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 adenylyl 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."

<table>
<thead>
<tr>
<th>Organism</th>
<th>Incubation Period</th>
<th>Vomiting</th>
<th>Diarrhea</th>
<th>Fever</th>
<th>Associated Foods</th>
<th>Diagnosis</th>
<th>Clinical Features and Treatment</th>
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</thead>
<tbody>
<tr>
<td>Staphylococcus (preformed toxin)</td>
<td>1–8 hours</td>
<td>+++</td>
<td>±</td>
<td>±</td>
<td>Staphylococci grow in meats.</td>
<td>Clinical. Food and stool can be</td>
<td>Abrupt onset, intense nausea and vomiting</td>
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<tr>
<td>Organism</td>
<td>Incubation Time</td>
<td>Severity</td>
<td>Symptoms</td>
<td>Testing</td>
<td>Management</td>
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<tr>
<td><strong>Bacillus cereus</strong>&lt;br&gt;(preformed toxin)</td>
<td>1–8 hours</td>
<td>+++ ± −</td>
<td>Reheated fried rice causes vomiting or diarrhea.</td>
<td>Clinical. Food and stool can be tested for toxin.</td>
<td>Acute onset, severe nausea and vomiting lasting 24 hours. Supportive care.</td>
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<tr>
<td><strong>B. cereus</strong>&lt;br&gt;(diarrheal toxin)</td>
<td>10–16 hours</td>
<td>± +++ −</td>
<td>Toxin in meats, stews, and gravy.</td>
<td>Clinical. Food and stool can be tested for toxin.</td>
<td>Abdominal cramps, watery diarrhea, and nausea lasting 24–48 hours. Supportive care.</td>
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<td><strong>Clostridium perfringens</strong></td>
<td>8–16 hours</td>
<td>± +++ −</td>
<td>Clostridia grow in rewarmed meat and poultry dishes and produce an enterotoxin.</td>
<td>Stools can be tested for enterotoxin or cultured.</td>
<td>Abrupt onset of profuse diarrhea, abdominal cramps, nausea; vomiting occasionally. Recovery usual without treatment in 24–48 hours. Supportive care; antibiotics not needed.</td>
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<tr>
<td><strong>Clostridium botulinum</strong></td>
<td>12–72 hours</td>
<td>± − −</td>
<td>Clostridia grow in anaerobic acidic environment eg, canned foods, fermented fish, foods held warm for extended</td>
<td>Stool, serum, and food can be tested for toxin. Stool and food can be cultured.</td>
<td>Diplopia, dysphagia, dysphonia, respiratory embarrassment. Treatment requires clear airway, ventilation, and intravenous polvvalent</td>
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<tr>
<td>Organism</td>
<td>Usually occurs after 7–10 days of antibiotics. Can occur after a single dose or several weeks after completion of antibiotics.</td>
<td>−</td>
<td>+++</td>
<td>++</td>
<td>Associated with antimicrobial drugs; clindamycin and cephalosporins most commonly implicated.</td>
<td>Stool tested for toxin.</td>
<td>Abrupt onset of diarrhea that may be bloody; fever. Oral metronidazole first-line therapy. If no response, oral vancomycin can be given.</td>
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<tr>
<td><em>Clostridium difficile</em></td>
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<td><em>Enterohemorrhagic Escherichia coli</em>, including <em>E. coli</em> O157:H7 and other Shiga-toxin producing strains (STEC)*</td>
<td>1–8 days</td>
<td>+</td>
<td>+++</td>
<td>−</td>
<td>Undercooked beef, especially hamburger; unpasteurized milk and juice; raw fruits and vegetables.</td>
<td><em>E. coli</em> O157:H7 can be cultured on special medium. Other toxins can be detected in stool.</td>
<td>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.</td>
</tr>
<tr>
<td><em>Enterotoxigenic E. coli</em> (ETEC)</td>
<td>1–3 days</td>
<td>±</td>
<td>+++</td>
<td>±</td>
<td>Water, food contaminated with feces.</td>
<td>Stool culture. Special tests required to identify toxin-</td>
<td>Watery diarrhea and abdominal cramps, usually lasting 3–7 days. In travelers,</td>
</tr>
<tr>
<td>Organism</td>
<td>Incubation Period</td>
<td>+/−/±</td>
<td>Disease Symptoms</td>
<td>Diagnostic Procedures</td>
<td>Treatment Recommendations</td>
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<tr>
<td>Vibrio parahaemolyticus</td>
<td>2–48 hours</td>
<td>+</td>
<td>Undercooked or raw seafood.</td>
<td>stool culture on special medium.</td>
<td>Abrupt onset of watery diarrhea, abdominal cramps, nausea and vomiting. Recovery is usually complete in 2–5 days.</td>
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<tr>
<td>Vibrio cholerae</td>
<td>24–72 hours</td>
<td>+</td>
<td>Contaminated water, fish, shellfish, street vendor food.</td>
<td>stool culture on special medium.</td>
<td>Abrupt onset of liquid diarrhea in endemic area. Needs prompt intravenous or oral replacement of fluids and electrolytes. Tetracyclines shorten excretion of vibrios.</td>
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<tr>
<td>Campylobacter jejuni</td>
<td>2–5 days</td>
<td>±</td>
<td>Raw or undercooked poultry, unpasteurized milk, water.</td>
<td>stool culture on special medium.</td>
<td>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.</td>
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<tr>
<td>Shigella species (mild cases)</td>
<td>24–72 hours</td>
<td>±</td>
<td>Food or water contaminated</td>
<td>routine stool culture.</td>
<td>Abrupt onset of diarrhea. often with</td>
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<tr>
<td>Pathogen</td>
<td>Incubation Period</td>
<td>Severity</td>
<td>Transmission</td>
<td>Symptoms</td>
<td>Treatment</td>
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<tr>
<td><em>Salmonella</em> species</td>
<td>1–3 days</td>
<td>++</td>
<td>Direct contact, foodborne</td>
<td>Diarrhea, cramps, tenesmus, lethargy. Therapy depends on sensitivity testing, but the fluoroquinolones are most active. Often mild and self-limited, resolving in 4–7 days.</td>
<td>Routine stool culture.</td>
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</tbody>
</table>
Without treatment, self-limited in 1–3 weeks.

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Incubation Period</th>
<th>Symptoms</th>
<th>Diagnostic Tests</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotavirus</td>
<td>1–3 days</td>
<td>Acute onset, vomiting, watery diarrhea that lasts 4–8 days.</td>
<td>Immunoassay on stool.</td>
<td>Acute onset, vomiting, watery diarrhea that lasts 4–8 days. Supportive care.</td>
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<td>Fecally contaminated foods touched by infected food handlers.</td>
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<tr>
<td>Noroviruses and other caliciviruses</td>
<td>12–48 hours</td>
<td>Nausea, vomiting (more common in children), diarrhea (more common in adults), fever, myalgias, abdominal cramps. Lasts 12–60 hours.</td>
<td>Clinical diagnosis with negative stool cultures. PCR available on stool.</td>
<td>Nausea, vomiting (more common in children), diarrhea (more common in adults), fever, myalgias, abdominal cramps. Lasts 12–60 hours. Supportive care.</td>
</tr>
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<td>Shell fish and fecally contaminated foods touched by infected food handlers.</td>
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</tbody>
</table>

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**

*Content adapted from CURRENT Medical Diagnosis & Treatment 2010.*

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