undercooked food
- Only eat fruit, vegetables or salads that have been peeled or cooked (even if they have been washed they could have been washed with contaminated water)
- Do not eat food sold by street vendors
- Do not eat/drink unpasteurized milk and dairy products

Water

- Do not drink tap water and do not use it to brush your teeth
- Only drink bottled water
- If bottled water is unavailable, then boil tap water to kill off unwanted pathogens – boil water vigorously for 1 minute and allow it to cool to room temperature
- Do not drink bottled water if the seal on the bottle has been broken
- Do not use ice unless you're sure it's made from purified water

Hand hygiene

Be honest – do you always wash your hands immediately prior to eating or preparing food? We all have hundreds of species of bacteria living in our guts and we can develop immunity to bacteria we are frequently exposed to. But your immune system may have never encountered some of the microbes you might meet abroad, so you have to be extra careful. Be scrupulous with hand hygiene: wash your hands thoroughly after visiting the toilet and before eating or preparing food.

TREATMENT OF TD

Most cases of TD are self-limiting, clear up within a few days, and do not require any drug treatment. The following advice may be followed to reduce the symptoms.

- It is essential to drink plenty of fluids to prevent dehydration; oral rehydration powder can be taken if you have lost a lot of water through vomiting or diarrhoea (don't forget to dissolve it in bottled or boiled water)

- Over-the-counter diarrhoea medicines may help; for example, loperamide slows down the action of the bowel and is very effective in treating diarrhoea – you can buy it in a pharmacy without a prescription, but always follow the instructions in the packet
- When diarrhoea persists, antibiotics may help to reduce symptoms if it is caused by a bacterium

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FURTHER READING

Hill, D.R. & Ryan, E.T. (2008). Management of travellers' diarrhoea. *B Med J* 337, a1746. doi:10.1136/bmj.a1746

You must see a doctor if there is blood in your stools, you have a severe fever or if the diarrhoea doesn't get better in a couple of days as you could have contracted a serious illness such as cholera, typhoid or dysentery.

Key stage 5 resource is a great success

MICROBIOLOGY: A RESOURCE FOR KEY STAGE 5 has now been distributed to all school members, and as soon as it landed on laboratory benches the feedback from teachers and technicians was fantastic. It has also been used successfully as a marketing tool to attract new members, and school membership now stands at over 670, a record for this point in the year.

The pack is also a great resource for SGM members that do outreach work with 6th-formers as it contains up to date microbiology information relevant to the AS and A2 specifications, including contemporary topics such as hospital-acquired infections, biotechnology and the role of microbes in climate change. It reflects *How Science Works* and has relevance to the wider curriculum, including ethical and moral issues and the implications of science in society. A CD-ROM accompanies this resource, which provides comprehensive, full-colour PowerPoint presentations and a range of student activities. So if you are an SGM member involved in outreach and would like a free copy to support your activities, email education@sgm.ac.uk

Don't forget we have a comprehensive range of resources which can be used across the various key stages. These can be viewed at www.microbiologyonline.org.uk/teachers/resources



THE WHY, WHEN & HOW OF HAND WASHING



Who wash your hands?
 Not all infections can be prevented but one of the simplest methods of prevention is correct hand washing. Illustrated in clearly stated facts and a very comprehensive of germs, this leaflet shows the why, when and how of hand washing. It is designed to be used by the 13-19 age group to discuss the importance of hand washing in reducing the spread of infection.

Food poisoning
 Bacteria, viruses and other germs can spread from raw foods to prepared and cooked foods. To prevent the spread of germs, it is important to wash your hands thoroughly before and after handling raw food. When these hands are washed they are safe to use. This is known as cross-contamination.

Each year an estimated 2 million people in the UK suffer from food poisoning caused by microbes. The symptoms are not only unpleasant - they include vomiting, diarrhoea, abdominal pain and fever - they also cost an estimated £1.3 billion a year in lost working days and medical care. Most food borne illness can be prevented by storing, cooking and eating food safely and washing your hands before and after handling food.



The why, when & how of hand washing

THE LATEST RESOURCE from the SGM is a 4-page fact file *The why, when & how of hand washing*. The brightly coloured leaflet explains how good hand hygiene can reduce the spread of infection and also help prevent food poisoning. Specially designed, bold cartoons are used to illustrate the key points. Inside the leaflet is an A3 pull-out poster demonstrating how to effectively wash your hands and on the back is a list of 'fascinating facts' about microbial transmission.

2010 Annual Schools Science Conference: Science is All Around Us



Over the last 10 years there has been a significant downward trend in the number of pupils opting to study science in 6th form and at university. This is an alarming trend for the future of science and there are

many factors involved; one key factor is a lack of understanding and knowledge of the career options that are available in science. In an effort to address this decline, the British Science Association organizes National Science and Engineering Week with a programme of events and activities for pupils of all ages. One event that specifically targets pupils between the ages of 13 and 19 is the Annual Schools Science Conference. The 7th conference was held in March 2010 at the Royal College of Pathologists, London.

The overall theme of the day was 'Science is All Around Us'. There were formal lecture-style presentations as well as informal, interactive stands on a variety of different subjects. These stands were manned by scientists and healthcare professionals from a wide range of backgrounds, including representatives of the London ambulance service, histopathologists and cardiac anaesthetists. In addition, there were a number of microbiology stands educating the students on the role of microbiology in the diagnosis and management of infection. These included stands displaying (silicon) plates of different bacteria and information regarding the importance of hand washing in the battle against hospital-acquired infections.

the age range of the pupils at the conference. We talked to children and teachers about chlamydia, HIV, gonorrhoea and genital herpes, discussing the science behind the diagnosis and treatment of STIs, and answering any questions they had.

Without a doubt the largest role we played was in our capacity as healthcare professionals in providing the students with potential career advice. There was a wide mixture of questions from 'what do you do?' to 'what A-levels did you need?' and naturally 'do you really work with bacteria?' Interestingly, most of the older pupils had stories of their own and wanted tailored advice to suit their own career needs.

OUR MICROBIOLOGY STAND

Our stand drew much attention from both children and teachers. We had a display of parasites, including liver flukes, pinworms and tapeworms, together with information about the respective diseases they cause. The specimens drew many shrieks of 'Eww!' when, for example, they were asked if they wanted to hold the tapeworm!

Along with the hands-on display, we had a microbiology quiz about 'good bugs and bad bugs' provided with answers and a factsheet about the featured organisms. While several pupils filled it in, it was a major success with teachers, many of whom asked if they could use it as a classroom exercise.

The backdrop of our stand was a poster display on sexually transmitted infections (STIs) – an important and especially relevant topic given

FEEDBACK

Many of the children had never heard of parasites or microbiology beforehand and appeared to take a genuine interest in our stand. Feedback from the conference website has been very positive. One teacher wrote: 'I just wanted to say a great big thank you, as we had a fantastic day yesterday.' Feedback from the schoolchildren was also good, with one student remarking: 'I was so glad I was able to make it, as it really was amazing. A big thank you to you and everyone involved and I can't wait until next year.'

SUMMARY

The conference was a fun and well-organized event that allowed both teachers and students from all backgrounds to interact with professionals in the healthcare and science industries. It remains to be seen whether this kind of exposure leads to an increased intake to science-based degrees, especially from students who traditionally would not have considered even going to university. The conference allowed students to gain free advice and information about all aspects of science for their future careers and as such it was a more than worthwhile venture.

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John Goodman on behalf of ScienceU (www.science4uinfo.com) and the Royal College of Pathologists

