

**QUICK LINKS****Traveler's Diarrhea—TRAVELER INFORMATION**

- Introduction • Prevention: Food and Beverage Precautions
- Prevention: Vaccines and Medications • Treatment

## Traveler Information

**TRAVELER'S DIARRHEA****INTRODUCTION**

Traveler's diarrhea (TD) is the most common health problem that travelers encounter, affecting up to 60% of travelers. TD is characterized by the passage of 3 or more unformed stools in a 24-hour period. Although traveler's diarrhea usually resolves within 3-4 days, 10% of cases last longer than 1 week and approximately 2% last a month or more. Travelers may experience more than 1 episode of TD per trip.

TD is caused by something the traveler ate or drank. Prevention continues to be important. However, despite prevention strategies, including the traditional advice "boil it, cook it, peel it, or forget it," TD still occurs. Therefore, it is important to learn how to recognize and manage TD if it occurs.

**Organisms That Cause TD**

TD can be caused by bacteria, protozoa, or viruses that are ingested when eating contaminated food or beverages.

- In short-term travelers, most cases of TD are caused by bacteria, most commonly *E. coli*.
  - Protozoa are an uncommon cause of TD in short-term travelers.
  - In longer-term travelers and expatriates, 10-20% of diarrhea is caused by protozoa, most commonly *Giardia lamblia*.
  - Gastrointestinal viruses account for about 5-10% of TD cases.
  - Enterotoxigenic *E. coli*, *Campylobacter*, and *Salmonella* are the most frequent cause of TD.

**Transmission**

Travelers get TD by eating contaminated food or beverages. Poor sanitation, the presence of stool in the environment, and the absence of safe restaurant practices lead to risk of diarrhea from eating a wide variety of foods. Because most travelers are careful to avoid drinking untreated water, many travelers acquire TD from eating contaminated food.

**Risk Areas**

Destination is the most important determinant of risk.

- Developing countries in Latin America, Africa, the Middle East, and Asia are considered high risk.
- Most countries in southern Europe and a few Caribbean islands are deemed intermediate risk.
- Low risk areas include the U.S., Canada, northern Europe, Australia, New Zealand, and several of the Caribbean islands.

**Risk Factors**

Persons from countries with a high level of hygiene traveling to countries with a low level of hygiene are at risk.

Persons at particularly high risk include:

- Young adults (because they are prone to risk-taking behavior and often are on limited budgets)
- Persons with immune suppression, inflammatory bowel disease, or diabetes
- Persons taking medications that decrease gastric acidity

## Symptoms

Bacterial TD has an abrupt onset of uncomfortable diarrhea. "Abrupt onset" generally means that one is aware of the exact time of day the illness began, and the symptoms are quite bothersome from the beginning. Fever, nausea, or vomiting may also occur.

- Travelers who experience an abrupt onset of uncomfortable diarrhea can be reasonably confident that the cause is bacterial and can self-treat with an appropriate antibiotic to shorten the illness.

Protozoal diarrhea begins gradually, with loose stools occurring in distinct episodes during the day (for example, mornings and evenings), gradually becoming more bothersome, and associated with fatigue. Persons with protozoal infections often do not seek medical care for several weeks due to the generally mild nature of the symptoms.

## PREVENTION: FOOD AND BEVERAGE PRECAUTIONS

Although it is difficult to guarantee the safety of food and beverages when traveling, especially in developing countries, travelers should follow food and water precautions and eat the types of food that tend to be safest. Where one eats may be even more important than what one eats; poor hygiene in the kitchen may contaminate even "safe" foods before, during, or after cooking. Nevertheless, food and water precautions can help to reduce the amount of organisms ingested and thus the severity of TD. Risk can be minimized by following the guidelines below.

### Food Precautions

Travelers should:

- Eat at establishments that are known to cater to foreigners or that are known by other foreigners to be safe.
- Eat foods that are well-cooked and served steaming hot.
- Eat breads, tortillas, crackers, biscuits, and other baked goods.
- Eat fruits, nuts, and vegetables with thick skins, peels, or shells that can be removed.
- Eat canned foods.
- Always wash hands with soap before eating and after using the toilet.

Travelers should not:

- Eat any food from street vendors or market stalls.
- Eat leafy or uncooked vegetables and salads. Some organisms in soil and water are not destroyed by normal cleaning methods.
- Eat undercooked, raw, or cold meat, seafood, or fish.
- Eat large carnivorous fish, especially from reef areas (barracuda, red snapper, amberjack, surgeon fish, parrot fish, mullet, sea bass, grouper, or moray eels). Many contain concentrated toxins.
- Eat or drink unpasteurized dairy products such as cheese, yogurt, or milk. Be particularly wary of ice cream and other frozen confections that may have been made or stored in contaminated containers.
- Eat cold sauces such as mayonnaise, salad dressing, chutneys, or salsas, which are usually raw and made by hand.
- Eat buffet foods such as lasagna, casseroles, and quiches—unless they are fresh (not reheated) and have been kept steaming hot. Avoid buffets where there are no food covers or fly controls.
- Eat creamy desserts, custards, or sauces that may not have been adequately refrigerated.

### Beverage Precautions

Developing countries don't always have the resources needed to ensure a pure water supply, and consequently tap water is not safe to drink. Even if the people who live there can drink the water, travelers should not assume that they can. Local residents have built up immunity to organisms in the water, but visitors have not. As a result, tap water can make travelers sick. When traveling through areas with less than adequate sanitation or with water sources of unknown purity, travelers can reduce the chance of illness by following these precautions.

Travelers should:

- Use only water that is sealed and bottled or chemically treated, filtered, or boiled for drinking and for brushing teeth.
- Drink beverages made only with boiled water whenever possible (such as hot tea and coffee). Water boiled for any length of time at sea level (even 1 minute) is safe to drink. Boil water longer at higher altitudes.
- Drink canned, boxed, or commercially bottled carbonated water and drinks. International brands are safest. Beware of unsealed containers that may have been refilled.
- Safely drink beer and wine; however, alcohol added to other beverages does not render them safe.
- Travelers can purify their own water (see "Treating Water," below) if one of these options is not available. Decide which method to use for water purification and bring along the appropriate equipment.
- Carry safe water when going out for the day if safe water is not assuredly available.
- Breastfeeding is the safest food source for infants who are still nursing. If formula is used, it must be prepared with boiled water and sterilized containers.

Travelers should not:

- Drink tap water.
- Rinse toothbrushes in tap water.
- Use ice unless it is made from boiled, bottled, or purified water. Freezing does not kill the organisms that cause diarrhea.
- Assume that water is safe because it is chlorinated. Chlorination does not destroy all the organisms that can cause illness.
- Drink from wet cans or bottles—the water on them may be contaminated. Dry wet cans/bottles before opening and clean all surfaces that will have contact with the mouth.
- Drink fruit juice unless it comes directly from a sealed container; otherwise it may have been diluted with tap water.

## Treating Water

### **Boiling**

Boiling is reliable in killing most common intestinal pathogens. Travelers may choose an immersion coil for boiling water (a plug adapter and current converter might be necessary). Boiling for 1 minute is usually sufficient at sea level. Because the boiling point decreases at higher altitudes, water should be boiled for 3 minutes at 2,000 m (6,600 ft).

### **Chemical Disinfection**

If it is not possible to boil water, chemical disinfection is an alternative. Most (but not all) diarrhea pathogens are susceptible to being killed by iodine, which can be used to disinfect water, leafy vegetables, and fruits. Add 5 drops of 2% iodine to 1 liter of water (approximately 1 quart) and let stand for 30 minutes.

- Travelers with thyroid problems or iodine allergies or who are pregnant should not use iodine for water purification.
- The use of iodine should be limited to a few weeks.
- To avoid the taste and smell of iodine in disinfected water, add vitamin C (ascorbic acid) to the water after the iodine has been in contact with the water for 30 minutes or more. Add about 50 mg of vitamin C to a liter of water and shake briefly.
- Tetraglycine hydroperiodide tablets (e.g., Globaline, Potable-Aqua, Coghlan's) are available from pharmacies and sporting goods stores. The manufacturer's instructions should be followed.

Chlorine also can be used, but its germicidal activity varies greatly with temperature and other factors; thus it is less reliable than iodine.

### **Portable Filters**

It cannot be assumed that portable filters will make drinking water safe. However, in areas where it is not practical to boil all drinking water, a good quality filter with a pore size of 0.2 microns will remove bacteria and cysts, but not viruses. The filtered water should be treated chemically, as well.

## Ultraviolet (UV) Light

UV light can kill bacteria, viruses, and protozoan oocysts in water. Battery-operated, portable units that deliver UV doses have become available and may be useful to disinfect small quantities of clear water but not turbid water.

## PREVENTION: VACCINES AND MEDICATIONS

**Vaccine:** A vaccine (Dukoral) is available in Canada and other countries (not available in the U.S.) but is only about 60% effective in preventing diarrhea caused by ETEC (enterotoxigenic *Escherichia coli*) bacteria and about 23% effective in preventing TD overall. The vaccine also protects against cholera; see *Cholera* for detailed information on Dukoral.

The vaccine provides short-term protection (less than 3 months) against ETEC, which causes less than 50% of TD cases. A recent study found insufficient evidence to justify the use of the vaccine for TD prevention.

Travelers should observe food and beverage precautions regardless of vaccine status.

**Antibiotics:** Antibiotic use is not usually recommended for travelers for prevention of TD, except for individuals who have a particularly high risk of acquiring diarrhea, who face serious consequences due to underlying illnesses, or who have a short-term work assignment that may be seriously impacted by diarrhea.

In general, travelers are better off learning how to self-diagnose and treat TD early with the appropriate antibiotic in order to try to limit the illness to a single day.

### Non-antibiotic methods:

**Bismuth subsalicylate** (BSS) can be taken as an ingredient of Pepto-Bismol in liquid form (2 oz taken 4 times per day) or as tablets (2 tablets taken 4 times per day). It is not recommended for more than 3 weeks when used for prophylaxis. Side effects include temporary black stools or a black tongue. Nausea and constipation may occur, and, rarely, ringing in the ears.

- BSS-containing drugs (i.e., Pepto-Bismol and the U.S. formulation of Kaopectate) should not be used in:
  - Children less than 12 years of age and should be used with caution in older children and adolescents with viral infections (e.g., influenza, chickenpox), because of the risk of Reye syndrome
  - Women who are pregnant or nursing
  - Individuals with an allergy to aspirin; persons with renal insufficiency or gout; or persons taking anticoagulants, probenecid, or methotrexate
- BSS can prevent absorption of doxycycline, so these 2 drugs should not be taken together.
- In travelers taking aspirin or other salicylates, the use of BSS may result in salicylate toxicity.

**Probiotics** are microorganisms found naturally in the human gut and are sold as dietary supplements. They have generated much interest as prophylaxis for TD, particularly *Saccharomyces boulardii* and *Lactobacillus* GG. These strains appear to have little in the way of side effects and some studies showed favorable outcomes; however, overall results of studies remain inconclusive. Taking live *lactobacillus* strains has been shown to produce a mild decrease in the rate of TD.

## TREATMENT

### Oral Rehydration

- Dehydration can be corrected with fluids, and travelers should drink any available appropriate fluids to rehydrate.
- If vomiting is also present, oral rehydration solutions (ORS) can be rapidly absorbed from the intestine. Many stores and pharmacies in developing countries carry ORS packets, and travelers to remote areas should carry their own ORS packets. Add the packet to boiled or treated water, and follow package instructions carefully to be sure the correct amount of water is used.
  - World Health Organization's (WHO) ORS tastes salty and is often unpalatable. (In the U.S., WHO's ORS packets are available from the major travel medicine supply houses.)
  - Flavored rice-based ORS (Ceralyte) is also available in the U.S. and may be more palatable.
  - Solution held at room temperature should be consumed or thrown away within 12 hours; if it has been kept refrigerated, it must be discarded after 24 hours.
  - If commercial ORS is not readily available, any fluid should be used until ORS can be obtained.
  - For treating dehydration in children, the following recommendations for use of ORS should be followed: In general, an

infant weighing less than 10 kg (22 lb) who is not severely dehydrated should get 2-4 ounces of ORS for every loose stool or vomiting episode; give 4-8 ounces to children weighing more than 10 kg.

## Dietary Management

- Avoid intestinal irritants such as alcohol, coffee, strong tea, spicy food, and greasy food.
- Avoid dairy products.
- If not hungry, the traveler should drink lots of fluids and not force oneself to eat.

## Drug Treatment

**Bowel immobilizers** such as **loperamide** are often used to manage the symptoms of TD. Bowel immobilizers sometimes induce prolonged constipation even at low doses, and they can lead to a bloated, uncomfortable feeling if taken for moderately severe infections without taking an antibiotic as well. Their use should be discontinued if symptoms last more than 48 hours.

- Bowel immobilizers should not be taken by travelers with bloody stool or fever.
- Loperamide should not be used in children who are less than 3 years of age, malnourished, moderately or severely dehydrated, systemically ill, or who have bloody diarrhea.
- Loperamide may be considered in some cases for children older than 3 years of age; consult a health care provider.

**Bismuth subsalicylate:** Drugs containing bismuth subsalicylate (Pepto Bismol and the U.S. formulation of Kaopectate) should not be used by:

- Children less than 12 years of age
  - Use with caution in older children and adolescents with viral infections (such as chickenpox or influenza), as there is a risk of a rare but serious illness called Reye syndrome, which can affect the blood, liver, and brain.
- Women who are pregnant or nursing
- Persons with an allergy to aspirin, persons with renal insufficiency or gout, and persons taking anticoagulants, probenecid, or methotrexate

Side effects of bismuth subsalicylate may include temporary black stools or a black tongue. Nausea and constipation may occur occasionally, and, rarely, ringing in the ears.

The formulation of Kaopectate currently marketed in the U.S. should not be used in pregnant women because it contains bismuth subsalicylate as the active ingredient. (A previous formulation, no longer available in the U.S., contained kaolin and pectin.) Bismuth subsalicylates compounds are contraindicated due to theoretical risk of fetal bleeding (salicylate) and teratogenicity (bismuth).

The formulation marketed in Canada, also called Kaopectate, contains attapulgite as the active ingredient. Attapulgite is likely safe to use in pregnant women because it adsorbs bacteria in the gut and does not enter systemic circulation, but it is not readily available in the U.S.

**Probiotics:** Taking live *Lactobacillus* strains has been shown to produce a mild decrease in the rate of TD. These strains appear to have few side effects.

**Antibiotics for bacterial diarrhea:** Travelers are often in areas where prompt, effective medical care is unavailable. Therefore, it is often more practical to self-treat bacterial diarrhea with antibiotics that have been prescribed and purchased prior to leaving for the trip. The use of antibiotics can turn a 3- or 4-day illness into a 1-day illness. The majority of TD cases are due to bacteria. Therefore it is not necessary to know specifically which bacterium is causing the diarrhea. It is sufficient to classify treatable TD as either bacterial or protozoal. (See "Symptoms.")

For treatment of suspected bacterial diarrhea, a **quinolone** antibiotic (ciprofloxacin, levofloxacin, ofloxacin, norfloxacin) is preferred (usually taken for 3 days).

- Quinolones may be used with caution in children of all ages, although only ciprofloxacin is FDA-approved for children less than 18 years of age.
- It is not known if quinolone antibiotics are safe to use during pregnancy and breastfeeding.
- Quinolones are associated with a small increased risk of tendinitis and tendon rupture. Risk is increased in persons older than age 60 years; in kidney, heart, or lung transplant recipients; and in persons taking steroids. At the first sign of tendon pain, swelling, or inflammation, stop taking the quinolone drug, avoid exercise and use of the affected area, and promptly contact a doctor to change to a non-quinolone antibiotic.

- Nerve damage has been reported in persons taking quinolones; symptoms can include pain, tingling, or numbness in the extremities. If these symptoms occur, the patient should stop taking the drug and contact their health care provider.

If quinolones cannot be used, **azithromycin** is an effective alternative in treating bacterial TD; it is usually taken for 3 days. Azithromycin is the drug of choice for children less than age 18 years and pregnant women. This drug should be used with caution in persons with preexisting cardiac conditions.

Another alternative is an antibiotic called **Rifaximin** (Xifaxan; Xifaxanta), which is available in the U.S., Europe, and other countries. It is approved for the treatment of traveler's diarrhea caused by *E. coli* in persons 12 years of age and older who do not have fever or bloody stools. Rifaximin is taken for 3 days.

- Safety of this drug in pregnancy and lactation has not been established.

**Medications for protozoal infections:** Protozoal infections usually cause diarrhea in the returned or long-term traveler. Travelers do not usually carry drugs to treat these infections; a proper diagnosis should be made and the drugs administered under supervision. However, travelers going to extremely remote locations might be given tinidazole to carry on a case-by-case basis.

- *Giardia lamblia* is the most common protozoal infection of travelers. It can be suspected if there is a gradual onset of loose stools, increased intestinal gas and bloating, upper abdominal discomfort, and gradually increasing fatigue. Vomiting is very rare and fever almost never occurs in *G. lamblia* infections. The standard therapy is either metronidazole or tinidazole (Tindamax). Either drug may cause side effects such as nausea, malaise, and a metallic taste in the mouth.

## Self-Treatment Guidelines

Discuss options with your health care provider. Antibiotics and/or other drugs may be recommended as shown below:

Mild diarrhea: loose stools without other symptoms:

- Antibiotic probably not necessary.
- Could use bismuth subsalicylate or antimotility drug such as loperamide (for maximum of 48 hours) if necessary for comfort during sightseeing or travel.

Moderate diarrhea: loose or frequent stools with cramps or nausea:

- Use antibiotic.
- Add antimotility drug (loperamide) for more rapid effect.

Severe diarrhea: Bloody stools with intense cramps, or fever and chills, or profuse frequent watery stools

- Use antibiotic.
- Stay in room and use toilet as necessary.
- Avoid antimotility drugs (loperamide) unless necessary for travel.
- Pay attention to rehydration.
- Seek medical attention if symptoms do not rapidly improve.

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