

TRAVELER'S DIARRHEA

INTRODUCTION

The prospect of developing diarrhea is a major concern for travelers heading to developing countries. "Traveler's diarrhea" (TD) occurs in up to 60% of travelers and is characterized by the passage of 3 or more unformed stools in a 24-hour period. Although it is a self-limited disease, TD lasts an average of 3-4 days. Ten percent of cases last longer than 1 week, and approximately 2% last a month or more. In addition, travelers may experience more than 1 episode per trip.

Despite prevention strategies including the traditional advice to help avoid diarrhea ("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.

DukoralTM, a vaccine available in Canada and elsewhere (not in the U.S.), has been shown to be effective against some types of diarrhea. See "Vaccine."

ORGANISMS THAT CAUSE TD

TD is caused by bacteria, protozoa, or viruses that are ingested by eating contaminated food or beverages. For short-term travelers in most areas, bacteria are the cause of the majority of diarrhea episodes. (In most parts of the world, *E. coli* is the most common cause of bacterial diarrhea.) Protozoa are an uncommon cause of TD in short-term travelers. Depending on the season, however, protozoa can account for 10-20% of diarrhea in longer-term travelers and expatriates. (*Giardia lamblia* is the most common protozoal pathogen.) Gastrointestinal viruses (rotavirus, Norwalk, etc.) exist throughout the world, and their importance varies in different regions. However, they probably account for no more than 5-10% of TD cases.

TRANSMISSION

You can get TD whenever you travel from countries with a high level of hygiene to countries that have a low level of hygiene. Poor sanitation, the presence of stool in the environment, and the absence of safe restaurant practices lead to widespread risk of diarrhea from eating a wide variety of foods in restaurants. Because most travelers are careful to avoid drinking untreated water, many travelers acquire TD from eating contaminated food.

It is important to follow the traditional advice given to travelers to help avoid diarrhea (see "Food and Beverage Precautions," below); however, in high-risk destinations the fecal contamination may involve a wide variety of foods, and simply adhering to this advice may not prevent illness. Therefore, it is also important to learn how to recognize and treat TD when it occurs (see "Self-Diagnosis and Self-Treatment").

RISK FACTORS

Your 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 United States, Canada, Northern Europe, Australia, New Zealand, and several of the Caribbean islands.

Persons at particularly high risk for TD 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; and persons taking medications that decrease gastric acidity.

SYMPTOMS

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

In contrast, **protozoal diarrhea** begins gradually, with looser 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 2 weeks or more due to the generally mild nature of the

symptoms.

If you experience an abrupt onset of uncomfortable diarrhea you can be reasonably confident that the cause is bacterial, and you can treat yourself with an appropriate antibiotic (as provided by your travel health physician) to shorten the illness.

PREVENTION

Food and Beverage Precautions

Traveler's diarrhea is caused by something you ate or drank. It is difficult, if not impossible, to guarantee the safety of food and beverages when traveling, especially in developing countries. Without strict public health standards, bacteria or parasites in food or water may go undetected and cause illness such as traveler's diarrhea.

However, you can continue to enjoy local foods—this is part of the pleasure of international travel. Just be sure to follow food and water precautions and concentrate on eating the types of food that tend to be safest. Although there is some evidence that suggests *where* you eat is more important than *what* you eat, following food and water precautions can still help decrease the amount of organisms ingested and decrease the severity of TD if you do become ill. It also helps reduce the risk of other infections such as dysentery, hepatitis A and E, giardiasis, typhoid, and paratyphoid.

While it may not be possible to avoid diarrhea in certain high-risk destinations even with the strictest adherence to preventive measures, the 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 you remove yourself.
- Eat canned foods.
- Always wash your 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 you know 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

In developed countries, clean drinking water is available right out of the tap and breakdowns in the system are rare. Developing countries, however, 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, you 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 (even 1 minute), at any altitude, is safe to drink.
- Drink canned, boxed, or commercially bottled carbonated water and drinks. International brands are safest. Beware of unsealed containers that may have been re-filled.
- Safely drink beer and wine; however, alcohol added to beverages does not render them safe.
- Purify your 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 with you if you are going out for the day and safe water is not assured.
- Breast-feeding 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 toothbrush 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 make you ill.
- 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

Urban travelers may choose an immersion coil for boiling water (a plug adapter and current converter might be necessary).

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.

- If you have thyroid problems or iodine allergies or are pregnant you should NOT use iodine for water purification.
- 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 to eliminate the iodine taste and odor.
- 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 eliminate the risk of pathogens. The filtered water should be treated chemically as well.

Antibiotics

Prophylactic antibiotics are not routinely recommended for travelers, mostly due to the risk of complications from the antibiotic. In addition, antibiotics do not protect against various viral and parasitic diseases.

Antibiotic prophylaxis may be recommended in special circumstances: for individuals who have a particularly high risk of acquiring diarrhea, persons who face serious consequences if they do develop diarrhea (those with underlying illnesses), or persons who have a short-term work assignment that would make diarrhea a disaster. Such prophylaxis generally is restricted to periods of less than a week. The most effective antibiotics for prevention of TD are the fluoroquinolones (ciprofloxacin, norfloxacin, ofloxacin, and levofloxacin).

If a social situation arises in which food may have to be accepted that may not be safe to eat, you may consider selective use of a single dose of prophylactic antibiotic (after the offending incident), but only if you clearly understand the risks and benefits.

In general, however, you 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

For prevention, bismuth subsalicylate can be taken (as an ingredient of Pepto-Bismol) in liquid form (2 oz., 4 times per day) or as tablets (2 tablets, 4 times per day). Its use has decreased the incidence of TD by about 60% in several studies, but it is not recommended for more than 3 weeks when used for prophylaxis. Side effects are minimal and may include temporary black stools or a black tongue. Nausea and constipation may occur occasionally, and, rarely, there is ringing in the ears. In travelers taking aspirin or other salicylates, the use of bismuth subsalicylate may result in salicylate toxicity. Do not take bismuth subsalicylate if you have an allergy to aspirin, renal insufficiency or gout, or are taking anticoagulants, probenecid, or methotrexate. Bismuth subsalicylate can prevent absorption of doxycycline so the two should not be taken at the same time. Bismuth subsalicylate is not approved for use in children less than 3 years of age and should not be given to children or adolescents with viral infections (such as chickenpox or the flu), as there is a risk of a rare but serious illness called Reye syndrome, which can affect the blood, liver and brain.

Taking live *lactobacillus* strains has been shown to produce a mild decrease in the rate of TD. These strains appear to have little in the way of side effects.

VACCINE

DukoralTM, a vaccine available in some countries (not in the U.S.), has been shown to be effective in preventing some types of traveler's diarrhea. You should observe strict food and beverage precautions whether or not you have received this vaccine.

SELF-DIAGNOSIS AND SELF-TREATMENT

The majority of cases of TD are due to bacteria and the majority of bacteria causing TD are currently sensitive to quinolones (with the exception of some *Campylobacter* species). Therefore it is not necessary to know specifically which bacteria is causing the diarrhea. It is sufficient to classify treatable TD as bacterial or protozoal. (See "Symptoms.")

Oral Rehydration

Traveler's diarrhea in adults is not usually associated with significant dehydration, but replacement of fluids remains a cornerstone of self-treatment. At the same time, any diarrhea that is severe enough to pose a risk of dehydration should be considered for antibiotic treatment (*see below*). Dehydration can be corrected with any fluid, and you should drink any available appropriate fluid while oral rehydration fluid is sought. In cases of TD where vomiting is also prominent, oral rehydration solutions (ORS) were designed to be rapidly absorbed from the intestine. If ORS is needed, many stores and pharmacies in developing countries carry ORS packets. Travelers to remote areas should carry their own ORS packets. Add the packet to boiled or treated water; follow package instructions carefully to be sure the correct amount of water is used.

World Health Organization (WHO) ORS tastes salty and is often unpalatable. (In the United States, WHO 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, you can make your own replacement solution by drinking alternating

glasses of these fluids—glass #1: drink 8 oz. fruit juice plus one-half tsp corn syrup or honey or sugar plus a pinch of salt; glass #2: drink 8 oz. boiled water plus one-fourth tsp baking soda.

Dietary Management of TD

The dietary advice routinely given to sufferers of TD (i.e., fast in the first 24 hours or eat only bananas, boiled rice, dry toast, chicken soup, etc.) has virtually no scientific basis. Studies on oral rehydration solutions suggest that balanced salt and carbohydrate solutions may be easier to absorb during diarrhea and may even diminish fluid loss into the intestines.

The following guidelines appear to be reasonable if you have diarrhea: if you are not hungry, drink lots of fluids but don't force yourself to eat. If you are hungry, you can eat, but you should avoid known intestinal irritants such as alcohol, coffee, strong tea, spicy food, and greasy food. Avoid dairy products.

Drug Treatment

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.

For treatment of suspected bacterial diarrhea, quinolone antibiotics (ciprofloxacin, levofloxacin, ofloxacin, norfloxacin) are preferred, and most clinicians recommend 3 days of therapy. Use of antibiotics for TD in children is not established but is often used in practice. 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. Safety of quinolone antibiotic use during pregnancy and lactation has not been established.

If quinolones cannot be used, azithromycin is an effective alternative in treating bacterial TD. Azithromycin is also the drug of choice for children and pregnant women. Azithromycin is usually taken for 3 days. An alternative to the quinolones and azithromycin is an antibiotic called Rifaximin (XifaxanTM) which is available in the U.S. 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. Safety of this drug in pregnancy and lactation has not been established. Rifaximin is taken for 3 days.

Bowel immobilizers such as loperamide are often used to manage the symptoms of TD. Although there is still some controversy, studies have demonstrated the safety of bowel immobilizers even in travelers with fever or with blood in the stool, if they are used along with an appropriate antibiotic. Loperamide appears to be safer than diphenoxylate in this regard. 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.

Mild loose stools without constitutional symptoms:

- An antibiotic is probably not necessary.
- Bismuth subsalicylate or antimotility drugs (for maximum of 48 hours) could be used if necessary for comfort during sightseeing or travel.

Moderately loose or frequent stools with cramps or nausea:

- Use antibiotic.
- Use antimotility drug if necessary for travel.

Severe diarrhea with intense cramps, nausea, bloody stools, dehydration, fever, OR chills:

- Use antibiotic.
- Stay in room and use toilet as necessary.
- Try to avoid antimotility drug unless necessary for travel.
- Seek medical attention if symptoms do not rapidly improve.

Protozoal infections more often cause diarrhea in the returned or long-term traveler. *Giardia lamblia* is the most common protozoal infection of travelers. It can be suspected if you have 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. In general, you should not carry these drugs for self-treatment. A proper diagnosis should be made and the drugs administered under supervision. However, travelers going to extremely remote locations can be given tinidazole to carry on a case-by-case basis.

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