

**TABLE 160-2 POST-DIARRHEA COMPLICATIONS OF ACUTE INFECTIOUS DIARRHEAL ILLNESS**

Complication	Comments
Chronic diarrhea	Occurs in ~1% of travelers with acute diarrhea
• Lactase deficiency	
• Small-bowel bacterial overgrowth	• Protozoa account for ~1/3 of cases
• Malabsorption syndromes (tropical and celiac sprue)	
Initial presentation or exacerbation of inflammatory bowel disease	May be precipitated by traveler's diarrhea
Irritable bowel syndrome	Occurs in ~10% of travelers with traveler's diarrhea
Reactive arthritis	Particularly likely after infection with invasive organisms ( <i>Shigella</i> , <i>Salmonella</i> , <i>Campylobacter</i> , <i>Yersinia</i> )
Hemolytic-uremic syndrome (hemolytic anemia, thrombocytopenia, and renal failure)	Follows infection with Shiga toxin-producing bacteria ( <i>Shigella dysenteriae</i> type 1 and enterohemorrhagic <i>Escherichia coli</i> )
Guillain-Barré syndrome	Particularly likely after <i>Campylobacter</i> infection

## EPIDEMIOLOGY

### TRAVEL HISTORY



Of the several million people who travel from temperate industrialized countries to tropical regions of Asia, Africa, and Central and South America each year, 20–50% experience a sudden onset of abdominal cramps, anorexia, and watery diarrhea; thus *traveler's diarrhea* is the most common travel-related infectious illness (Chap. 149). The time of onset is usually 3 days to 2 weeks after the traveler's arrival in a resource-poor area; most cases begin within the first 3–5 days. The illness is generally self-limited, lasting 1–5 days. The high rate of diarrhea among travelers to underdeveloped areas is related to the ingestion of contaminated food or water.

The organisms that cause traveler's diarrhea vary considerably with location (Table 160-3), as does the pattern of antimicrobial resistance. In all areas, enterotoxigenic and enteroaggregative strains of *E. coli* are the most common isolates from persons with the classic secretory traveler's diarrhea syndrome. Infection with *Campylobacter jejuni* is especially common in areas of Asia.

### LOCATION

Closed and semi-closed communities, including day-care centers, schools, residential facilities, and cruise ships, are important settings for outbreaks of enteric infections. Norovirus, which is highly contagious and robust in surviving on surfaces, is the most common etiologic agent associated with outbreaks of acute gastroenteritis. Other common organisms, often spread by fecal-oral contact in such communities, are *Shigella*, *C. jejuni*, and *Cryptosporidium*. Rotavirus is rarely a cause of pediatric diarrheal outbreaks in the United States since rotavirus vaccination was broadly recommended in 2006. Similarly, hospitals are sites in which enteric infections are concentrated. Diarrhea is one of the most common manifestations of nosocomial infections. *C. difficile* is the predominant cause of nosocomial diarrhea among adults in the United States, and outbreaks of norovirus infection are common in health care settings. *Klebsiella oxytoca* has been identified as a cause of antibiotic-associated hemorrhagic colitis. Enteropathogenic *E. coli* has been associated with outbreaks of diarrhea in nurseries for newborns. One-third of elderly patients in chronic-care institutions develop a significant diarrheal illness each year; more than one-half of these cases are caused by cytotoxin-producing *C. difficile*. Antimicrobial therapy can predispose to pseudomembranous colitis by altering the normal colonic flora and allowing the multiplication of *C. difficile* (Chap. 161).

**TABLE 160-3 CAUSES OF TRAVELER'S DIARRHEA**

Etiologic Agent	Approximate Percentage of Cases	Comments
<b>Bacteria</b>	<b>50–75</b>	
Enterotoxigenic <i>Escherichia coli</i>	10–45	Single most important agent
Enteroaggregative <i>E. coli</i>	5–35	Emerging enteric pathogen with worldwide distribution
<i>Campylobacter jejuni</i>	5–25	More common in Asia
<i>Shigella</i>	0–15	Major cause of dysentery
<i>Salmonella</i>	0–15	
Others	0–5	Including <i>Aeromonas</i> , <i>Plesiomonas</i> , and <i>Vibrio cholerae</i>
<b>Viruses</b>	<b>0–20</b>	
Norovirus	0–10	Associated with cruise ships
Rotavirus	0–5	Particularly common among children
<b>Parasites</b>	<b>0–10</b>	
<i>Giardia lamblia</i>	0–5	Affects hikers and campers who drink from freshwater streams
<i>Cryptosporidium</i>	0–5	Resistant to chlorine treatment
<i>Entamoeba histolytica</i>	<1	
<i>Cyclospora</i>	<1	
<b>Other</b>	<b>0–10</b>	
Acute food poisoning <sup>a</sup>	0–5	
No pathogen identified	10–50	

<sup>a</sup>For etiologic agents, see Table 160-4.

**Source:** After DR Hill et al: The practice of travel medicine: Guidelines by the Infectious Diseases Society of America. Clin Infect Dis 43:1499, 2006.

### AGE

Globally, most morbidity and mortality from enteric pathogens involves children <5 years of age. Breast-fed infants are protected from contaminated food and water and derive some protection from maternal antibodies, but their risk of infection rises dramatically when they begin to eat solid foods. Exposure to rotavirus is universal, with most children experiencing their first infection in the first or second year of life if not vaccinated. Older children and adults are more commonly infected with norovirus. Other organisms with higher attack rates among children than among adults include enterotoxigenic, enteropathogenic, and enterohemorrhagic *E. coli*; *Shigella*; *C. jejuni*; and *G. lamblia*.

### HOST IMMUNE STATUS

Immunocompromised hosts are at elevated risk of acute and chronic infectious diarrhea. Individuals with defects in cell-mediated immunity (including those with AIDS) are at particularly high risk of invasive enteropathies, including salmonellosis, listeriosis, and cryptosporidiosis. Individuals with hypogammaglobulinemia are at particular risk of *C. difficile* colitis and giardiasis. Patients with cancer are more likely to develop *C. difficile* infection as a result of chemotherapy and frequent hospitalizations. Infectious diarrhea can be life-threatening in immunocompromised hosts, with complications including bacteremia and metastatic seeding of infection. Furthermore, dehydration may compromise renal function and increase the toxicity of immunosuppressive drugs.

### BACTERIAL FOOD POISONING

If the history and the stool examination indicate a noninflammatory etiology of diarrhea and there is evidence of a common-source outbreak, questions concerning the ingestion of specific foods and the time of onset of the diarrhea after a meal can provide clues to the bacterial cause of the illness. Potential causes of bacterial food poisoning are shown in Table 160-4.