

Infectious diarrhoea

Paul Kelly

Abstract

Infectious diarrhoea remains a major cause of morbidity and mortality worldwide. Viruses, bacteria and protozoa are responsible for the majority of infections, which are transmitted most commonly by the faecal–oral route through water, food and person-to-person transmission. Clinical presentation of infectious diarrhoea conforms to three patterns: acute watery diarrhoea; dysentery; and persistent diarrhoea, which can include steatorrhoea. Diagnosis still rests heavily on stool microscopy and culture, although faecal antigen tests and molecular assays are increasingly used. Oral rehydration therapy continues to be the most important supportive intervention, particularly in acute watery diarrhoea, in which death from dehydration and acidosis can be prevented in the vast majority of sufferers. There have been some important advances in the development of new approaches to antibiotic therapy. The non-absorbable antibiotic, rifaximin, is highly effective in the treatment of traveller's diarrhoea and has fewer adverse effects than systemically absorbed antibiotics. The broad-spectrum antimicrobial, nitazoxanide, is often effective in the treatment of cryptosporidiosis but is also effective in giardiasis, amoebiasis and *Clostridium difficile* infection. There is great interest currently in promicrobial therapies: probiotics, prebiotics and faecal microbial transplantation. Recent meta-analyses suggest that promicrobial therapies have a place in the prophylaxis and treatment of antibiotic-associated diarrhea, especially *C. difficile* infection, and acute diarrhoea in children.

Keywords antibiotics; antidiarrhoeal agents; bacteria; diarrhoea; enteropathogens; probiotics; protozoa; viruses

Introduction

Infections of the gastrointestinal tract are the most common intestinal disorders. They have their major impact in the developing world and are still responsible for the deaths of almost 1 million pre-school children each year.¹ Despite industrialization, wealth and public health interventions in the Western world to ensure water quality and sewage disposal, intestinal infections, including both food-borne (*Salmonella* sp. and *Campylobacter* sp.) and water-borne (*Cryptosporidium parvum* and *Giardia intestinalis*) infections remain important causes of morbidity and mortality.² Infectious enteritis due to *Salmonella* sp., *Campylobacter jejuni* or enterohaemorrhagic *Escherichia coli* (EHEC) infection can have serious complications, such as the haemolytic–uraemic syndrome.³ The increase in foreign travel has further contributed to the importance of infectious diarrhoea in the industrialized world, as has the increasing use of broad-spectrum antibiotics and associated antibiotic-related diarrhoea caused by

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What's new?

- Our understanding of pathogens and their effects is evolving rapidly
- While the principles of treatment remain unchanged, refinements in antimicrobial therapy and in formulations of oral rehydration solution represent important advances
- The role of promicrobial therapies is beginning to have an evidence base

Clostridium difficile. Opportunistic infections in various immunodeficiency states (such as AIDS, transplants, ulcerative colitis) are important to diagnose and treat.

Epidemiology

The key sources of human enteropathogens are food, water and other humans. Certain human infective agents are carried by animals, giving rise to conditions known as zoonoses (such as salmonellosis, campylobacteriosis, giardiasis and cryptosporidiosis). Domestic water supplies, swimming pools, sea water and inland freshwater lakes and rivers are also a source of enteropathogens.

Faecal–oral transmission, the main route by which these infections are spread, may occur either through ingestion of contaminated food or fluids, or by direct person-to-person contact. The latter is particularly important when only small infective doses are required to initiate infection, as in shigellosis. *Vibrio cholerae* and non-cholera vibrios are transmitted by contaminated water, shellfish and other seafood and by person-to-person contact. Food-borne infection – so-called ‘food poisoning’ – may be caused by true infection of the intestine or related to the ingestion of a pre-formed toxin (Table 1).

Viruses such as the norovirus (previously known as small, round, structured viruses (SRSVs) of the Norwalk family) can be spread by aerosol, especially as vomiting is an important early symptom of the illness. This probably explains why this infection spreads so rapidly through cruise ships, hotels and hospital wards. Immunodeficiency and reduced gastric acid secretion are well-recognized risk factors for intestinal infections. Intimate sexual contact, notably oro–anal sex, can be associated with transmission of enteropathogens.

Causes

Infective diarrhoea presents in a variety of ways, the recognition of which may assist clinical diagnosis and early management. The three major patterns are: (i) acute watery diarrhoea; (ii) bloody diarrhoea (dysentery), usually due to an infective enterocolitis causing colonic ulceration; and (iii) persistent diarrhoea, sometimes with steatorrhoea and/or evidence of an enteropathy. The major organisms responsible for these clinical syndromes are summarized in Table 2. However, there is considerable overlap between these clinical patterns; infection with some organisms, such as *Shigella* sp. and *C. jejuni*, presents initially as acute watery diarrhoea but then progresses to a dysenteric illness with fever and bloody diarrhoea. Similarly,

Microbial pathogens responsible for food-borne diarrhoeal disease

Organism	Incubation period (h)	Recovery
Gut colonization		
<i>Salmonella</i> spp.	12–48	2–14 days
<i>Campylobacter jejuni</i>	48–168	7–21 days
EHEC	24–168	7–21 days
<i>Vibrio parahaemolyticus</i>	2–48	2–30 days
<i>Yersinia enterocolitica</i>	2–144	1–3 days
<i>Clostridium perfringens</i>	8–22	1–3 days
Pre-formed toxins		
<i>Staphylococcus aureus</i>	2–6	Few hours
<i>Bacillus cereus</i>	1–2	Few hours
<i>Clostridium botulinum</i>	18–36	10–14 days

EHEC, enterohaemorrhagic *Escherichia coli*.

Table 1

Causes of infectious diarrhoea by clinical pattern

Enteropathogen	Acute watery diarrhoea	Dysentery	Persistent diarrhoea
Viruses			
Rotavirus	+	–	–
Enteric adenovirus (types 40, 41)	+	–	–
Norovirus and other SRSVs	+	–	–
Calicivirus	+	–	–
Astrovirus	+	–	–
Cytomegalovirus	+	+	+
Bacteria			
<i>Vibrio cholerae</i> and other vibrios	+	–	–
Enterotoxigenic <i>Escherichia coli</i> (ETEC)	+	–	–
Enteropathogenic <i>E. coli</i> (EPEC)	+	–	+
Enterotoxigenic <i>E. coli</i> (EAEC)	+	–	+
Enteroinvasive <i>E. coli</i> (EIEC)	+	+	–
Enterohaemorrhagic <i>E. coli</i> (EHEC)	+	+	–
<i>Shigella</i> spp.	+	+	+
<i>Salmonella</i> spp.	+	+	+
<i>Campylobacter</i> spp.	+	+	+
<i>Yersinia</i> spp.	+	+	+
<i>Clostridium difficile</i>	+	+	+
<i>Mycobacterium tuberculosis</i>	–	+	+
Protozoa			
<i>Giardia intestinalis</i>	+	–	+
<i>Cryptosporidium parvum</i>	+	–	+
Microsporidia	+	–	+
<i>Isospora belli</i>	+	–	+
<i>Cyclospora cayatanensis</i>	+	–	+
<i>Entamoeba histolytica</i>	+	+	+
<i>Balantidium coli</i>	+	+	+
Helminths			
<i>Strongyloides stercoralis</i>	–	–	+
<i>Schistosoma</i> spp.	–	+	+

SRSVs, small, round, structured viruses.

Table 2

giardiasis may start as acute watery diarrhoea but eventually becomes persistent with features of malabsorption.

Clinical presentation

Acute watery diarrhoea

Rotavirus infection, the most common cause of acute diarrhoea in infants and young children, often takes the form of a brief prodromal illness with fever and mild respiratory symptoms that is followed by vomiting and diarrhoea. If fluid and electrolyte losses are not replaced promptly, dehydration and metabolic acidosis soon follow. The degree of dehydration can be assessed clinically by noting skin tone and tissue turgor, dryness of mucous membranes, intra-ocular tension and, in young infants, depression of the anterior fontanelle. As the degree of dehydration increases, there is impairment of consciousness, leading ultimately to stupor and coma. Typically, the illness lasts about 7 days. Adenovirus infection causes a more prolonged illness with pronounced respiratory symptoms.

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