

Cholera

Key Features

Essentials of Diagnosis

- History of travel in endemic area or contact with infected person
- Voluminous, watery diarrhea
- Stool is liquid, gray, turbid, and without fecal odor, blood, or pus ("rice water stool")
- Rapid development of marked dehydration
- Positive stool cultures and agglutination of vibrios with specific contaminated food or water

General Considerations

- An acute diarrheal illness caused by certain serotypes of *Vibrio cholerae*
- The toxin activates adenyl cyclase in intestinal epithelial cells of the small intestines, producing hypersecretion of water and chloride ion and a massive diarrhea of up to 15 L/day
- Occurs in epidemics under conditions of crowding, war, and famine (eg, in refugee camps) and where sanitation is inadequate
- Infection is acquired by ingestion of contaminated food or water

Demographics

- Rarely seen in the United States until 1991, when epidemic cholera returned to the Western Hemisphere, originating as an outbreak in coastal cities of Peru
- The epidemic spread to involve several countries in South and Central America as well as Mexico, and cases have been imported into the United States
- A major cause of epidemic diarrhea throughout the developing world

Clinical Findings

Symptoms and Signs

- See Table 30-3
- A sudden onset of severe, frequent watery diarrhea (up to 1 L/h)
- The liquid stool is gray, turbid, and without fecal odor, blood, or pus ("rice water stool")
- Dehydration and hypotension develop rapidly
- The disease is toxin mediated, and fever is unusual

Table 30-3. Acute bacterial diarrheas and "food poisoning."

Organism	Incubation Period	Vomiting	Diarrhea	Fever	Associated Foods	Diagnosis	Clinical Features and Treatment
Staphylococcus (reformed toxin)	1–8 hours	+++	±	±	Staphylococci grow in meats.	Clinical. Food and stool can be	Abrupt onset, intense nausea and vomiting

					dairy, and bakery products and produce enterotoxin.	tested for toxin.	for up to 24 hours, recovery in 24–48 hours. Supportive care.
<i>Bacillus cereus</i> (preformed toxin)	1–8 hours	+++	±	–	Reheated fried rice causes vomiting or diarrhea.	Clinical. Food and stool can be tested for toxin.	Acute onset, severe nausea and vomiting lasting 24 hours. Supportive care.
<i>B. cereus</i> (diarrheal toxin)	10–16 hours	±	+++	–	Toxin in meats, stews, and gravy.	Clinical. Food and stool can be tested for toxin.	Abdominal cramps, watery diarrhea, and nausea lasting 24–48 hours. Supportive care.
<i>Clostridium perfringens</i>	8–16 hours	±	+++	–	Clostridia grow in rewarmed meat and poultry dishes and produce an enterotoxin.	Stools can be tested for enterotoxin or cultured.	Abrupt onset of profuse diarrhea, abdominal cramps, nausea; vomiting occasionally. Recovery usual without treatment in 24–48 hours. Supportive care; antibiotics not needed.
<i>Clostridium botulinum</i>	12–72 hours	±	–	–	Clostridia grow in anaerobic acidic environment eg, canned foods, fermented fish, foods held warm for extended	Stool, serum, and food can be tested for toxin. Stool and food can be cultured.	Diplopia, dysphagia, dysphonia, respiratory embarrassment. Treatment requires clear airway, ventilation, and intravenous polyvalent

					periods.		antitoxin (see text). Symptoms can last for days to months.
<i>Clostridium difficile</i>	Usually occurs after 7–10 days of antibiotics. Can occur after a single dose or several weeks after completion of antibiotics.	–	+++	++	Associated with antimicrobial drugs; clindamycin and cephalosporins most commonly implicated.	Stool tested for toxin.	Abrupt onset of diarrhea that may be bloody; fever. Oral metronidazole first-line therapy. If no response, oral vancomycin can be given.
Enterohemorrhagic <i>Escherichia coli</i> , including <i>E coli</i> O157:H7 and other Shiga-toxin producing strains (STEC)	1–8 days	+	+++	–	Undercooked beef, especially hamburger; unpasteurized milk and juice; raw fruits and vegetables.	<i>E coli</i> O157:H7 can be cultured on special medium. Other toxins can be detected in stool.	Usually abrupt onset of diarrhea, often bloody; abdominal pain. In adults, it is usually self-limited to 5–10 days. In children, it is associated with hemolytic-uremic syndrome (HUS). Antibiotic therapy may increase risk of HUS.
Enterotoxigenic <i>E coli</i> (EPEC)	1–3 days	±	+++	±	Water, food contaminated with feces.	Stool culture. Special tests required to identify toxin-	Watery diarrhea and abdominal cramps, usually lasting 3–7 days. In travelers.

						producing strains.	fluoroquinolones shorten disease.
<i>Vibrio parahaemolyticus</i>	2–48 hours	+	+	±	Undercooked or raw seafood.	Stool culture on special medium.	Abrupt onset of watery diarrhea, abdominal cramps, nausea and vomiting. Recovery is usually complete in 2–5 days.
<i>Vibrio cholerae</i>	24–72 hours	+	+++	–	Contaminated water, fish, shellfish, street vendor food.	Stool culture on special medium.	Abrupt onset of liquid diarrhea in endemic area. Needs prompt intravenous or oral replacement of fluids and electrolytes. Tetracyclines shorten excretion of vibrios.
<i>Campylobacter jejuni</i>	2–5 days	±	+++	+	Raw or undercooked poultry, unpasteurized milk, water.	Stool culture on special medium.	Fever, diarrhea that can be bloody, cramps. Usually self-limited in 2–10 days. Early treatment (erythromycin) shortens course. May be associated with Guillain-Barré syndrome.
<i>Shigella</i> species (mild cases)	24–72 hours	±	+	+	Food or water contaminated	Routine stool culture.	Abrupt onset of diarrhea. often with

					with human feces. Person to person spread.		blood cramps, tenesmus, and lethargy. Therapy depends on sensitivity testing, but the fluoroquinolones are most active. Often mild and self-limited, resolving in 4–7 days.
<i>Salmonella</i> species	1–3 days	–	++	+	Eggs, poultry, unpasteurized milk, cheese, juices, raw fruits and vegetables.	Routine stool culture.	Gradual or abrupt onset of diarrhea and low-grade fever. No antimicrobials unless high risk (see text) or systemic dissemination is suspected, in which case give a fluoroquinolone. Prolonged carriage can occur.
<i>Yersinia enterocolitica</i>	24–48 hours	±	+	+	Undercooked pork, contaminated water, unpasteurized milk, tofu.	Stool culture on special medium.	Severe abdominal pain, (appendicitis-like symptoms) diarrhea, fever. Polyarthritits, erythema nodosum in children. If severe, give tetracycline or fluoroquinolone.

							Without treatment, self-limited in 1–3 weeks.
Rotavirus	1–3 days	++	+++	+	Fecally contaminated foods touched by infected food handlers.	Immunoassay on stool.	Acute onset, vomiting, watery diarrhea that lasts 4–8 days. Supportive care.
Noroviruses and other caliciviruses	12–48 hours	++	+++	+	Shell fish and fecally contaminated foods touched by infected food handlers.	Clinical diagnosis with negative stool cultures. PCR available on stool.	Nausea, vomiting (more common in children), diarrhea (more common in adults), fever, myalgias, abdominal cramps. Lasts 12–60 hours. Supportive care.

PCR, polymerase chain reaction.

Differential Diagnosis

- Viral gastroenteritis
- Other small intestinal diarrhea, eg, salmonellosis, enterotoxigenic *Escherichia coli*
- Vasoactive intestinal polypeptide-producing pancreatic tumor (pancreatic cholera)

- Food poisoning, eg, *Staphylococcus aureus*

See also DDx: Cholera

Diagnosis

Laboratory Tests

- Stool culture

Treatment

Medications

- Antimicrobial therapy will shorten the course of illness
- Several antimicrobials are active against *V cholerae*, including
 - Tetracycline
 - Ampicillin
 - Chloramphenicol
 - Trimethoprim-sulfamethoxazole
 - Fluoroquinolones
 - Azithromycin

- Multiple drug-resistant strains are increasingly encountered, so susceptibility testing, if available, is advisable
- A single 1 g oral dose of azithromycin was effective for severe cholera caused by strains with reduced susceptibility to fluoroquinolones, but resistance is emerging to this drug as well

Therapeutic Procedures

- Aggressive fluid replacement is essential
- In mild or moderate illness, oral rehydration is usually adequate

Outcome

Complications

- Death results from profound hypovolemia

Prevention

- A vaccine is available that confers short-lived, limited protection
- Vaccine may be required for entry into or reentry after travel to some countries
- Vaccine is administered in two doses 1–4 weeks apart
- A booster dose every 6 months is recommended for persons remaining in areas where cholera is a hazard

- Vaccination programs are expensive and not particularly effective in managing outbreaks of cholera
- When outbreaks occur, efforts should be directed toward establishing clean water and food sources and proper waste disposal

Prognosis

- 25–50% fatality if untreated

When to Admit

- Severe diarrhea
- Moderate to severe dehydration in need of parenteral fluid replacement
- Inability to maintain fluid replacement because there can be rapid development of dehydration

References

- Tobin-D'Angelo M et al. Severe diarrhea caused by cholera toxin-producing *Vibrio cholerae* serogroup O75 infections acquired in the southeastern United States. *Clin Infect Dis*. 2008 Oct 15;47(8):1035–40. [PMID: 18781876]
- Zuckerman JN et al. The true burden and risk of cholera: implications for prevention and control. *Lancet Infect Dis*. 2007 Aug;7(8):521–30. [PMID: 17584531]

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