

Food and Water Guidelines

Guideline to educate and prepare travellers against illnesses and diseases from food and water



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1 INTRODUCTION

1.1 Purpose of Guideline

The purpose of this guideline is to aid travel health practitioners to consider the risk of infections, poisonings and diseases from **food and water** (including envenomation from aquatic animals), for the traveller. The practitioner should be able to identify high risk travellers, provide education, offer vaccines where recommended and advise on prevention and management of any symptoms during and following travel.

1.2 Pre-travel Health Risk Assessment Overview

1. Determine if traveller will be visiting high risk areas or have risk factors for illness spread by contaminated food or water or by having contact with aquatic animals
2. Assess whether the traveller is likely to undertake activities which may increase risk of infection or other illnesses from food and water?

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1.3 Pre-travel Health Risk Assessment

2 Determine if traveller will be visiting high risk areas or have risk factors for illness spread by contaminated food and water or by having contact with aquatic animals

Diseases resulting from food and water are common throughout the world. **Infections** from *ingestion* of contaminated water or food are very common however, infections can also result from contaminated water or organisms infecting *broken skin* or gaining entry to the blood stream via *skin breaches* or from *penetrating the skin*. **Poisoning** and **toxicoses** can also occur from *ingestion* of chemicals, food and aquatic animals and *envenomation* can occur from skin contact with **aquatic animals**.

2.1 High risk areas for gastrointestinal infections (from food and water ingestion)

2.1.1 Destination

Destination is the most important risk factor for food poisoning and traveller’s diarrhoea (TD) (Steffen, 2015; Steffen, 2017; Adler, 2022; LaRocque, 2025). Gastrointestinal symptoms are particularly common in travellers to low and middle resource countries where access to safe drinking water is often limited and sanitation and hygiene practices are often poor (LaRocque, 2025). Additionally, areas with inadequate refrigeration and outdoor markets leads to unsafe food practices which increases the risk of contaminated food (LaRocque, 2025).

Travellers, military personnel and expatriates returning home to visit family and relatives in Asia, Africa, Latin America, Caribbean and Western Pacific regions have a high risk of developing an infection from

contaminated water and or food during their trip (Adler, 2022). Overall, incidence rates for TD have been decreasing with current rates between 10-40% (Adler, 2022; Steffen, 2015).

Food poisoning and TD can occur in all countries, but certain activities may put the traveller at higher risk (see below).

2.1.2 Risk factors

a. Environmental

Environmental factors include:

- eating from *street vendors* increases the risk of food poisoning and TD.
- travelling during *warmer months* and *wetter seasons* also increase risk (Steffen, 2015; Steffen, 2017; LaRocque, 2025)
- Those embarking on *remote treks* or *adventure travel* (Steffen, 2017)
- cruises pose a lower risk than land-based travel for GIT upset however cruises are associated with a higher risk for norovirus outbreaks (Steffen, 2015)

b. Host factors

- Backpackers, students, adventure and independent travellers are at higher risk. (Steffen, 2015; Steffen 2017; LaRocque, 2024; Sharma, 2020).
- *Younger* travellers, (young adults and teenagers) are more likely to develop TD than older persons yet infants and toddlers have an increased risk of severe disease resulting in hospitalisation (Steffen 2015)
- The infectious dose of some organisms to cause disease (*Campylobacter* and *Salmonella* species) is lower in patients with conditions that reduce *gastric acidity* (Bavishi, 2011). Such patients include those who have undergone gastric surgery, those taking medications that reduce stomach pH (e.g. antacids, proton pump inhibitors, H2 blockers), those with hypo or achlorhydria, (pernicious anaemia, other auto immune diseases, chronic *Helicobacter pylori* infection, gastric radiation and/or surgery) (Soonawala, 2011; Fatima, 2023; LaRocque, 2025; Kohli, 2019) Since pathogens are not killed by gastric acid, more pathogens are able to enter the small intestine where they can cause disease (LaRocque, 2025)
- HIV positive/AIDS patients living in a resource limited country have an increased frequency and/or severity of some pathogens including *Campylobacter*, *Salmonella*, *Shigella*, enteroaggregative *E. coli* and *Vibrio* species. This may then apply to HIV positive patients travelling *to* these areas and being at more risk of infection (LaRocque, 2024)

- Patients with a history of *inflammatory bowel disease* have a higher incidence of TD and longer duration of diarrhoea and abdominal pain than those without (Steffen, 2015)
- *Pregnant* persons and their unborn child are at increased risk of some organisms including Listeriosis, Hepatitis A and Hepatitis E.

The effects of TD may be greater in the very young, elderly, the frail, pregnant persons, and those who are immune-suppressed or have inflammatory bowel disease, chronic kidney and heart disease (NaTHNaC, 2019).

2.2 High risk areas for ingestion of poison and toxins

Poisoning from certain fish, crustaceans and mushroom toxins occur globally however when travelling, public health messaging declaring algal blooms or danger for certain aquatic animals may not be in a language understandable to the traveller (if at all). Likewise, aquatic animals or mushrooms that may appear familiar in one's home country, may actually be a different species that could be harmful if ingested. See table 2 or more details and references.

2.2.1 Risk groups

Children are more susceptible to ill effects of poisons and toxins due to the amount absorbed compared with their body weight.

2.3 High risk areas for chemical poisoning

2.3.1 Destination

Whilst acute chemical poisoning is rare, travellers to certain areas may be exposed to either naturally occurring chemicals in ground water (such as arsenic, lead and fluoride) or from unfiltered surface or river water which may contain these elements or chemicals from insecticides and herbicides. Naturally occurring arsenic is found in very high levels in groundwater in Bangladesh, Northern India, Pakistan, parts of China, Cambodia, Vietnam, Argentina, Mexico and Chile (WHO, 2022); and fluoride hotspots also include many of these countries (Bangladesh, India, Pakistan, Vietnam, Argentina, Mexico) as well as Iran and Kenya (WHO, 2019).

Another poisoning that can affect travellers is methanol poisoning which can result from poor brewing techniques or deliberate blending of methanol with ethanol to reduce production costs/increase profits.

Travellers should be careful of cheap alcohol and/or locally made alcohol. Drinking canned beverages is safer than having spirits mixed. Drink spiking is also a problem in some areas so travellers should be urged to be careful in bars and nightclubs.

2.3.2 Risk groups

Children and *unborn babies* are more susceptible to ill effects of chemicals as the amount absorbed compared with body weight is higher than with adults (Goldman, 2024). *Pregnant* persons have a higher risk of spontaneous abortions, stillbirths, low birth weight and premature infants with resultant increase in infant mortality. (Goldman, 2024; Anderson, 2019; WHO, 2022; WHO, 2023). See [table 2](#) for more details.

2.4 High risk areas for skin and other systemic infections (from penetration of or contact with broken skin)

2.4.1 Destination

Numerous organisms can cause infection after entry is gained from penetration of intact skin or by organisms being present in water that is in direct contact with broken skin. Many of these organisms are found in tropical and sub-tropical countries but also in other regions during warmer months of the year when water temperature in rivers, estuaries and ocean increase. See [table 3](#) for organisms and references.

2.4.2 Risk groups

a. Host factors

- Travellers involved in aquatic activities (swimming, surfing, crabbing, fishing etc) and eating and preparing fish and other aquatic animals, are at higher risk of skin infection particularly when they have skin abrasions or cuts. Infection is also possible by skin penetration of an object (including shellfish when preparing to eat) which allows passage of pathogens to enter the dermis and beyond.
- Severe infections are often more common in travellers with chronic ill health such as those with liver disease, diabetes mellitus, chronic renal or respiratory disease, autoimmune disorders, malignancies, hazardous alcohol use, HIV/AIDS, transplant recipients and those on immunosuppressive therapy (corticosteroids, ~~TNF~~ inhibitors, oncology medications). See [table 2](#) & [table 3](#) for more details and references.

2.5 High risk areas for marine envenomation

Envenomation or stings from various aquatic species can be very painful and can cause death. There are numerous species including jellyfish, coral, sea urchins, fish, stingrays and venomous fish that can sometimes cause severe pain, infection and other severe symptoms. Species can be found in various locations however many are found in temperate and tropical waters in the Indo-Pacific region (Spyres, 2020).

3 ASSESS WHETHER THE TRAVELLER IS LIKELY TO UNDERTAKE ACTIVITIES WHICH MAY INCREASE RISK OF INFECTION OR OTHER ILLNESSES FROM FOOD AND WATER?

3.1 Activities which increase the risk of gastrointestinal infections/intoxication

Eating

- from street vendors
- raw, preserved, fermented or under cooked foods (includes vegetables, fruit, mushrooms as well as meat, fish and crustaceans)
- pre prepared foods such as sandwiches, foods offered at buffets, cooked foods kept warm on a bain-marie or left at room temperature (which in tropical regions is often over 30C) or processed foods e.g. meats, soft cheeses
- pre-cut fruit and vegetables (which may have been contaminated during or after preparation). This includes salads as they may have been contaminated with human or animal waste when grown, transported or prepared.
- fresh sauces and condiments including 'communal' condiments found in restaurants e.g. chilli paste or other sauces where containers are regularly topped up but rarely emptied and cleaned

Drinking

- water that has been poorly or not treated (some protozoa resistant to chlorine)
- fluids with ice. Some countries have ‘block ice’ – large ice ‘bricks’ that are not well kept, are carved or broken up into smaller pieces before being added to drinks. This type of ice has a higher risk of being contaminated due to unhygienic practices (transportation, making the bricks smaller using crude tools such as pick axe or in unclean areas)
- or eating products made from unpasteurised milk

Other risks include:

Failure to wash hands with soap and water or alcohol hand gel prior to eating or after toileting

Water activities where accidental ingestion of contaminated water may occur (swimming, hot tubs, spas, skiing, other water recreational activities).

3.2 Activities that increase the risk of skin infection, envenomation and other extra-intestinal infections (through penetration of skin or infecting abrasions/cuts with contaminated water)

- Walking barefoot outside
- Walking or wading through water without waterproof shoes/clothes where there may be a high chance of contamination such as:
 - after heavy rainfall with overflowing storm water drains (during monsoon in tropical areas where tropical downpours can lead to ‘flash floods’)
 - through water soaked and muddy rice fields
 - in areas where animals are living and urinating/defaecating etc.
- Aquatic activities such as
 - swimming (river, lake or ocean)
 - walking through shallow water/beach walking
 - fishing/crabbing
 - boating

- surfing, skiing, scuba diving, snorkelling
 - hot tubs and spas
 - other water recreational activities
-
- Peeling and eating or preparing aquatic animals

When reading the lists above, it would seem a traveller would be very limited in what they can eat, drink and do whilst travelling however, some general rules can be helpful. [See Section 5](#) below.

4 EDUCATE THE TRAVELLER ABOUT POSSIBLE INFECTIONS AND POISONINGS FROM FOOD AND WATER, AND ENVENOMATION FROM AQUATIC ANIMALS DURING TRAVEL

4.1 Acute Gastrointestinal disease

Many travellers to low and middle resourced countries, experience gastrointestinal symptoms during their travel. Travellers can experience symptoms of **upper GIT** (anorexia, nausea, vomiting, epigastric pain, bloating) and/or **lower GIT** (abdominal pain, diarrhoea, constipation, blood or mucus in stools). There are many causes including ingestion of bacteria, viruses, parasites, toxins and chemicals. The clinical picture is often dependent on the cause: some pathogens will primarily cause upper GI symptoms, others may cause predominantly lower GI symptoms, other pathogens, toxins and chemicals may cause a combination of both upper and lower GI symptoms (and other symptoms – see below).

4.1.1 Upper Gastrointestinal symptoms

Acute onset of nausea and vomiting is often due to ingestion of a preformed bacterial toxin but can also be caused by viruses and parasites. Bacterial toxins include heat stable enterotoxins produced by *S. aureus* and *B. cereus*, which, when ingested, cause acute onset of vomiting from 1 to 6 hours post ingestion. Diarrhoea is uncommon and the condition is self-limiting.

Noro and rotavirus also present predominantly with vomiting although diarrhoea can develop some time later. Hepatitis A and E often present with anorexia, nausea, vomiting, abdominal pain and fever but

diarrhoea is usually absent (WHO, 2023; O’Ryan, 2023).

Ingestion of raw fish can result in the parasite *Anisakis* being ingested which can lead to nausea, vomiting and epigastric pain 1 to 12 hours post ingestion (LaRocque, 2025). Ingestion of raw or uncooked freshwater fish can lead to liver fluke infection predominantly in South-East and East Asia which can have both acute (nausea, vomiting, RUQ pain) and chronic symptoms some of which can be very serious weeks to years later. See table 2.

4.1.2 Lower Gastrointestinal symptoms

Traveller’s Diarrhoea

Traveller’s diarrhoea (TD) is common with 10-40% of travellers developing diarrhoea during a 2-week trip depending on destination and host characteristics (Steffen, 2015). South Asia and West and Central Africa have the highest risk with decreasing rates in Latin America, East and South-East Asia (Steffen, 2015).

Traveller’s diarrhoea is self-reported and defined as at least 3 loose stools within a 24 hour period with at least 1 additional symptom such as nausea, vomiting, fever, abdominal cramps, tenesmus or faecal urgency (Steffen, 2015). The diarrhoea may be watery, have mucus and/or blood, or a combination of these. Symptoms vary depending on the causative agent and host factors.

The risk is highest in the first month of travel and decreases thereafter (LaRocque, 2025). It is rare to have more than 10 unformed stools per day with only 3% of cases reporting such frequent bowel actions (Steffen 2015).

The majority of infections are caused by bacteria followed by viruses and parasites. Sometimes more than one organism is found in stool cultures (Bodhidatta, 2019; Jiang, 2017). Pathogens are ingested in either contaminated food, water or by faecal-oral route.

Causative organism

Bacteria include various strains of *E. coli* (of which enterotoxigenic *E. coli* (ETEC) is the most common), *Campylobacter jejuni*, various species of *Shigella*, *Salmonella*, *Aeromonas*, *Plesiomonas* and *Vibrios* (Steffen, 2015; Bodhidatta, 2019; Jiang, 2017). Whilst diarrhoea is a common feature, anorexia, nausea, vomiting, abdominal cramps, malaise and fever are not always present.

Bloody stools are more commonly found in various *Shigella* species, *C. jejuni*, ETEC, *Plesiomonas shigelloides* and some *Aeromonas* species (Steffen, 2015; LaRocque, 2025). Children are more likely than adults to have blood in stool if infected with non-typhoidal *Salmonella* (Hohmann, 2024) and *Yersinia* species (Tauxe, 2024).

Common **viruses** causing TD include norovirus and rotavirus (Steffen 2015) which are more likely to occur as outbreaks in resorts or on cruises (O’Ryan, 2023).

Protozoa also cause TD however onset is usually after 1-2 weeks of travel (Steffen, 2015) and symptoms are more likely to persist and/or relapse (Adler, 2022; LaRocque, 2025). Common causes include *G. lamblia* (bloating, gas, nausea often accompany diarrhoea), *Cyclospora cayetanensis*, *Cryptosporidium parvum* and *Entamoeba histolytica* (Steffen 2015, LaRocque 2025). These are mostly chlorine resistant therefore infection is possible from both ingestion of untreated water and from swimming pools (particularly *Cryptosporidium parvum*) (Leder, 2024).

Helminths such as Hookworm and *Strongyloides stercoralis* can also cause symptoms including nausea, vomiting, diarrhoea, epigastric pain however these symptoms are either mild or particularly in Strongyloidiasis, patients are often asymptomatic (Weller, 2024; Leder, 2024). Chronic effects are often more severe (see below and [table 3](#)).

Likely course of Travellers Diarrhoea

TD is usually self-limiting with about half the patients spontaneously cured within 48 hours (Steffen, 2017). Between 12% and 46% of travellers have short term disability (usually less than a day) which means they may not feel comfortable to leave their accommodation or are unable to continue with their travel plans (Steffen, 2015). Higher rates of disability are observed where incidence rates are higher e.g. South Asia (Steffen, 2015). Hospitalisation is rare (Steffen, 2017).

In 1% of patients, symptoms persist for at least a month and 17% have TD persisting upon their return (Steffen, 2017).

Occasionally travellers may have severe effects from TD including Guillain-Barre syndrome, haemolytic uraemic syndrome and reactive arthritis (Steffen 2017).

In recent years, a new definition of severity has been developed to help educate travellers about TD and what they may expect if they are infected. Each traveller should be educated about possible symptoms prior to their departure i.e. diarrhoea is tolerable (mild), distressing, inconvenient and interferes with planned activities (moderate) or incapacitating, often unable to leave the room, and prevents planned activities from going ahead (severe). Travellers should also be educated about the need to check for bloody stools (frank blood mixed with stool rather than streaks on toilet paper which may indicate haemorrhoids or fissures). Blood in stool may be accompanied by fever (more common in *Shigella* and *Campylobacter* species) however fever may not be present (e.g. *E. histolytica* infection) (Steffen, 2015).

Travellers should also be aware of the possibility of persistent diarrhoea (≥2 weeks) which may indicate failed treatment if antibiotics were taken or certain pathogens such as *Giardia* spp, *Cryptosporidium* spp, *Campylobacter* spp, *E. histolytica*, *Shigella* spp and *S. stercoralis* (LaRocque, 2025) where symptoms may persist for more than 2 weeks. *C. difficile* is another possible cause particularly those who may have taken antibiotics recently. Travellers are advised to seek medical attention as different management to acute TD may be required. See Table 1 below for details of severity scale (Riddle, 2017) and [see Section 6](#) for management of symptoms during travel.

Table 1 Severity scale of Traveller’s Diarrhoea

Symptoms	Effects
Mild	Diarrhoea is tolerable, not distressing Does not interfere with planned activities
Moderate	Diarrhoea that is distressing and inconvenient and/or potentially interferes with planned activities
Severe	Diarrhoea that is incapacitating and may confine to room OR completely prevents planned activities Dysentery (bloody stools) is considered severe
Persistent	Diarrhoea lasting ≥2 weeks

4.1.3 Combination of upper and lower Gastrointestinal symptoms

Chemical intoxication (arsenic, fluoride and lead) can lead to both upper and lower gastrointestinal symptoms along with other non-GI symptoms such as headache, paraesthesiae, muscle spasms and seizures. Travellers should be advised where they are travelling remotely or where lead water pipes are likely, they should have their own water filtration system to reduce the risk of ingestion of these chemicals. See [here](#) for more details.

Ingestion of toxins (mushrooms, shellfish, pufferfish, ciguatera poisoning) also present similarly with nausea, vomiting, abdominal pain and diarrhoea along with additional symptoms of the specific toxin e.g. neurological or cardiovascular. Travellers should understand the risks of consuming mushrooms or

aquatic animals that may appear at first glance to be safe to eat however it is best to avoid when travelling where medical care may be sub optimal.

4.2 Persistent Gastrointestinal disease

4.2.1 Symptoms predominantly diarrhoea

Some travellers may experience persistent diarrhoea which may be due to ongoing infection by the pathogen causing initial disease (ETEC, species of *Aeromonas*, *Plesiomonas*, *G. lamblia*), a different pathogen causing the symptoms e.g. *Clostridioides difficile* or due to other causes (post-infectious irritable bowel syndrome – PI-IBS) (Steffen, 2015).

PI-IBS may occur in around 5% of patients (Steffen 2017) and whilst it is difficult to predict who will develop this, it is more common in those with severe TD, the number of episodes and infection with heat-labile toxin-producing ETEC (Steffen, 2015).

Travellers therefore need to be aware that TD may not only interrupt and change travel plans, but symptoms may persist even after their return to Australia and New Zealand. Avoiding infection is therefore recommended.

4.3 Additional chronic GI symptoms and syndromes

Chronic symptoms other than diarrhoea are common with infection from certain pathogens and some are life threatening. Encouraging all travellers to prevent infection reduces the risk of acute, chronic and sometimes life-threatening disease.

- *Shigella* infection can have severe GIT complications (obstruction, perforation) as well as bacteraemia and neurological (seizures, encephalopathy) and reactive arthritis. (Agha, 2023).
- *Salmonella* species (non-typhoidal and Typhoidal) can have serious complications including intestinal perforation, neurological symptoms (meningitis, focal CNS infections, encephalopathy), arthralgias, myalgias, bacteraemia with seeding in various organs and death (Andrews, 2023; Hohmann, 2024). Pre antibiotics, deaths from typhoid were reportedly 8 to 13% (McNulty, 2023).
- *Aeromonas* and *Plesiomonas* can lead to bacteraemia with resultant extraintestinal infections which can be severe and have a high mortality rate (Morris, 2023; Morris, 2023).
- Malaise, weight loss, malabsorption or upper abdominal symptoms such as anorexia, epigastric pain, bloating can occur with chronic protozoal infections such as *lamblia*, *C. cayetanensis* and *C. parvum* (Leder, 2024; Leder, 2024).

- Jaundice, pruritis and anorexia are common with Hepatitis A and E viral infection and rarely fulminant hepatitis can occur (WHO, 2023; WHO, 2023; Lai, 2024).
- Chronic effects of liver flukes (Opisthorchis and Clonorchis) can include biliary obstruction, cholangitis, cholecystitis, liver abscess, pancreatitis, hepatitis, cirrhosis and cholangiocarcinoma; Fascioliasis can lead to hepatomegaly, jaundice, biliary obstruction, cholangitis, cholecystitis and pancreatitis (Leder, 2024; Leder, 2024).
- Chronic Strongyloides infection may include peri-umbilical pain, diarrhoea, constipation and borborygmi however disseminated disease with high mortality is not uncommon in some immunosuppressed patients (Leder, 2024).

4.4 Acute skin manifestations from contact with water

Travellers are at risk of skin infections if in contact with contaminated water (surface, flood, river, lake, ocean) when they have skin abrasions or cuts or if they have penetration of the skin whilst in the water.

4.4.1 Bacterial infections

Whilst some bacteria have a global distribution, travellers may be more likely to be infected whilst travelling due to activities they engage in whilst holidaying. In addition, travellers with certain medical conditions are more likely to have severe infection than those without risk factors.

Species of *Aeromonas*, *Plesiomonas*, *Vibrio vulnificus* and *V. parahaemolyticus* can be found in fresh, brackish and/or salty water in tropical, sub-tropical and warmer months of temperate climates (Baddour, 2023). Recreational activities may result in puncture wounds (aquatic injury, fish hook punctures, catching, preparing and peeling seafood etc) which can become infected. These skin infections can be very severe and patients can also develop bacteraemia and its sequelae, which is not uncommon. Those at greatest risk include those with liver disease, haematological malignancies and those who are immunosuppressed (Baddour, 2023; Morris, 2023). (See table 3).

All those at high risk need to be aware and take steps to mitigate the risks.

4.4.2 Other pathogens

Various parasites also cause acute skin reactions in humans via penetration of skin. Hookworm species (human and animal) and Strongyloides stercoralis are helminths where larvae living in soil (including water-

soaked soil) can penetrate the skin, particularly when walking without shoes, causing an acute maculopapular eruption at the site(s). *Schistosomes* species are trematodes that can also penetrate the skin. Walking, swimming or wading through fresh water can lead to skin penetration which can result in an acute itch for all species and therefore travellers should be aware of these risks in areas where these infections occur (see table 3).

4.4.3 Aquatic envenomation

Envenomation and stings from aquatic animals are often due to the traveller accidentally stepping on, falling on, swimming amongst or being injured when fishing (Isbister, 2023). Travellers should be warned that familiar looking fish or other aquatic animals may be different to those found in Australia or New Zealand and therefore best avoided during travel.

Jellyfish stings can cause immediate redness and pain at the site of contact with intense burning, itching and throbbing also common (Marcus, 2024). Travellers should avoid swimming or walking in these waters particularly during monsoon seasons when stings are more likely. Stings from some jelly fish can be lethal.

4.5 Chronic skin manifestations from contact with water

Skin lesions may develop during travel and may have been treated yet persist for weeks or months.

M. marinum is an atypical *Mycobacterium* that is also found in similar water conditions as the bacteria mentioned above. Patients usually present with an indolent and prolonged skin infection so the traveller may only present on return from travel when the lesion has continued to persist (Baddour, 2023).

Burkholderia pseudomallei is a bacterium found in water and soil and can cause Melioidosis with numerous clinical presentations including chronic skin infections that may persist for weeks and months. The skin lesions are often not particularly painful but despite often numerous antibiotic courses, persist due to resistance to commonly used antibiotics and prolonged treatment being required.

Haematogenous spread is not uncommon and can have severe outcomes (Meumann, 2024). See Section 7 for additional details.

Chronic urticaria may be a manifestation of chronic strongyloidiasis and auto infection may present with chronic pruritus. Schistosomiasis may also present with chronic urticaria.

4.6 Other systemic infections transmitted by water

Infections from *Leptospira* species are more common in tropical regions and are due to infection by a spirochete which is often found in flood water or flash floods during monsoons. The organism is passed in the urine of various animals including rats, dogs, pigs and cattle and then can enter the human body via abrasions or cuts in the skin as the human moves through the water. An acute infection can ensue which can be very severe if untreated with a high mortality rate (Day, 2022). Avoidance of flood waters and cleaning of broken skin with soap and clean water as soon as possible after potential exposure is recommended. When participating in water activities in risk areas, any skin lesions should be covered with waterproof dressings and care taken not to consume the water.

Burkholderia pseudomallei is a bacterial infection that can cause a range of diseases in humans some of which are life threatening and have a very high mortality rate. The disease is called melioidosis. Infections are more common in Northern Australia, SE and South Asia however as laboratory diagnostics improve, it is becoming increasingly recognised in China, Central and South America, Africa and infections increasingly occur in returned travellers (Fertitta, 2018; Meumann, 2024). Inoculation of skin or infection of abrasions usually with contaminated water is one mode of transmission (with ingestion and inhalation other modes). As with leptospirosis, walking through monsoonal downpours or in water-soaked rice fields without adequate foot and leg protection puts the traveller at risk (along with ingestion of contaminated water (+/-food) and inhalation more likely during monsoon months).

Travellers *may* present with pneumonia, bacteraemia, joint infections or an infection in any part of the body. Those most at risk of infection include diabetics, those with chronic renal, lung and liver disease, alcohol excess, corticosteroid or other immunosuppressive therapy or other immunocompromised conditions (Wiersinga, 2018; Meumann, 2024). Hence these travellers should be aware of this disease and seek medical treatment early if they experience fever and other symptoms of infection.

4.7 Food Allergies

All travellers with food allergies need to be more astute when travelling. Many countries do not have regulations or do not follow regulations regarding appropriate labelling.

Where travellers are allergic to peanuts or prawns or other food items, they would be wise to ensure their condition is written in local language and this can be shown to chefs, cooks and waiting staff to

reduce the risk of consuming foods that may be problematic. A doctor’s letter should also accompany the traveller whilst travelling (aircraft, ship, trains etc).
EpiPens should be carried as they would in Australia or New Zealand.

Travellers need to be aware that illness during their trip may not only be very inconvenient but also lead to significant financial losses if they need to change their travel plans (Steffen, 2017; Soonawala, 2011).

Table 2 Ingested pathogens, toxin producing organisms and chemicals causing predominantly gastrointestinal symptoms in travellers Click here to print Table 2 (PDF)					
Pathogen, toxin producing organism or chemical	Acute GIT symptoms	Chronic GIT symptoms	Symptoms	Epidemiology & route of transmission	
Bacteria					
<i>Escherichia coli</i>	X	x	Watery diarrhoea +/- blood; Nausea, vomiting, fever, malaise and abdominal cramps vary according to strain of <i>E. coli</i> . Mild to severe effects	Most common cause of traveller’s diarrhoea; Latin America, Caribbean, Africa, Middle East, Asia (Leung, 2024; Adler, 2022; Boddhidatta, 2019; Lopez-Velez, 2022) Contaminated food and water, faecal-oral route; more common if taking histamine blockers (LaRocque, 2025)	

<i>Shigella</i> spp	X	x	Fever, anorexia, malaise; initially watery diarrhoea but blood and mucus often develop (depends on species). Tenesmus common. Nausea and vomiting usually absent. Can develop severe complications (bacteraemia) as well as long term sequelae (GI obstruction/perforation, seizures, encephalopathy, reactive arthritis) (Agha, 2023).	More common in SE Asia, but also found in South Asia, Latin America, Caribbean, Sub-Saharan Africa (Adler, 2022; Lopez-Velez, 2022). Contaminated food (raw vegetables are a common cause), drinking water or recreational water. MSM more likely to be infected Survives stomach acid (Agha, 2023).
<i>Campylobacter jejuni</i>	X	x	Abdominal pain, cramps and diarrhoea, +/- fever, rigors, aches, dizziness, delirium. Children more likely to have nausea, vomiting, bloody stools. Severe complications can occur. Reactive arthritis, Guillian Barre can occur (Allos, 2025: Steffen, 2017; Leung, 2024; La Rocque, 2025).	More common in SE Asia, but also found in Western Asia, Latin America, Caribbean, Sub-Saharan Africa, North Africa (Adler, 2022; Lopez-Velez, 2022; LaRocque, 2025). Contaminated food (mostly chicken but can be any meat or any foods contaminated by

				raw meat), unpasteurised milk and water (fresh or salty). HIV patients more likely to be infected (Allos, 2025).
<i>Salmonella</i> spp	X	can shed in stools for weeks to months (usually no symptoms)	Diarrhea, nausea, vomiting, abdominal cramping (blood rare but more common in children), fever, fatigue, malaise, chills and headache. Severe complications <5% (see risk factors next column) (Hohmann, 2024)	Asia, Africa, Latin America, Caribbean (Adler, 2022; Lopez-Velez, 2022; Andrews, 2024). Contaminated food (poultry, eggs, milk products, fresh produce, meats), contact with pets, reptiles, contaminated water. More common in infants, > 60 years, steroid use, malignancy, previous antibiotic use, advanced HIV, reduced gastric acidity, IS, those with atherosclerosis, prosthesis (heart valves, joints)
Non typhoidal Salmonella				

				(Kotton, 2024; Hohmann, 2024).
S. Typhi, S. Paratyphi (A, B, C) (enteric fever)	X	Chronic carriage > 12 months in stool or urine (usually no symptoms) (Andrews, 2024)	Fever, chills, abdominal pain. Diarrhoea more common in children, constipation more common in adults. GI symptoms often not major complaint. Can become very severe (Andrews, 2024; Hohmann, 2024)	Common SE Asia, South-Central Asia, southern Africa. Less common Latin America, Caribbean and Oceania (Adler, 2022; Lopez-Velez, 2022; Andrews, 2024). Contaminated food and water. Unvaccinated (for S. Typhi) at higher risk of disease. (Andrews, 2024)
<i>Vibrio</i> spp <i>V. cholerae</i>	X		Watery diarrhoea +/- vomiting. Can be very severe diarrhoea – rice water stools with significant hypovolaemia and death. Rare for travellers to be infected but potentially life-threatening (LaRocque, 2023; LaRocque, 2024; Leung, 2024)	Endemic 50 countries Asia, Africa, Caribbean and Central America. (LaRocque, 2023; Leung, 2024; Adler, 2022) Contaminated food and water, faecal-oral route. More common in those with hypochlorhydria or partial gastrectomy (LaRocque, 2024).

Non cholera vibrios – <i>V. parahaemolyticus</i> , <i>V. vulnificus</i>	X			Diarrhoea, cramps and less often fever, nausea, vomiting. Blood even less common (<i>V. p</i>). <i>V. v</i> more likely to present with non-GIT (see Table 3) but if GIT symptoms, diarrhoea predominates (Morris, 2024; Morris, 2024).	Global distribution. Found in estuarine and marine environments (warmer climates). Associated with seafood consumption and water activities (swimming, boating). More common in those with liver disease, alcohol, DM, CRF, RA, other IC conditions. (Morris, 2024; Morris, 2024).
<i>Aeromonas</i> spp	X		X	Can be mucus, bloody or watery diarrhoea; Can be acute and chronic (Morris, 2023). Non-GIT symptoms see table 3	Common SE Asia (Steffen, 2015) but has global distribution (Morris, 2023; Boddhidatta, 2019). Can survive in fresh, brackish, surface, drinking and polluted water. Risk factors include liver disease and haematological malignancies (Morris, 2023).

<i>Plesiomonas shigelloides</i>	X		Can be prolonged (2 weeks – 3 months) (Morris, 2023)	Mostly watery but can be secretory or occasionally bloody. Abdominal pain/cramps common in adults, vomiting in children (Morris, 2023).	Found in fresh or brackish water; secondary to undercooked seafood, contaminated water; outbreaks in Asia (South, SE, East) (Bodhidatta, 2019; Adler, 2022; Morris, 2023). More common with liver disease, IC, haematological malignancies (Morris, 2023).
<i>Clostridioides difficile</i>	X	X		Can be acute, persistent, chronic, recurrent diarrhoea but may develop severe illness (megacolon, perforation, death). (Neuberger, 2013). Diarrhoea is usually water and associated with abdominal pain, cramping, nausea, anorexia (Lamont, 2025).	Reported in travellers visiting Asia, Latin America, Caribbean, Africa (Steffen, 2015; Adler, 2022; Lopez-Velez, 2022; Neuberger, 2013) Environmental organism but can also be a gut coloniser (asymptomatic). More common in those who have used antibiotics however can cause TD without use of

			antibiotics. Other risk factors include >65, severe underlying medical disorders (Lamont, 2025).
<i>Yersinia</i> spp	X	Abdominal pain, diarrhoea (UTD) and fever (Steffen, 2015; Tauxe, 2024). Nausea and vomiting in some. Blood more common in children than adults. More subacute than other causes of TD. Bacteraemia in infants and iron overload (high mortality) (Tauxe, 2024).	More common northern Europe. Zoonotic disease (found in pigs, birds, mammals) and occasionally waterborne. Often due to consumption uncooked pork products. Risk factors include those with iron metabolism derangement (cirrhosis, haemachromatosis, aplastic anaemie, thalassaemia, sickle cell disease), IC, malignancy, diabetes and severe malnutrition (Tauxe, 2024).
<i>Staphylococcus aureus</i> enterotoxin	X	Nausea, vomiting, abdominal cramps 1- 6	Ingestion of food contaminated with

		hours post eating foods with heat stable enterotoxin. Diarrhoea and fever uncommon. (LaRocque, 2025).	enterotoxin producing <i>S. aureus</i> (LaRocque, 2025)
<i>Bacillus cereus</i> enterotoxin	X	Nausea and profuse vomiting 1-6 hours post ingestion (LaRocque, 2025).	Ingestion of food contaminated with enterotoxin (often rice left at room temperature) (LaRocque, 2025).
<i>Listeria monocytogenes</i>	X	Acute infection – diarrhoea, fever, headache, myalgia Severe invasive disease – fever, myalgia, septicaemia, meningitis (including in neonates born of infected mother). In pregnant women, listeria infection can cause spontaneous abortion, stillbirth or congenital or neonatal infection. (WHO, 2018)	Global distribution. found in water, soil, environment, intestines of animals hence any infected water or foodstuffs may be ingested. Higher risk products include unpasteurised milk (and any of its products), soft cheeses, raw vegetables, processed meats. <i>Listeria</i> will grow at fridge temperatures therefore any pre-packaged ready to eat meals can be

				contaminated (including uncooked vegetables, pre or under cooked meat, seafood etc). Pregnant women, elderly, IC (steroids, TNF inhibitors, malignancy, HIV, DM, CRF, liver disease, transplant recipients) at higher risk (Gelfand, 2025; WHO 2018).
Viruses				
Norovirus	X	Chronic possible with haem malignancies and transplant patients (O’Ryan, 2023)	Abrupt onset of vomiting (predominately) and watery diarrhoea +/- fever, myalgia, malaise, headache (O’Ryan, 2023).	Global distribution. Contaminated water and food (leafy greens, fruit, shellfish), person-to-person, fomites, aerosolised vomitus. Commonly caught at restaurants, on cruises, staying in dormitories/groups etc (Jiang 2017; O’Ryan, 2023; Bodhidatta, 2019; Adler, 2022; Steffen 2015)

Rotavirus	X		Vomiting (predominately), watery diarrhoea (non-bloody) +/- fever, respiratory symptoms. Children more common and more severe than adults. IC more likely severe and prolonged symptoms (O’Ryan, 2024).	Global distribution. Year round in tropical regions; cooler months in temperate regions. Faecal-oral route. More common children < 5 years. Reported in travellers. (Jiang 2017; O’Ryan, 2024; Bodhidatta, 2019; Adler, 2022; Steffen 2015)
Hepatitis A	X	Rarely but can be prolonged illness in adults	Nausea, vomiting, anorexia, fever, malaise and abdominal pain (symptoms more common in adults). Up to a week later, pale stools, bilirubinuria, jaundice, pruritis (as early symptoms have waned). Children < 5 years often asymptomatic or mild symptoms (30%), older children 70% jaundiced. Fulminant hepatitis more likely in patients	Global distribution; medium-high prevalence- sub-Saharan Africa, North Africa, Middle East, Central and South Asia, Latin America, Caribbean and Oceania (WHO, 2022). Contaminated food or water and person-to person transmission. Long incubation period (average 28 days) so may be sick only on return. Pregnant

			who have liver disease from HBV, HCV and those > 50 years (Lai, 2024; WHO, 2022).	persons increased risk pre-term labour and gestational complications (Lai, 2024; WHO, 2022).
Hepatitis E	X	Can be prolonged in HIV, transplant patients.	Mild fever, nausea, anorexia, vomiting, abdominal pain followed by jaundice. Often asymptomatic in children. Fulminant liver failure rare (Sherman, 2023; WHO, 2023).	Global distribution but most common South and East Asia, Africa (Sherman, 2023; WHO, 2023). Transmission depends on serotype but includes water and food contamination (under cooked pork, deer, shellfish, wild boar), perinatal, blood transfusion. More common in young adults (15-40). Severe in pregnant women, liver disease, haematological malignancies and transplant patients (Sherman, 2023; WHO, 2023).
Polio virus	Only with meningism	Virus may persist in	Mild illness is more common than severe	Infection from wild or oral vaccine

		stool for up to 6 weeks but no GIT symptoms (Simionescu, 2023)	Mild includes fever headache, sore throat, fatigue. Severe includes paralytic polio (severe illness with acute flaccid paralysis and pain) and non-paralytic polio (severe illness (fever, headache, vomiting, meningismus with no motor signs) (Simionescu, 2023; WHO, 2024).	derived types. Wild type still circulating in Pakistan and Afghanistan. Some sub-Saharan African countries have vaccine derived polio. Most common in children < 5 yrs. Faecal-oral, contaminated food/water or pharyngeal secretions (Simionescu, 2023; WHO, 2024).
Parasites				
<u>Protozoa</u>				
<i>Giardia lamblia</i>	X	X	Diarrhoea, foul smelling and fatty stools, flatulence, cramps and bloating. Nausea, malaise and less common fever. Chronic infection common with loose stools, steatorrhoea, bloating, flatulence,	Global distribution but common for travellers visiting South Asia (especially Nepal), SE Asia, Latin America (Adler, 2022; Jiang, 2017; Steffen, 2015). Food and waterborne (raw

			weight loss, malaise, malabsorption.	and under cooked foods); cysts resistant to chlorination (Leder, 2024).
<i>Cyclospora cayetanensis</i>	X	X	Acute presentation – anorexia, nausea, flatulence, fatigue, abdominal cramping, water diarrhoea +/- mucus or blood. Can lead to prolonged waxing and waning course of sustained diarrhoea, anorexia, upper GI symptoms for weeks or months (Weller, 2023).	Latin America, the Indian subcontinent, Southeast Asia and sub-Saharan Africa (Leung, 2024; Weller, 2023; Adler, 2022). Food, water and soil transmitted protozoa; chlorine insensitive (Weller, 2023).
<i>Entamoeba histolytica</i>	X	X	Majority of infections are asymptomatic. Subacute symptoms over 1-3 weeks ranging from mild to severe dysentery, abdominal cramps and mucus diarrhoea. Fever is absent which is distinguishing feature for other organisms causing dysentery (Shigella spp, <i>E. coli</i>	Global distribution but common in India, Africa, Mexico, Central and Southern America (Leder, 2024). Contaminated food or water, sexual transmission (faecal-oral route), chlorine resistant (at levels used for water supplies);

etc). Fulminant colitis possible with high mortality. Not as common as other protozoal infections but can be associated with prolonged diarrhoea (may not be bloody), weight loss, liver abscesses (Leder, 2024).	iodine may be effective. Severe disease more common in very young, pregnancy, steroid use, malignancy, alcohol, malnutrition (Leder, 2024).
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<i>Cryptosporidium parvum</i>	X	X	Asymptomatic, mild or severe. Diarrhoea can be acute or chronic, transient, intermittent or continuous; scant or voluminous. Diarrhoea is watery and often associated with malaise, nausea, anorexia, crampy abdominal pain and low-grade fever. Can become persistent or relapse with severe wasting. Joint pains (knees, ankles, feet) associated and ongoing GIT symptoms (Leder, 2024)	Global distribution but more common in Asia, Latin America and sub-Saharan Africa (Adler, 2022; Jiang, 2017; Leder, 2024). Waterborne predominantly (drinking water, swimming pool and recreational water facilities) but also food borne. Chlorine and iodine resistant. More common in HIV positive (low CD4 count), those on immunosuppressive therapy including transplants (Leder, 2024).
<u>Helminths</u>				
Anisakis spp	X	X	Nausea, vomiting and epigastric pain 1-8 hours post ingestion. Can also get intestinal anisakis 5-7 days post ingestion with abdominal pain,	Humans are incidental host. Ingestion of undercooked, raw or pickled infected marine fish containing

				distension, diarrhoea (blood or mucus)	nematodes. Most common in Japan but increasingly in Europe and Americas (Leder, 2024).
Liver flukes					
				For both Opisthorchis and Clonorchis Acute symptoms less problematic than sequelae – chronic liver and bile duct disease. <u>Acute</u> symptoms can include nausea, vomiting, RUQ pain, diarrhoea, fatigue 2 to 4 weeks. <u>Late manifestations</u> include biliary obstruction, cholangitis, cholecystitis, liver abscess, pancreatitis, hepatitis and cirrhosis, Cholangiocarcinoma is often seen with heavy infections (Leder, 2024).	Cambodia, Thailand, Laos, Vietnam, China & Myanmar (<i>O. viverrini</i>); SE Asia, Central and eastern Europe (<i>O. felineus</i>). Ingestion of raw, pickled, salted, smoked or undercooked freshwater fish (Leder, 2024).

				freshwater fish (Leder, 2024).
o Fasciola spp (<i>F. hepatica</i>, <i>F. gigantica</i>)	x	x	<u>Sub-acute</u> symptoms (6-12 weeks) – fever, RUQ pain, nausea, vomiting, weight loss, myalgia. <u>Late manifestations</u> include epigastric and RUQ pain, nausea, vomiting, diarrhoea, hepatomegaly, jaundice, biliary obstruction, cholangitis, cholecystitis and pancreatitis	Infection is endemic in Europe, Central and South America, Asia (East and SE), Africa and Middle East. Ingestion of contaminated water and uncooked freshwater grown plants e.g. morning glory, watercress, water chestnuts (Leder, 2024).
Lung fluke o Paragonimiasis	x mostly respiratory symptoms	X Respiratory symptoms most common; GIT complications rare	<u>Acute infection</u> – fever, malaise, diarrhoea, epigastric pain, urticaria followed by SOB, cough, malaise, pleuritic chest pain. <u>Chronic</u> respiratory symptoms – recurrent haemoptysis, SOB (Leder, 2023).	Asia (Thailand, China, Korea, Japan, Taiwan, Cambodia, Laos, Vietnam, Philippines, Malaysia, India), Western/Central Africa, North/Central/South America Ingestion freshwater crabs and crayfish (Leder, 2023).

Hookworm (<i>Ancylostoma duodenale</i> , <i>Necator Americanus</i> , <i>Ancylostoma ceylanicum</i>)	X		<u>Acute infection</u> – as establishes in GIT may cause nausea, vomiting, diarrhoea, epigastric pain (Weller, 2024).	Various species found in different areas including Iran, India, Pakistan, Mediterranean countries, North and South America, Central Africa, Indonesia, SE Asia, Pacific Islands, northern Australia. Ingestion of raw vegetables contaminated by helminths although not major mode of transmission. Faecal-oral route is a minor route compared with skin contact with contaminated soil (see table 3). (Weller, 2024).
Strongyloidiasis (<i>Strongyloides stercoralis</i>)	X	x	<u>Acute infection</u> – establishes infection in small bowel – anorexia, abdominal pain, diarrhoea or constipation are possible but not common. Often asymptomatic	Endemic in tropical and subtropical regions including SE Asia, Pacific, Africa, northern Australia, USA (Leder, 2024). As with hookworm, infection is predominantly

		<u>Chronic infection</u> – usually mild but can include peri-umbilical pain, diarrhoea, constipation, intermittent vomiting and borborygmi. Respiratory symptoms rare. Can develop disseminated disease that can be fatal (Leder, 2024).	through skin penetration however, faecal oral route is well recognised (Leder, 2024).
Toxins			
Mushrooms	X	<u>Onset of symptoms < 6 hours:</u> Nausea, vomiting, abdominal cramps, diarrhoea 1-3 hours post ingestion. May also have CNS excitation or depression, hallucinations, seizures, symptoms of cholinergic poisoning (muscarine toxin producing mushrooms). <u>Onset of symptoms > 6 hours:</u> Vomiting, diarrhoea (cholera like), abdominal pain and dehydration with	Global distribution. Numerous mushrooms cause poisoning. Symptom onset < 6 hours post consumption rarely life threatening (compared with those where symptoms begin after 6 hours) (Wiegand, 2023).

		progressive liver toxicity (encephalopathy, coagulopathy, renal failure etc) (Wiegand, 2023). -	
Shellfish poisoning	Neuro	<u>Paralytic shellfish poisoning</u> – many neurological symptoms including perioral tingling, ataxia, dysphagia, dizziness, paresthesias, weakness prior to paralysis and respiratory failure. Onset few minutes to four hours. Death in around 12% if untreated (Marcus, 2024).	Global distribution but mostly found in temperate climates, although described in shellfish from tropical waters. Ingestion of shellfish (mussel, clams, scallops, oysters, crabs, snails) contaminated with neurotoxins formed by algae, primarily saxitoxins (not destroyed by heat, marinating or freezing) (Marcus, 2024).
	X (GIT and neuro symptoms)	<u>Neurotoxic shellfish poisoning</u> – 2 modes of transmission: <i>Ingestion:</i> from 30 mins to 3 hours GI symptoms (nausea, vomiting, diarrhoea, abdominal	USA, Gulf of Mexico, Caribbean and New Zealand. Toxins produced by algae taken up by bivalve shellfish which are then ingested as

		pain) and neurological symptoms (paraesthesias of face, mouth, limbs, dizziness, ataxia, myalgia, temperature related dysesthesias; may proceed on to paralysis, seizures and coma). <i>Inhalation:</i> toxins inhaled from sea spray with rhinorrhea, bronchoconstriction and other respiratory symptoms. Asthmatics and those with chronic respiratory disease are susceptible (Marcus, 2024). -	well as aerosolised during algal blooms. Seafood smells, tastes and looks normal (Marcus, 2024).
	X	<u>Diarrheic shellfish poisoning</u> – chills, nausea, vomiting, diarrhoea, abdominal cramps about 2 hours after eating mussels or scallops (Marcus, 2024).	Global distribution; mostly due to ingestion of contaminated mussels and scallops (Marcus, 2024).
Pufferfish Poisoning (tetrodotoxin)	Mostly neuro symptoms	Symptoms rapidly occur after ingestion and include weakness, dizziness, paraesthesiae of face and limbs,	Most commonly reported in Japan and SE Asia (TG, 2020). Micro-organisms

		nausea. Severe hypotension and paralysis can occur with higher doses ingested (Marcus, 2024; TG, 2020).	associated with the fish produce neurotoxin which concentrates in liver, visceral organs and skin of various fish which are considered delicacies in Japan. The neurotoxins are resistant to washing, cooking and other food preparation. The toxin can also be found in some frogs and octopus (Marcus, 2024).
Ciguatera fish poisoning	X plus neuro and cardio-vascular symptoms	Symptoms affecting three systems are common however geographical differences in predominance and severity. GIT symptoms usually the first to develop; vomiting, diarrhoea, abdominal cramps 3-6 hours after eating contaminated fish. Neuro – peri-oral paraesthesiae, pruritus (no rash), metallic taste,	Foodborne illness found mostly in tropics and subtropics (particularly Pacific and Caribbean) (TG, 2020; Marcus, 2023). Ingestion of reef fish contaminated with ciguatera toxin produced by algae like organism on coral reefs. Fish do not taste, smell or appear abnormal. Cooking,

		painful teeth, dysuria, blurred vision, ataxia and temperature related dysesthesias. 10% paresis in South Pacific. Onset 3- 72 hours post ingestion CVS – bradycardia, heart block, hypotension within hours of consumption (Marcus, 2023).	marinating, freezing does not destroy toxins. Perinatal transmission is possible e.g. pregnant person poisoned can transmit to foetus; breast feeding should be avoided as toxin passed through milk (TG, 2020; Marcus, 2023).
Scombroid poisoning	x	Symptoms usually begin within one hour of consumption of contaminated fish/cheese. Flushing of face, neck, rash on upper torso, diarrhoea and headache are the most common symptoms however peri-oral burning, itching or oedema, nausea, vomiting, abdominal pain, dizziness, palpitations, chest tightness, SOB are also possible. Can become hypotensive;	Global distribution; consumption of contaminated fish e.g. tuna, mackerel, bluefish, swordfish, herring, sardines, tilapia, trout as well as contaminated Swiss cheese. Bacterial overgrowth and conversion of histidine to histamine if fish not refrigerated at appropriate temperatures. Cooking and

		respiratory distress and cardiac arrhythmias are rare (TG, 2024; Marcus, 2023).	freezing do not destroy histamine. Patients taking isoniazid or monoamine oxidase inhibitors may have more prolonged or severe symptoms. Those on antihistamines may be protected somewhat (TG, 2024; Marcus, 2023).
Botulism	X	Prodromal GIT symptoms of nausea, vomiting abdominal pain and diarrhoea followed by neurological symptoms (cranial nerves and descending weakness) (Pegram, 2023).	Global distribution; neurotoxin produced by environmental and soil bacteria <i>Clostridium botulinum</i> . Often found in canned, preserved and fermented foods contaminated by preformed botulinum toxin. Heat and gastric acid resistant; sensitive to 20 minutes of chlorine. No smell or taste (Pegram, 2023).

Chemicals					
Heavy metals					
Arsenic	X	x (non GIT)	<u>Acute</u> poisoning is rare – nausea, vomiting, diarrhoea, abdominal pain, peripheral tingling/numbness, muscle cramping (Anderson, 2019; Goldman, 2024; WHO 2022). <u>Cumulative effects</u> from chronic ingestion are more common – skin lesions (hyperkeratosis), cancers, cardiovascular disease, neurological (Anderson, 2019; Goldman, 2024).	Naturally occurring in groundwater. Also in some pesticides, insecticides and herbicides hence could be ingested if drinking from wells or unfiltered river water/run-off (Goldman, 2024; WHO 2022). Clinical cases well described in Bangladesh, India (West Bengal), Pakistan, Cambodia, China, Vietnam, Chile, Argentina, Mexico (WHO, 2022). Children more susceptible to ill effects. Inorganic arsenic can cross placenta with increased risk of spontaneous abortions, stillbirths, low birth weight,	

				increased infant mortality (Anderson, 2019; Goldman, 2024; WHO 2022).
Lead	X	x (non GIT)	<u>Acute symptoms</u> – vomiting, abdominal pain, constipation, headaches, muscle weakness, paraesthesia (CDC, 2014; TG, 2024). <u>Chronic effects</u> – intellectual and behavioural disorders in children; adults high blood pressure, cardiovascular and kidney damage; pregnant women – miscarriage, stillbirth, premature, low birth weight (CDC 2014, WHO 2023)	Naturally occurring in groundwater. Can also leech into water systems from industry (mining, manufacturing), recycling or leeching of batteries, lead pipes or parts, ‘traditional’ medicines including moonshine) (WHO, 2022; WHO 2023). Children and unborn babies are more susceptible as absorb more than adults (TG, 2024; CDC 2014; WHO 2023 Pregnant person at risk of miscarriage, stillbirth, premature, low birth weight (CDC 2014; WHO 2023)

Fluoride	X	x (non GIT)	<u>Acute symptoms</u> – nausea, vomiting, diarrhoea, abdominal pain, excessive salivation. Seizures, paraesthesiae and muscle spasms may also occur. (Gessner, 1994: WHO 2019) <u>Chronic effects</u> – teeth and bone effects (Anderson 2019).	Naturally occurring in groundwater (at least 30 countries) (Nizam 2022). Can also leech into water systems from manufacturing, fertilisers, (WHO 2019). Fluoride hotspots found in India, China (WHO 2019), Bangladesh, Iran, Pakistan, Vietnam, Kenya, Tanzania, Mexico, Argentina, (Nizam, 2022)
Insecticide poisoning				
Organophosphate and carbamates	x		<u>Acute</u> poisoning is uncommon however can be severe. Oral or respiratory exposures lead to symptoms within 3 hours however dermal absorption is often delayed up to 12 hours. Symptoms are due to cholinergic excess including bradycardia, miosis, salivation, lacrimation,	Commonly found in insecticides. Can be ingested (run off into rivers) or inhaled (Bird, 2024).

	diaphoresis, bronchospasm, urinate, vomiting and diarrhoea. Cardiac arrythmias and heart block are rare (Bird, 2024).	
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Table 3 Clinical Manifestations, Epidemiology and Risk Factors of Pathogens and toxins penetrating or infecting broken skin

[Click here to download table 3 \(PDF\)](#)

Type of pathogen or toxin producing organism	Clinical Manifestations	Epidemiology and risk factors
BACTERIA		
<i>V. vulnificus</i> and <i>V. parahaemolyticus</i>	Acute skin infection (can be very severe) Septicaemia (high mortality rate) (Morris, 2024; Morris 2024)	Global distribution – warmer months. Puncture wounds or injured skin/abrasions (recreational activities) can become infected in contaminated water (brackish and salt water); more common in those with liver disease, DM, CRF, RA, other IC conditions (Morris, 2024; Morris 2024)
<i>Aeromonas</i> spp	Acute skin infection – mild to severe	Global distribution – warmer months. Aquatic injury in fresh, brackish or surface

	Bacteraemia with possible infection in multiple sites (Morris, 2023)	water (including post flood). More common in those with liver disease, haem malignancies (Morris, 2023).
<i>Plesiomonas</i> spp	Acute skin infection – cellulitis, abscesses. Bacteraemia, and other extraintestinal infections which can be severe; high mortality rate (Morris, 2023).	Global distribution in warmer months. Aquatic injury in fresh or brackish water. More common in those with liver disease, neonates, IS (Morris, 2023).
<i>Mycobacterium marinum</i>	Indolent and prolonged skin infection however disseminated disease is possible (more likely in immunosuppressed) but rare (Mazumder, 2023; Hashish, 2018).	Global distribution in fresh, brackish and salt water; fish-hook punctures, preparing seafood including oysters (Mazumder, 2023; Hashish, 2018).
<i>Leptospira</i> spp	Acute febrile illness which can develop into severe pulmonary haemorrhage, jaundice. High mortality rate (Day 2024).	Most common South and SE Asia, Oceania, Caribbean, Latin America and sub-Saharan Africa Contact with animal urine-contaminated water (rat urine common but also dogs, pigs, cattle, sheep). Enters through cuts/abrasions, often during heavy rainfall and floods but

		can also be in ponds, lakes and rivers. Often misdiagnosed in pregnant persons; affects to foetus can be devastating (abortion or foetal death) (Day 2024).
<i>Burkholderia pseudomallei</i>	Acute and chronic febrile illness Single or multi-system infections Mimics many other infections. High mortality rate (Meumann, 2024; Wiersinga, 2018).	More common in SE Asia, South Asia (and Northern Australia) but increasingly recognised in China, South America and Africa (Meumann, 2024; Wiersinga, 2018). Ingestion (of contaminated water), inoculation of skin or infection of abrasions with contaminated water (and also inhalation of the bacterium). More common in diabetics, chronic respiratory, renal and liver disease, high alcohol intake (especially binge drinking), immunosuppressive therapy (e.g. steroids) (Meumann, 2024; Wiersinga, 2018).
PARASITES		
Schistosoma spp	<u>Acute and chronic</u> effects (chronic more serious)	Sub-saharan Africa and Middle East, Sthn Arabian Peninsula

- o <i>S. haematobium</i> - o <i>S. mansoni</i>, - o <i>S. japonicum</i> - o <i>S. mekongi</i> - o <i>S. malayensis</i> - o <i>Schistosoma intercalatum</i> and <i>S. guineensis</i>	Skin penetration of cercariae in fresh water leads to acute itch for all species. Some go onto have a hypersensitivity reaction. Chronic infection has indolent presentation. Affects GUT disease (<i>S. haem</i>) – haematuria, pyuria followed by fibrosis and calcification, strictures, reduced renal function and malignancy All other species present with GIT disease – chronic or intermittent abdominal pain, poor appetite, and diarrhea followed by bowel strictures, hepatosplenomegaly, portal hypertension, GI bleeds. Other systems can also be involved (Clerinx, 2024). -	Sub-Saharan Africa and western South America Africa, (mainly Brazil), and some of the South Caribbean islands. China, southern Philippines, Indonesia (Sulawesi) Thailand, Laos, Cambodia Peninsular Malaysia West and Central Africa – Congo, Gabon, and Cameroon (Clerinx, 2024).
<u>Helminths</u>		
Hookworm – human and animal (<i>Ancylostoma duodenale</i>, <i>Necator Americanus</i>,	Predominantly larval penetration of skin leaving a pruritic maculopapular eruption at the site. As larvae move through the	Most common in sub-Saharan Africa, Asia, Latin America and Caribbean. At risk of infection when walking bare foot, particularly

<i>Ancylostoma ceylanicum</i> , <i>Ancylostoma braziliensis</i> and <i>A. caninum</i> (<i>cutaneous larva migrans</i>)	body there may be symptoms e.g. through respiratory system (cough), GIT (nausea, vomiting, diarrhoea, epigastric pain). Chronic infection can lead to anaemia due to blood and iron loss (Weller, 2024).	moist surfaces such as the beach, river side etc. Ingestion of raw vegetables contaminated by helminths also (Weller, 2024).
<i>Strongyloides stercoralis</i>	Skin contact with contaminated soil predominantly. <u>Acute infection</u> reflects the path of larval migration – from the site of skin penetration (skin irritation/redness) – migration through bloodstream and lymphatics to lungs and alveoli (dry cough) – ascend tracheobronchial tree and swallowed and then establishes infection in small bowel (anorexia, abdominal pain, diarrhoea or constipation) (Weller, 2024). <u>Chronic infection</u> – symptoms mostly related to	Endemic in tropical and subtropical regions – most common SE Asia, Africa, Western Pacific regions. Skin contact with contaminated soil, faecal-oral, fomites and sexual contacts. Risk factors for hyperinfection/disseminated disease include those on corticosteroids (includes short courses), TNF inhibitors, HTLV infection, AIDS, malignancy, hypogammaglobulinaemia, alcohol use, transplant recipients. Pregnant persons may also be at higher risk (Weller, 2024).

	skin (pruritus, urticaria) and GIT (usually mild but can include peri-umbilical pain, diarrhoea, constipation, borborygmi). Respiratory symptoms rare. Can develop disseminated disease that can be fatal (Weller, 2024).	
AQUATIC ANIMALS		
Jelly fish – various species	Immediate pain at site of contact with redness and intense burning, itching and throbbing. Pending type of jellyfish can get vomiting, abdominal and chest pain, sweating, agitation, tachycardia +/- cardiorespiratory arrest (Marcus, 2024; TG, 2020).	Found in Indo-Pacific, northern Australia, Hawaii (Spyres, 2020; Marcus, 2024). When jellyfish tentacles contact skin, they release nematocytes that inject toxins into skin. Some jellyfish highly toxic. Seasonal (tropical monsoon season) (Marcus, 2024).
Other aquatic species e.g. coral, sea urchins, stingrays, spines of fish (catfish, stonefish), sea snakes	Acute pain and sometimes redness and swelling depending on aquatic animal. Some envenomations can result in severe pain (Isbister, 2023).	Distribution depends on the species

5 PREVENTION OF DISEASE – PRE-TRAVEL VACCINATIONS AND OTHER PREVENTIVE MEASURES TO REDUCE THE RISK OF ILLNESS AND ENVENOMATION DURING TRAVEL

As well as knowing what infections and diseases one may acquire from food or water, travellers need to know how to best protect themselves from becoming ill.

Those with risk factors for severe illness should be particularly knowledgeable about how they can mitigate risks whilst travelling.

5.1 Pre-Travel Vaccinations

All travellers should be encouraged to prevent disease whilst travelling. Prevention starts with vaccinations prior to departure and all travellers should be up to date with routine vaccinations (including polio and tetanus).

All travellers should be up to date with **polio** vaccine as per the standard schedule. As polio remains endemic in some countries many travellers require an adult booster of polio vaccine. See [here](#) for a list of countries with polio outbreaks. Some countries may require polio vaccination and an international certificate (ICVP) as a condition of entry if they are visiting endemic or outbreak areas for more than 4 weeks. For information about polio by destination see recommendations for [Australia](#), and [New Zealand](#).

There are very few vaccines available to reduce the risk of infections caused by ingestion of contaminated food and water, however some are available and recommended for certain risk groups. See table below for monthly incidence estimates of typhoid, Hepatitis A and cholera in non-immune travellers.

Table 4 Monthly incidence estimates of travel vaccine-preventable diseases in non-immune travellers* (Streeton, 2024)



Disease	Approximate incidence
COVID-19	4 in 100
Influenza	1 in 100
Dengue (symptomatic with seroconversion)	6 in 1000
Rabies risk (animal bite)	4 in 1000
Yellow fever	0.1–1 in 1000
Typhoid (South Asia)	2 in 10,000
Hepatitis A	1–7 in 100,000
Hepatitis B (Asia)	2 in 100,000
Tick-borne encephalitis (rural Baltics)	5 in 100,000
Measles	3 in 100,000
Pertussis	2 in 1,000,000
Typhoid (Africa, Latin America, Middle East, South East Asia)	8 in 1,000,000
Active tuberculosis	2 in 100,000
Typhoid (Caribbean, North East Asia)	<1 in 1,000,000
Japanese encephalitis	<1 in 1,000,000
Rabies (fatal)	<1 in 1,000,000
Meningococcal disease	<1 in 1,000,000
Cholera	<1 in 1,000,000
Diphtheria	<1 in 1,000,000

* Adapted from Steffen R, et al. Travel vaccines-priorities determined by incidence and impact. J Travel Med 2023; 30: taad085.²

Vaccination for all travellers to endemic areas for gastrointestinal infections may include Hepatitis A and Typhoid vaccination. Hepatitis A is especially important for travellers who are immunosuppressed and those with liver disease regardless of their destination. Cholera vaccine is also recommended for those going to areas with an outbreak of cholera disease and may be considered for certain high-risk travellers. See below.

5.1.1 Hepatitis A vaccination

Vaccination against Hepatitis A virus is recommended for all travellers over the age of 1 year travelling to endemic countries who have not previously been infected (ATAGI, 2024). Two intramuscular vaccines 6 months apart is the recommended schedule however one dose will provide adequate protective levels for the proposed trip. The second dose will increase the duration of protection (ATAGI, 2024). If time does not permit for the second vaccine pre travel, it can be given no earlier than 6 months after dose 1 and depending on type of vaccine, up to 18 or 36 months post first dose (ATAGI, 2024). If the second dose exceeds the recommended inter-dose interval, there is no need to repeat doses (WHO, 2022).

Hepatitis A vaccines are not recommended for pregnant persons or those breastfeeding, however if the person is travelling to endemic areas, the risk of infection may outweigh the risk of vaccination (ATAGI, 2024).

5.1.2 Typhoid vaccination

Typhoid vaccination is recommended for anyone 2 years or older who will travel to an endemic area. Oral and intramuscular options are available.

Children 2 years and older and adults can receive 1 IM typhoid vaccine.

Children 6 years and older and adults can receive 3 or 4 doses of oral typhoid vaccine. 3 doses are taken on an empty stomach one hour before food on days 1, 3, 5 and whilst the 4th dose (day 7) is optional, it may provide better protection than 3 doses (ATAGI, 2023).

Children under age 2 years of age are not recommended to receive either vaccine. The parenteral typhoid vaccine (polysaccharide) is poorly immunogenic in this age group therefore strict adherence to personal and food hygiene by care givers is important when travelling.

Revaccination is recommended for those travelling for an extended time or living in an endemic region. If first vaccine was parenteral it is recommended to be revaccinated every three years with parenteral vaccine. For those having oral vaccine as first vaccination, revaccination with oral vaccine is recommended at 3 years (after a 3-dose course) or at 5 years (after a 4-dose course) (ATAGI, 2023). Despite this recommendation, many travel doctors use the vaccines interchangeably (if no contraindications), particularly for those who may have had adverse effects with the initial schedule. For the last-minute traveller, the parenteral vaccine may be the only choice regardless of previous vaccine history.

Vaccination is not routinely recommended in pregnant persons unless they will travel to endemic countries and the benefit of vaccination outweighs the risk of enteric fever. The parenteral vaccine is the vaccine of choice.

Parenteral vaccination is recommended for HIV positive travellers, immunosuppressed and persons taking antibiotics.

5.1.3 Cholera vaccination

Routine cholera vaccination is not recommended for all travellers. However, it is recommended for children 2 years and older, and adult travellers who

1. have a high risk of exposure e.g. aid workers or crisis responders travelling to cholera **endemic** areas or an area with an outbreak or risk of an outbreak in a crisis (ECDC, 2024; CDC, 2024;)
2. have a high risk of acquiring diarrhoeal disease due to a medical condition e.g. achlorhydria (ATAGI, 2024) (pernicious anaemia, other auto immune diseases, chronic *Helicobacter pylori* infection, gastric radiation and/or surgery)
3. are travelling to a known cholera area and they have a higher risk of severe or complicated diarrhoeal disease e.g. complicated or poorly controlled diabetics, inflammatory bowel disease, HIV, immunocompromised persons, significant cardiovascular disease (ATAGI, 2024)
4. those travelling to very remote areas with poor health services e.g. trekking

There are 2 types of oral vaccines:

1. Inactivated cholera vaccine 'Dukoral'
2. Live cholera vaccine 'Vaxchora' (available in New Zealand using Section 29 only)

There is no preference for either vaccine **except** for those who are immunocompromised or on immunosuppressive treatment where the inactivated cholera vaccine should be given. These include people with HIV, pregnant persons, people taking antibiotics, those with acute gastrointestinal illness with persisting diarrhoea or vomiting, travellers with galactose intolerance, congenital lactase deficiency, glucose-galactose malabsorption, fructose intolerance or sucrose-isomaltose insufficiency (ATAGI, 2024).

Dosage (ATAGI, 2024)

- Children 2-6 years should receive

- 3 doses of *inactivated* vaccine with a 1-6 week interval between each dose OR
- 1 dose of *live attenuated* vaccine
- Children > 6 years and adults should receive
 - 2 doses of *inactivated* vaccine with a 1-6 week interval OR
 - 1 dose of *live attenuated*

Please note:

- Where the interval between each inactivated dose is longer than 6 weeks, the primary course should be restarted.
- Where an ongoing risk of cholera exists in a person whose primary vaccination was with *inactivated* vaccine, a single oral booster of inactivated vaccine is recommended 6 months after finishing primary course if aged 2-6 years and 6 months to 2 years for children > 6 years and adults.
- Where the interval between primary course and booster is greater than the recommended intervals, the primary course should be repeated.
- Food and drink should be avoided both 1 hour before and after the vaccine since the vaccines are acid-labile.
- For details of how to administer the vaccine please see [here](#)
- Travellers can receive *inactivated* oral cholera vaccines before, with or after other parenteral vaccines given for travel (ATAGI, 2024)
- For travellers receiving *inactivated oral cholera vaccine* and oral *live attenuated typhoid vaccine*, at least 8 hours should lapse prior to taking the second vaccine. (ATAGI, 2024)
- Travellers can receive *live attenuated oral cholera vaccine* at the same time as any other parenteral vaccines given for travel
- For travellers receiving *live attenuated oral cholera vaccine* and *live attenuated oral typhoid vaccine* at least 2 hours should lapse prior to taking the second vaccine.

The *inactivated* cholera vaccine may provide some protection against the common ~~TD~~ pathogen ~~E.TEC~~ although it is not recommended to be used routinely for prevention of TD (Ahmed 2013).

There may be some added benefit against ETEC for those at high risk of serious illness and therefore off label use of *inactivated cholera vaccine* (Dukoral) may be considered particularly those with high risk factors for severe disease and/or those where infection may interfere negatively with their activities and cause significant inconvenience e.g. professional sports people, politicians etc.

There is currently no country that requires a cholera vaccination for entry.

5.1.4 Potential future vaccines

WHO has prequalified two conjugate vaccines for the prevention of typhoid and has introduced these into some typhoid endemic countries. These appear to have longer-lasting immunity than the older typhoid vaccines and can be given as a single dose to children from the age of 6 months (WHO, 2023). They are not currently available in Australia or New Zealand.

Other vaccines that are under development for pathogens mentioned in table 2 include Hepatitis E (currently available for use in China and used in outbreaks in Sudan) (WHO, 2023) and *Burkholderia pseudomallei* (Hinjoy 2018). Hence additional vaccines may become available for travellers in future.

5.2 Other measures to prevent gastrointestinal disease

All travellers should be educated about how to reduce the risk of gastrointestinal symptoms which can interfere with activities and travel plans.

5.2.1 Antibiotic prophylaxis

Antibiotics are **not routinely recommended** in Australia or New Zealand for prevention of TD. Daily antibiotics can disrupt the normal gastrointestinal flora, can cause side effects and promote antimicrobial resistance (LaRocque, 2025; Riddle, 2017). Antibiotics may be appropriate for some travellers in the short term (<2 weeks) for travellers that have an underlying medical condition that may increase risk of diarrhoea complications or would be severely exacerbated by dehydration. Medical conditions include severe inflammatory bowel disease, severe cardiac, renal or vascular disease where dehydration could compromise the patient or travellers who are severely immunocompromised.

Other groups where it may be considered include those without access to adequate medical treatment (remote and adventure trips) or those individuals where interruption to their travel plans could be very difficult e.g. politicians, competing athletes, professional musicians etc) (Riddle, 2017).

There is evidence that rifaximin is beneficial for non-invasive TD treatment as it is not absorbed from the bowel (Steffen, 2015; Riddle, 2017) however it is less effective in South Asia and SE Asia perhaps due to the high incidence of Campylobacter resistance to rifaximin (Riddle, 2017; LaRocque, 2025). Rifaximin is only available for hepatic encephalopathy in both Australia and New Zealand but can be prescribed off label prescription for those that may benefit (but it is very expensive).

5.2.2 Other non-antibiotic measures

a. Bovine colostrum product (Travelan)

Bovine colostrum is a powdered extract produced by immunising pregnant cattle with numerous ETEC strains known to cause TD (Otto, 2011; Islam, 2023). The product is manufactured in Australia and commercially available over the counter in both Australia and New Zealand for prophylaxis of ETEC induced TD (Islam, 2023). Studies have shown to provide up to 90.9% protection against ETEC diarrhoea when taken three times daily (Otto, 2011) although number of participants in the studies were small.

The product also contains cytokines, growth factors and lactoferrin that potentially provides innate immune defences and promotes intestinal repair (Islam, 2023). Travelan can also recognise other enteric pathogens including Shigella antigens and therefore may provide additional benefit to other enteric pathogens causing TD (Islam, 2023).

Travelan may be useful particularly for those who are at high risk of severe disease or those travelling for short duration but being infected with TD may cause significant interruption to their travel plans. It is necessary to take Travelan at least three times per day so if travellers forget to take at one meal, they may not have protection for the food eaten at that time (or snacks/food/drinks ingested outside of mealtime doses).

b. Prebiotics and probiotics

There is insufficient evidence to recommend prebiotics or probiotics to prevent or treat TD (Riddle, 2017; LaRocque, 2025).

c. Bismuth

Bismuth taken four times daily provides some protection against TD (Steffen, 2015; Riddle, 2017; LaRocque, 2025) however it is not currently available in either Australia or New Zealand for this purpose.

5.3 How to reduce risk of GIT symptoms whilst travelling

5.3.1 Eat

- where you can order your food and have it freshly and well cooked (rather than it being pre -cooked and kept warm).
- only very hot or very cold food (not luke-warm) (CDC, 2023).
- at establishments that are busy since it is likely there is a good turn-over of food and less chance of long periods without appropriate food storage
- where refrigeration of all foods is most likely
- where the establishment looks cleaner, hand washing facilities (including soap) are available (practices within kitchens may not be much different to less clean looking kitchens however)

Avoid

- eating raw fruit and vegetables (including salads) unless one can peel and wash in boiled or treated water.
- all pre-cooked food, raw or undercooked meat and seafood
- all products with mayonnaise may include raw eggs (high risk of Salmonella spp infection as well as more recently, the risk of avian influenza has also increased)
- ‘special Vietnamese coffee’ and other products that include raw or partly cooked eggs
- eating places where it is obvious that only one chopping board and knife is used for both raw meat and vegetables
- eating places where there is no refrigeration of stored food
- open containers containing common condiments such as chilli, oils, sugar which customers can add to their food (spoon).

Dry or packaged foods are usually safe since pathogens usually require a damp environment to replicate. (CDC, 2023)

5.3.2 Drink

- refrigerated drinks that are well sealed such as canned or bottled drinks.
- hot drinks made with water just boiled as they are generally safe.

- commercially bottled water because it should be safe however seals should be checked to ensure contamination after bottling has not occurred
- boiled or treated water prior to drinking/using for cleaning vegetables and fruit if no safe bottled water available). See 'e' below in Special Groups for details

Avoid

- Non pasteurised milk
- Ice in all drinks – alcohol doesn't sterilise water or ice
- Ice cream which may contain unpasteurised milk, may not be kept correctly (thawed out and re frozen), soft serve ice cream machines may not be adequately serviced

Wash hands with soap and water prior to eating and after toileting. Where water and soap is unavailable, alcohol hand gel (at least 60%) should be used however this is not effective against some pathogens e.g. norovirus, Cryptosporidium species.

The saying 'boil it, cook it, peel it or forget it' sounds sensible but there is insufficient evidence that it is beneficial (Steffen, 2015).

5.3.3 Special groups

a. Infants – breast and bottle fed

- continue breastfeeding infants and young children
- avoid non pasteurised milk
- consider water for infant formula and oral rehydration solution (ORS) – boiled or filtered is likely safer but if not available then bottled water can be used

b. Children

- avoid non pasteurised milk
- consider water for ORS – boiled or filtered is likely safer but if not available then bottled water can be used
- carbonated drinks have high sugar levels therefore drinking safe water and other drinks that have been prepared safely or are safe to drink (freshly cut coconut) should be encouraged

c. Pregnant persons

Pregnant persons should be very careful about food and drinks they consume whilst travelling to avoid severe disease as well as to avoid complications for their unborn baby. They should avoid iodine for water purification as it can be harmful to the thyroid of foetus.

Pregnant persons have a higher risk of complications for some infections including:

- Hepatitis A
- Hepatitis E
- Listeria monocytogenes
- Strongyloidiasis

See [section above](#) for information on vaccination for HAV in pregnant persons.

Foetal effects can be severe in

- ~~HAV~~ where there is an increased risk of pre-term labour and gestational complications
- Ciguatera poison can cross the placenta and cause symptoms in the foetus
- Lead poisoning – increased risk of miscarriage, stillbirth, premature, low birth weight

d. Travellers with medical risk factors

Many travellers will have co-morbidities that predispose them to complications of specific infections (see [table 2](#) & [table 3](#)).

Strict adherence to hand hygiene (soap and water or antibacterial wipes or alcohol gel) is recommended.

Education about reducing risk of dehydration with GIT symptoms is important for those where dehydration may complicate their underlying illness (diabetes, cardiac and renal disease).

e. Travellers visiting rural and remote areas

Safe water may be difficult to find in rural and remote areas therefore travellers are recommended to treat the water. Methods will depend on the dangers posed by the local water supply. As well as pathogens, toxins generated by biological organisms e.g. algae, agricultural chemicals and other chemicals from industry or those naturally occurring may be in local water sources and cause ill health.

Various methods exist to treat water with more than one method often required to produce palatable water that is safe from pathogens and chemicals. No single method will remove all dangers.

Boiling water will kill all pathogens but has no effect on various chemicals. Travellers need to take care not to contaminate the boiled water during transfer to storage containers. Where water is turbid, clarification can be performed prior to boiling (WHO, 2022).

Chemical disinfection of non-turbid water is effective for killing bacteria, most viruses and some protozoa. The exception is *Cryptosporidium* oocysts and *Cyclospora* and therefore where this is likely, additional methods are required e.g. boiling (Backer, 2024). Chlorine or iodine-based compounds are used widely although iodine is not recommended for long term use or for the following – infants, pregnant women, hypersensitivity to iodine, thyroid disease unless post disinfection, another technique to reduce taste and smell, such as activated carbon is used (WHO, 2022). Short term use (3-4 weeks only) is recommended for iodine disinfection. Where water is turbid, clarification or filtration can be performed prior to disinfection.

Portable filtration such as membrane and activated carbon filters are popular and useful for travellers. They vary in their filtration capacity with microfilters having a pore size down to 0.1 micron, ultrafilters 0.002 to 0.01 micron, nano-filters 0.001 micron and reverse osmosis filters with pore sizes of 0.0001 micron or less. The smaller the pore size the greater the surface area required and the higher the pressure required. Microfilters will remove protozoan cysts and bacteria easily however, viruses being much smaller will be filtered less effectively. Pathogens often clump together including viruses or attach themselves to larger particles which aids in filtration of often significant quantities. Electrochemical attraction also cause viruses to adhere to the filter surface further reducing the amount of viruses able to pass however microfilters will never achieve complete removal of all viruses. Therefore, ultra or nano-filters are required to remove all viruses and include compact and lightweight filters that use gravity, a squeeze bag or a hand pump to treat water for individuals or small groups. Where water is turbid, using a pre filter to remove particles to avoid clogging the final filter will extend the life of the filter (Backer, 2024).

Other portable filters include **UV filters** such as SteriPEN which are effective against bacteria, viruses and protozoa when treating small amounts of clear water. They should not be used in turbid water or where sediments are visible as they are less effective (CDC, 2024).

A combination of methods is often required e.g. clarification or filtration prior to chemical disinfection or UV filtration which also improves the quality of the water by removing significant numbers of protozoa, bacteria and viruses.

Reverse osmosis and **carbon filtration** is required to remove chemical contaminants from the drinking water.

See [here](#) for a table outlining drinking water disinfection methods for use by travellers (CDC, 2024).

- Provide information sheets on traveller's diarrhoea to travellers to read such as [here](#) and [here](#).

5.4 How to reduce risk of skin acquired infections and envenomation

Travellers should be aware of how to reduce the risk of skin infections and envenomation from aquatic animals.

- Where a traveller has skin abrasions or cuts, they should avoid all contact with potentially contaminated water to reduce the risk of infections via skin. Where this is not possible, it is important to protect all open wounds, cuts and burns by using waterproof dressings to keep damaged skin from contacting potentially infected water. Some pathogens can cause a fairly benign skin infection however many can cause severe sepsis with high mortality rates and some result in chronic infections which can be debilitating.
- Where water contact is unavoidable e.g. having to walk through storm water following a monsoonal downpour or collecting and shucking of oysters, the skin should be immediately washed with soap and clean water or a waterproof dressing should be applied prior to contact.
- Thoroughly wash any new skin abrasions or cuts and apply an antiseptic such as povidone-iodine to reduce the risk of infection. Thereafter keep it covered with a waterproof dressing.

Many of these pathogens causing illness via penetration of skin or through open wounds, are more likely to cause severe illness in those with underlying conditions such as diabetes, chronic liver, renal and respiratory disease, those on immunosuppressive therapy (steroids, ~~TNF~~ inhibitors, transplant patients), malignancies and chronic alcohol use. Pregnant persons and neonates are also more likely to have severe effects with some pathogens (e.g. Leptospirosis or Strongyloidiasis). Hence education to prevent these infections and to be aware of the need to seek immediate medical care for these travellers is essential. [See table 3](#) for more details.

- Take care not to step on, handle aquatic animals such as coral, sea urchins, stonefish, catfish even if they look familiar to the traveller
- Don't
 - enter the ocean or swim during wet season in areas where dangerous jelly fish are found unless full cover swimsuit

- swim or paddle in areas where Schistosoma is endemic ([See table 3](#)). Water for bathing should be boiled and cooled prior to use or left standing for a day (provided no snails are present). Wear boots or waders if crossing an at-risk watercourse
- don't swim in a resort or other pool even if chlorinated if there are reports of diarrhoea (since numerous protozoa are chlorine resistant)

6 MANAGEMENT OF SYMPTOMS DURING TRAVEL

All travellers should be warned about the possibility of developing gastrointestinal symptoms, skin infections and other potentially life-threatening illnesses from contaminated food and water particularly when travelling to areas where sanitation and hygiene is poor.

6.1 Management of Gastrointestinal symptoms

The risks of GI symptoms have been described above. Management of symptoms will depend on the severity of the symptoms.

6.1.1 Nausea and vomiting

All travellers with vomiting need to ensure adequate hydration so they should be recommended to take small sips of fluid (preferably oral rehydration solution (ORS) or something similar) and very often. If the traveller has severe nausea and/or persistent vomiting, they are unable to change travel plans and need to travel or they have little access to medical care, then an anti-emetic such as metoclopramide (older than 20 years) (AMH, 2024) or ondansetron for children (Freedman, 2013) or adults (Athavale, 2020) may be prescribed if no contraindications.

6.1.2 Diarrhoea predominantly – Traveller's diarrhoea

Ensuring rehydration is the key management for all travellers with diarrhoea particularly in warmer climates where it is more difficult to keep up with fluid intake when sweating and having frequent loose stools.

Oral rehydration solution (ORS)

As with nausea and vomiting, avoiding dehydration (or rehydration) is paramount particularly for infants, toddlers, elderly and those with medical conditions where dehydration can cause major medical concerns e.g. cardiovascular disease, diabetes, chronic renal failure. Oral rehydration solution, sold in sachets and easy to make up if required, is an essential component of a first aid travel kit ([See table 5](#)).

Sachets of ORS are readily available over the counter in Australia and New Zealand as well as many countries where TD is common. It is possible to make up ORS if required with the following recipe: to 1 litre of clean water add 2 tablespoons of sugar, half teaspoon of salt (AHS, 2024).

As mentioned above, a new definition of severity has been developed to help travellers understand what to expect if they are infected and how to manage their symptoms.

a. Management of mild diarrhoea

Definition: diarrhoea that is tolerable, not distressing, does not interfere with planned activities.

The most important message to give travellers is that they should maintain their hydration status or rehydrate if they have reduced urine output, feel thirsty or have cracked lips.

Fluids include ORS and any other fluids they can tolerate such as diluted fruit juice, diluted canned soft drinks, broth. Food can be eaten as tolerated however a bland diet may be preferable for many patients. Children are at higher risk of severe dehydration particularly in warmer climates, so it is essential to ensure frequent ingestion of fluids. Breastfeeding should continue in those who are being breastfed.

b. Management of moderate diarrhoea

Definition: diarrhoea that is inconvenient so it may interfere with planned activities. It may be distressing but generally does not make the individual particularly unwell.

As with mild diarrhoea, fluid intake is essential to reduce the risk of dehydration. If the patient is nauseated or vomiting, small amounts given often are recommended to reduce the risk of vomiting (e.g. 50 ml every 15 to 30 minutes in adults and 10ml/kg over 60 minutes divided into 5 minutes aliquots in children) (RCH, 2020). Travellers may benefit from taking an anti-motility drug such as loperamide, particularly where they can't delay their travel or diarrhoea may be problematic during travel e.g. long trips by road or air. Treatment is for symptomatic relief only.

Children under 12 years, those with a fever or bloody stools should not take loperamide (AMH, 2024).

Dosing of loperamide is 4mg followed by 2 mg after each loose bowel action to a maximum of 16 mg per day (Riddle, 2017; AMH, 2024). Patients should be instructed to stop loperamide if diarrhoea worsens or they develop bloody diarrhoea (Riddle, 2017).

c. Management of severe diarrhoea

Definition: 1. diarrhoea that is incapacitating or completely prevents planned activities and/or

2. dysentery (passage of grossly bloody stools) (not only streaks of blood on toilet paper); may be accompanied by fever but not always

As with mild and moderate diarrhoea, preventing dehydration or rehydrating is the most important measure. Loperamide can also be taken (>12 years) however this should not be taken if patient has dysentery.

Antibiotics are **not routinely recommended** for patients with traveller's diarrhoea. Antibiotics can reduce the number of hours or days a traveller is symptomatic (Riddle 2017) however, as the disease is usually self-limiting, antimicrobial resistance is increasing and sequelae post antibiotics is possible, it is **not recommended** to routinely prescribe or take antibiotics despite having severe diarrhoea.

Antimicrobials can interrupt the gut microbiome and in one study, those taking antimicrobials for TD were found to have 40% colonization rates of extended spectrum beta lactamase (ESBL) producing bacteria and, when taken with loperamide, this number increased to 71% (Kantele, 2016).

Hence, antimicrobials **should only** be recommended as standby treatment for those patients with a high risk for complications if severely dehydrated e.g. diabetics, immunosuppressed or those who are travelling very remotely and may not have access to adequate health care. Antibiotics may be used in dysentery however even very severe dysentery may be self-limiting.

The recommended antibiotic is azithromycin 1 g stat dose or 500 mg daily for 3 days if nausea is a major problem (Riddle, 2017; LaRocque, 2025). It can be used safely in children and pregnant women (LaRocque, 2025). Resistance to fluoroquinolones (FQ) is increasing particularly in *C. jejuni* in SE Asia which is a common cause of TD in this region (LaRocque 2024) as well as other pathogens causing TD and FQ are therefore not recommended as standby treatment.

If symptoms do not improve within 24-36 hours, the traveller should seek medical attention.

d. Persistent diarrhoea

Travellers should be aware of the possibility of persistent diarrhoea (≥ 2 weeks) which may indicate certain causative pathogens (see above) and hence different management may be required. It is recommended that medical care should be sought to diagnose the cause of diarrhoea particularly where

it is severe and/or blood or mucus persist. Whilst causative agent(s) may not be found, appropriate treatment may be provided where the most likely cause is identified. Empiric treatment with Metronidazole/Ornidazole is often used and is useful in a situation where medical care may not be easily accessible.

Table 5 Self-treatment for Traveller’s diarrhoea		
Click here to print Table 5 (PDF)		
Symptoms	Symptoms	Treatment
Mild	• Diarrhoea is tolerable, not distressing • Does not interfere with planned activities	• Prevent dehydration/rehydration with ORS or any tolerated fluids. If nausea/vomiting, give small amounts of fluid often to reduce risk of vomiting • Beware dehydration especially in children • Continue breastfeeding • Food as tolerated • Loperamide not recommended
Moderate	• Diarrhoea that is inconvenient and interferes with planned activities e.g. wanting to have a toilet close by. It may be distressing.	• Prevent dehydration/rehydration with ORS (as above) • Loperamide (>12 years only) if can’t delay travel or if diarrhoea would be problematic during travel. Cease if worsens or if develops fever
Severe	• Diarrhoea that is incapacitating or completely	• Prevent dehydration/rehydration with

	prevents planned activities e.g. confined to bed or accommodation • Dysentery (bloody stools) is considered severe	ORS (as above) • Loperamide (>12 years only) but only if no blood in stools • Azithromycin 1 g stat dose may be recommended for high-risk travellers, those travelling in very remote locations including those who have dysentery. Pregnant persons are able to take the antibiotic.
Persistent	• Diarrhoea lasting 2 weeks or more	• revent dehydration or rehydration with ORS • Loperamide (>12 years only) may be considered • Investigate cause and treat accordingly • Empiric treatment with metronidazole or ornidazole (available in New Zealand) can be used if persistent and unable to seek suitable medical care.

Where the traveller is concerned or there are symptoms other than nausea, vomiting and diarrhoea such as severe abdominal pain, jaundice, neurological or cardiovascular symptoms, travellers should seek expert medical care.

Where chemical poisoning is suspected, travellers should also seek expert medical care.

A TD treatment kit is recommended for most travellers, but contents will depend on the individual’s risk factors e.g. age, medical conditions, style of travel, activities planned, season and destination of travel and access to adequate local medical facilities. Written instructions should be provided to the traveller so they are clear about what should be taken and when.

Table 6 Traveller’s Diarrhoea Treatment Kit



[Click here to print Table 6 \(PDF\)](#)

TRAVELLER’S DIARRHOEA TREATMENT KIT	
Basic kit contents include	• Oral rehydration sachets • Antimotility agent e.g. loperamide (>12 years only)
A more advanced kit might also contain	• Anti-emetic such as metoclopramide (>20 years only) or ondansetron (children and adults) • Anti-spasmodic such as hyoscine butylromide (buscopan) • Antibiotic such as azithromycin for standby treatment for specific travellers only (including those with dysentery) • Anti-parasitic agent such as metronidazole or ornidazole (NZ)

6.2 Management of skin abrasions and cuts

Travellers should wash all abrasions, cuts and skin wounds with soap and water prior to applying an antiseptic such as povidone-iodine. Wound should be kept dry with a waterproof dressing and any traveller not up to date with tetanus toxoid should be vaccinated.

Where skin becomes infected, medical care should be sought.

For indolent lesions, any pus should be drained, collected and sent for analysis and biopsies may also be required for atypical Mycobacterium.

Serious infections can result from contact with contaminated water and therefore travellers who experience symptoms other than local skin symptoms, should seek medical care as soon as possible. [See table 3](#) for details.

6.3 Management of envenomation

Envenomation from aquatic animals can cause a diverse array of syndromes including systemic and life threatening as well as delayed presentations. Children are at higher risk of serious reactions due to smaller body mass and higher relative venom load (Spyres, 2020). Elderly are also at high risk if they have co-morbidities (Spyres, 2020). Management of envenomation will depend on the envenomating creature as well as geographic location. Pain management is important and immediate first aid and life support may be required.

For jellyfish stings (except bluebottle), application of vinegar is recommended and if not available, douse in sea water (not fresh water). Manually removing the tentacles using fingertips is recommended before washing hands well with sea water.

Pain management includes either cold or hot packs (depends on the aquatic animal and where envenomation occurs) with transfer to medical treatment recommended as serious consequences are possible. See [ANZCOR Guidelines](#) for more information.

Stings or injuries from sea urchins, coral or fish require removal of any foreign material, thorough irrigation of the wound, application of antiseptic and tetanus prophylaxis as needed. Extensive wounds should be left unclosed but covered with a waterproof dressing.

Medical attention is recommended as x-rays, ultrasound or debridement may be required.

7 ADVICE ON RETURN TO AUSTRALIA OR NEW ZEALAND

Symptoms of an injury or illness may still be present on return to Australia or New Zealand, or the patient may present weeks, months or years after travel with symptoms attributed to an overseas trip.

Always be alert to the possibility of a patient being infected or exposed to toxins, chemicals or envenomation whilst overseas and developing sequelae or having ongoing symptoms, weeks, months or years later.

Here we will only include symptoms and diseases attributed to food or water (ingestion or contact/penetration of the skin). See other guidelines for additional infections or diseases that may be related to previous travel.

7.1 Gastrointestinal symptoms

It is uncommon to have prolonged upper GIT symptoms however when bloating, gas and nausea are present, it is typical of giardiasis infection (LaRocque, 2025).

Persistent diarrhoea (duration longer than 14 days), following acute diarrhoeal episode whilst travelling is common. Approximately 2% of TD cases will have persistent diarrhoea (Steffen 2015). If treated with antibiotics, a pathogen resistant to the antibiotic given could be responsible and one should also consider *Clostridioides difficile*. Invasive pathogens such as *Shigella*, *Salmonella* and *Campylobacter* can also cause prolonged diarrhoea (LaRocque, 2025).

An infection with a protozoa, (*Giardia* or *Cryptosporidium*) or a helminth infection may be the causative agent where symptoms have lasted for at least 30 days (Adler, 2022; Steffen, 2015).

A non-pathogenic cause is also possible including irritable bowel syndrome. Persistent diarrhoea may also be associated with bowel cancer and inflammatory bowel disease.

Travellers with severe or ongoing symptoms (including bloody and mucus in stool), should have 3 stool specimens collected and sent for

- culture
- ova, cysts and parasites
- antigen and PCR testing

It is important to include travel history in clinical notes and any medications the patient may have received.

Serology for some pathogens may also be important e.g. schistosomiasis, strongyloidiasis (TG, 2022).

Travellers that are food handlers, childcare workers or health care workers should refrain from working until a diagnosis has been provided to reduce the risk of onward transmission.

7.2 Non-GIT symptoms

Always think about the possibility of the traveller being infected during overseas travel particularly in patients with chronic diseases such as diabetes, chronic renal, liver or respiratory disease, those that are immunocompromised and those on immunosuppressive medications.

Presentations may be soon after the trip or may present months or years later. It is important to take a travel history as it may increase the chances of a definitive diagnosis.

As our population ages, more travellers will have co-morbidities so it is likely, infections not readily encountered in Australia or New Zealand may be seen after they return.

7.2.1 Skin infections

Most acute infections will be self-limited or treated whilst travelling however patients may present with acute, sub-acute, persistent or relapsing infections.

For acute infections, a history of recent activities as well as any other symptoms the patient may be experiencing, may guide the clinician to the most likely causative agent. Microbiology testing along with a full blood count should be the minimum investigations to aid with diagnosis and management.

Burkholderia pseudomallei can cause both acute and chronic skin infections including ulcers, nodules and abscesses which are often persistent and unresponsive to multiple antibiotics (self-administered or prescribed whilst travelling). Clinicians should be alert to the possibility of this rarely heard-of pathogen in returned travellers which is common in diabetics and patients with a history of alcohol excess, chronic renal, liver, lung or other chronic disease (Fertitta, 2018; Wiersinga, 2018; Meumann, 2024). Collection or any pus from incision of an abscess or wound should be sent for culture including clinical notes that the lesion is chronic and patient has risk factors for melioidosis. Haematogenous spread from skin infections occurs and may have a high mortality rate if not identified and treated appropriately.

Mycobacterium marinum causes an indolent nodular infection usually on extremities which may enlarge, suppurate and ulcerate over severe months (Akram, 2023; Baddour, 2023; Mazumder, 2023). There can be localised pain and they too, are often unresponsive to multiple antibiotics.

7.2.2 Other symptoms

Travellers may present with innumerable symptoms (respiratory, generalised, chronic fever, musculoskeletal etc) however it is important that clinicians consider that the patient may have been exposed to chemicals, toxins and infectious diseases from food and water during their travel. Expert opinion may be required to assist in diagnosis and management.

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