



## Complete Summary

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### GUIDELINE TITLE

Diagnosis and management of foodborne illnesses: a primer for physicians and other health care professionals.

### BIBLIOGRAPHIC SOURCE(S)

American Medical Association, American Nurses Association, American Nurses Foundation, Centers for Disease Control and Prevention, Center for Food Safety and Applied Nutrition, U.S. Food and Drug Administration, Food Safety and Inspection Service, U.S. Department of Agriculture. Diagnosis and management of foodborne illnesses: a primer for physicians and other health care professionals. MMWR Recomm Rep 2004 Apr 16;53(RR-4):1-33. [PubMed](#)

### GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Diagnosis and management of foodborne illnesses: a primer for physicians. MMWR Recomm Rep 2001 Jan 26;50 (RR-2):1-69.

## \*\* REGULATORY ALERT \*\*

### FDA WARNING/REGULATORY ALERT

**Note from the National Guideline Clearinghouse (NGC):** This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- [July 08, 2008, Fluoroquinolones \(ciprofloxacin, norfloxacin, ofloxacin, levofloxacin, moxifloxacin, gemifloxacin\)](#): A BOXED WARNING and Medication Guide are to be added to the prescribing information to strengthen existing warnings about the increased risk of developing tendinitis and tendon rupture in patients taking fluoroquinolones for systemic use.

## COMPLETE SUMMARY CONTENT

\*\* REGULATORY ALERT \*\*

SCOPE

METHODOLOGY - including Rating Scheme and Cost Analysis

RECOMMENDATIONS

EVIDENCE SUPPORTING THE RECOMMENDATIONS

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

QUALIFYING STATEMENTS

## SCOPE

### **DISEASE/CONDITION(S)**

Foodborne illnesses ("foodborne illnesses" include any illness that is related to food ingestion; gastrointestinal tract symptoms are the most common clinical manifestations of foodborne illnesses).

### **GUIDELINE CATEGORY**

Diagnosis  
Evaluation  
Management  
Treatment

### **CLINICAL SPECIALTY**

Emergency Medicine  
Family Practice  
Infectious Diseases  
Internal Medicine  
Pediatrics  
Preventive Medicine

### **INTENDED USERS**

Physicians

### **GUIDELINE OBJECTIVE(S)**

To help physicians and other health professionals in the prevention and control of food-related disease outbreaks by providing practical and concise information on the diagnosis, treatment, and reporting of foodborne illnesses

### **TARGET POPULATION**

Infants, children, adolescents and adults

### **INTERVENTIONS AND PRACTICES CONSIDERED**

#### **Diagnosis**

1. Differential diagnosis:
  - Evaluation for signs and symptoms

- Differentiation between foodborn illness and viral syndromes
  - Duration
  - Associated foods
  - Evaluation for underlying medical conditions (e.g., irritable bowel syndrome, inflammatory bowel disease, Crohn's disease)
2. Microbiology testing:
    - Stool cultures
    - Blood cultures
    - Direct antigen detection tests and molecular biology techniques

### **Treatment**

1. Supportive care
2. Oral and/or intravenous hydration, with fluid +/- electrolyte replacement
3. Gastric lavage
4. Pharmacotherapy (penicillin, ciprofloxacin, erythromycin, trimethoprim-sulfamethoxazole, ampicillin, gentamicin, rifampin, doxycycline, ceftazidime, tetracycline, quinolones, bismuth sulfate, metronidazole, iodoquinol, paromomycin, spiramycin, pyrimethamine, nitazoxanide, mebendazole, albendazole, sulfadiazine, methylene blue, atropine, pralidoxime, antihistamines, corticosteroids, nalidixic acid, intravenous mannitol)
5. Botulinum antitoxin and botulism immune globulin

### **Surveillance and Reporting**

1. Report potential foodborne illness
2. Contact local or state health department with specific notifiable disease
3. Report increases in unusual illnesses, symptom complexes, or disease complexes to public health authorities
4. Follow the most current information on food safety

### **MAJOR OUTCOMES CONSIDERED**

Disease outbreaks

## **METHODOLOGY**

### **METHODS USED TO COLLECT/SELECT EVIDENCE**

Searches of Electronic Databases

### **DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE**

Not stated

### **NUMBER OF SOURCE DOCUMENTS**

Not stated

## **METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE**

Not stated

## **RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE**

Not applicable

## **METHODS USED TO ANALYZE THE EVIDENCE**

Review

## **DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE**

Not stated

## **METHODS USED TO FORMULATE THE RECOMMENDATIONS**

Not stated

## **RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS**

Not applicable

## **COST ANALYSIS**

A formal cost analysis was not performed and published cost analyses were not reviewed.

## **METHOD OF GUIDELINE VALIDATION**

Peer Review

## **DESCRIPTION OF METHOD OF GUIDELINE VALIDATION**

Not stated

# **RECOMMENDATIONS**

## **MAJOR RECOMMENDATIONS**

### **Diagnosing Foodborne Illnesses**

#### **Differential Diagnosis**

The presentation of a patient with a foodborne illness is often only slightly different from that of a patient who presents with a viral syndrome. In addition, viral syndromes are so common that it is reasonable to assume that a percentage

of those diagnosed with a viral syndrome have actually contracted a foodborne illness. Therefore, the viral syndrome must be excluded in order to suspect the foodborne illness and take appropriate public health action. Fever, diarrhea, and abdominal cramps can be present or absent in both cases so they are not very helpful. The absence of myalgias or arthralgias would make a viral syndrome less likely and a foodborne illness (that does not target the neurologic system) more likely. Foodborne illnesses that do target the neurologic system tend to cause paraesthesias, weakness and paralysis that are distinguishable from myalgias or arthralgias (see below). The presence of dysentery (bloody diarrhea) is also more indicative of a foodborne illness, particularly if it is early in the course.

If any of the following signs and symptoms occur, alone or in combination, laboratory testing may provide important diagnostic clues (particular attention should be given to very young and elderly patients and to immunocompromised patients, all of whom are more vulnerable):

- Bloody diarrhea;
- Weight loss;
- Diarrhea leading to dehydration;
- Fever;
- Prolonged diarrhea (3 or more unformed stools per day, persisting several days);
- Neurologic involvement such as paresthesias, motor weakness, cranial nerve palsies;
- Sudden onset of nausea, vomiting, diarrhea;
- Severe abdominal pain.

In addition to foodborne causes, a differential diagnosis of gastrointestinal tract disease should include underlying medical conditions such as irritable bowel syndrome; inflammatory bowel diseases such as Crohn's disease or ulcerative colitis; malignancy; medication use (including antibiotic-related *Clostridium difficile* toxin colitis); gastrointestinal tract surgery or radiation; malabsorption syndromes; immune deficiencies; and numerous other structural, functional, and metabolic etiologies. Consideration also should be given to exogenous factors such as the association of the illness with travel, occupation, emotional stress, sexual practices, exposure to other ill persons, recent hospitalization, child care center attendance, and nursing home residence.

The table below presents a list of etiologic agents to consider for various manifestations of foodborne illnesses.

| <b>Clinical Presentation</b>   | <b>Potential Food-Related Agents to Consider</b>   |
|--|--|
| Gastroenteritis (vomiting as primary symptom; fever and/or diarrhea also may be present) | Viral gastroenteritis, most commonly rotavirus in an infant or norovirus and other caliciviruses in an older child or adult; or food poisoning due to preformed toxins (e.g., vomitoxin, <i>Staphylococcus aureus</i> toxin, <i>Bacillus cereus</i> toxin) and heavy metals. |

| Clinical Presentation   | Potential Food-Related Agents to Consider  |
|---|--|
| <p>Noninflammatory diarrhea (acute watery diarrhea without fever/dysentery; some cases may present with fever)*</p> | <p>Can be caused by virtually all enteric pathogens (bacterial, viral, parasitic) but is a classic symptom of:</p> <ul style="list-style-type: none"> <li>• Enterotoxigenic <i>Escherichia coli</i></li> <li>• <i>Giardia</i></li> <li>• <i>Vibrio cholerae</i></li> <li>• Enteric viruses (astroviruses, noroviruses and other caliciviruses, enteric adenovirus, rotavirus)</li> <li>• <i>Cryptosporidium</i></li> <li>• <i>Cyclospora cayetanensis</i></li> </ul>   |
| <p>Inflammatory diarrhea (invasive gastroenteritis; grossly bloody stool and fever may be present)**</p>            | <ul style="list-style-type: none"> <li>• <i>Shigella</i> species</li> <li>• <i>Campylobacter</i> species</li> <li>• <i>Salmonella</i> species</li> <li>• Enteroinvasive <i>Escherichia coli</i></li> <li>• Enterohemorrhagic <i>Escherichia coli</i></li> <li>• <i>Escherichia coli</i> O157:H7</li> <li>• <i>Vibrio parahaemolyticus</i></li> <li>• <i>Yersinia enterocolitica</i></li> <li>• <i>Entamoeba histolytica</i></li> </ul>   |
| <p>Persistent diarrhea (lasting <math>\geq 14</math> days)</p>  | <p>Prolonged illness should prompt examination for parasites, particularly in travelers to mountainous or other areas where untreated water is consumed. Consider <i>Cyclospora cayetanensis</i>, <i>Cryptosporidium</i>, <i>Entamoeba histolytica</i>, and <i>Giardia lamblia</i>.</p>  |
| <p>Neurologic manifestations (e.g., paresthesias, respiratory depression, bronchospasm, cranial nerve palsies)</p>  | <ul style="list-style-type: none"> <li>• Botulism (<i>Clostridium botulinum</i> toxin)</li> <li>• Organophosphate pesticides</li> <li>• Thallium poisoning</li> <li>• Scombroid fish poisoning (histamine, saurine)</li> <li>• Ciguatera fish poisoning (ciguatoxin)</li> <li>• Tetrodon fish poisoning (tetrodotoxin)</li> <li>• Neurotoxic shellfish poisoning (brevetoxin)</li> <li>• Paralytic shellfish poisoning (saxitoxin)</li> <li>• Amnesic shellfish poisoning (domoic acid)</li> <li>• Mushroom poisoning</li> <li>• Guillain-Barré Syndrome (associated with infectious diarrhea due to <i>Campylobacter jejuni</i>)</li> </ul> |

| Clinical Presentation   | Potential Food-Related Agents to Consider   |
|---|---|
| Systemic illness (e.g., fever, weakness, arthritis, jaundice) | <ul style="list-style-type: none"> <li>• <i>Listeria monocytogenes</i></li> <li>• <i>Brucella</i> species</li> <li>• <i>Trichinella spiralis</i></li> <li>• <i>Toxoplasma gondii</i></li> <li>• <i>Vibrio vulnificus</i></li> <li>• Hepatitis A and E viruses</li> <li>• <i>Salmonella</i> Typhi and <i>Salmonella</i> Paratyphi</li> <li>• Amebic liver abscess</li> </ul> |

\* Noninflammatory diarrhea is characterized by mucosal hypersecretion or decreased absorption without mucosal destruction and generally involves the small intestine. Some affected patients may be dehydrated because of severe watery diarrhea and may appear seriously ill. This is more common in the young and the elderly. Most patients experience minimal dehydration and appear mildly ill with scant physical findings. Illness typically occurs with abrupt onset and brief duration. Fever and systemic symptoms usually are absent (except for symptoms related directly to intestinal fluid loss).

\*\* Inflammatory diarrhea is characterized by mucosal invasion with resulting inflammation and is caused by invasive or cytotoxigenic microbial pathogens. The diarrheal illness usually involves the large intestine and may be associated with fever, abdominal pain and tenderness, headache, nausea, vomiting, malaise, and myalgia. Stools may be bloody and may contain many fecal leukocytes.

### Clinical Microbiology Testing

Stool cultures are indicated if the patient is immunocompromised, febrile, has bloody diarrhea, has severe abdominal pain, or if the illness is clinically severe or persistent. Stool cultures are also recommended if many fecal leukocytes are present. This indicates diffuse colonic inflammation and is suggestive of invasive bacterial pathogens such as *Shigella*, *Salmonella*, and *Campylobacter* species, and invasive *Escherichia coli*. In most laboratories, routine stool cultures are limited to screening for *Salmonella* and *Shigella* species, and *Campylobacter jejuni/coli*. Cultures for *Vibrio* and *Yersinia* species, *Escherichia coli* O157:H7, and *Campylobacter* species other than *jejuni/coli* require additional media or incubation conditions and therefore require advance notification or communication with laboratory and infectious disease personnel.

Stool examination for parasites generally is indicated for patients with suggestive travel histories, who are immunocompromised, who suffer chronic or persistent diarrhea, or when the diarrheal illness is unresponsive to appropriate antimicrobial therapy. Stool examination for parasites is also indicated for gastrointestinal tract illnesses that appear to have a long incubation period. Requests for ova and parasite examination of a stool specimen will often enable identification of *Giardia lamblia* and *Entamoeba histolytica*, but a special request may be needed for detection of *Cryptosporidium* and *Cyclospora cayetanensis*. Each laboratory may vary in its routine procedures for detecting parasites so it is important to contact your laboratory.

Blood cultures should be obtained when bacteremia or systemic infection are suspected.

Direct antigen detection tests and molecular biology techniques are available for rapid identification of certain bacterial, viral, and parasitic agents in clinical specimens. In some circumstances, microbiologic and chemical laboratory testing of vomitus or implicated food items also is warranted. For more information on laboratory procedures for the detection of foodborne pathogens, consult an appropriate medical specialist, clinical microbiologist, or state public health laboratory.

### **Treating Foodborne Illnesses**

Selection of appropriate treatment depends on identification of the responsible pathogen (if possible) and determining if specific therapy is available. Many episodes of acute gastroenteritis are self-limiting and require fluid replacement and supportive care. Oral rehydration is indicated for patients who are mildly to moderately dehydrated; intravenous therapy may be required for more severe dehydration. Routine use of antidiarrheal agents is not recommended because many of these agents have potentially serious adverse effects in infants and young children. Choice of antimicrobial therapy should be based on:

- Clinical signs and symptoms;
- Organism detected in clinical specimens;
- Antimicrobial susceptibility tests; and
- Appropriateness of treating with an antibiotic (some enteric bacterial infections are best not treated).

Knowledge of the infectious agent and its antimicrobial susceptibility pattern allows the physician to initiate, change, or discontinue antimicrobial therapy. Such information also can support public health surveillance of infectious disease and antimicrobial resistance trends in the community. Antimicrobial resistance has increased for some enteric pathogens, which requires judicious use of this therapy.

Suspected cases of botulism are treated with botulinum antitoxin. Equine botulinum antitoxin for types A, B, and E can prevent the progression of neurologic dysfunction if administered early in the course of illness. Physicians and other health care professionals should notify their local and state health departments regarding suspected cases of botulism. The Centers for Disease Control and Prevention (CDC) maintains a 24-hour consultation service to assist health care professionals with the diagnosis and management of this rare disease.

The following tables summarize diagnostic features, laboratory testing and treatment for bacterial, viral, parasitic, and noninfectious causes of foodborne illness. (*Note: To print the following large tables, users may have to change their printer settings to landscape, print on legal size paper, and/or use a small font size.*)

### **Foodborne Illnesses (Bacterial)**

| <b>Etiology</b> | <b>Incubation Period</b> | <b>Signs and Symptoms</b> | <b>Duration of Illness</b> | <b>Associated Foods</b> | <b>L</b> |
|-----------------|--------------------------|---------------------------|----------------------------|-------------------------|----------|
|-----------------|--------------------------|---------------------------|----------------------------|-------------------------|----------|



| <b>Etiology</b>   | <b>Incubation Period</b> | <b>Signs and Symptoms</b>   | <b>Duration of Illness</b> | <b>Associated Foods</b>   | <b>L</b>   |
|---|--------------------------|---|----------------------------|---|--|
| <i>Bacillus anthracis</i>   | 2 days to weeks          | Nausea, vomiting, malaise, bloody diarrhea, acute abdominal pain.   | Weeks                      | Insufficiently cooked contaminated meat.                                | Bloo   |
| <i>Bacillus cereus</i> (preformed enterotoxin)  | 1 to 6 hours             | Sudden onset of severe nausea and vomiting. Diarrhea may be present.  | 24 hours                   | Improperly refrigerated cooked and fried rice, meats.                   | Norm<br>clini<br>Clini<br>labo<br>not<br>iden<br>orga<br>indio<br>stoo<br>spec<br>refer<br>labo<br>cultu<br>iden |
| <i>Bacillus cereus</i> (diarrheal toxin)  | 10 to 16 hours           | Abdominal cramps, watery diarrhea, nausea.  | 24 to 48 hours             | Meats, stews, gravies, vanilla sauce.                                   | Test<br>neces<br>limit<br>testi<br>stoo<br>outb  |
| <i>Brucella abortus</i> ,<br><i>Brucella melitensis</i> , and<br><i>Brucella suis</i> | 7 to 21 days             | Fever, chills, sweating, weakness, headache, muscle and joint pain, diarrhea, bloody stools during acute phase. | Weeks                      | Raw milk, goat cheese made from unpasteurized milk, contaminated meats. | Bloo<br>posi   |
| <i>Campylobacter jejuni</i>   | 2 to 5 days              | Diarrhea, cramps, fever, and vomiting;  | 2 to 10 days               | Raw and undercooked   | Rout<br>cultu  |

| Etiology  | Incubation Period | Signs and Symptoms  | Duration of Illness  | Associated Foods  | L  |
|---|-------------------|---|--|---|--|
|   |                   | diarrhea may be bloody.   |  | poultry, unpasteurized milk, contaminated water.  | Cam<br>req<br>med<br>incu<br>degr<br>grow  |
| <i>Clostridium botulinum</i> -children and adults (preformed toxin) | 12 to 72 hours    | Vomiting, diarrhea, blurred vision, diplopia, dysphagia, and descending muscle weakness.  | Variable (from days to months). Can be complicated by respiratory failure and death. | Home-canned foods with a low acid content, improperly canned commercial foods, home-canned or fermented fish, herb-infused oils, baked potatoes in aluminum foil, cheese sauce, bottled garlic, foods held warm for extended periods of time (e.g. in a warm oven). | Stoc<br>and<br>test<br>Stoc<br>can<br>cult<br>orga<br>test<br>perf<br>som<br>heal<br>depa<br>labo<br>the<br>Dise<br>and<br>(CD |
| <i>Clostridium botulinum</i> -infants                               | 3 to 30 days      | In infants <12 months, lethargy, weakness, poor feeding, constipation, hypotonia, poor head control, poor gag and sucking reflex. | Variable   | Honey, home-canned vegetables and fruits, corn syrup.   | Stoc<br>and<br>test<br>Stoc<br>can<br>cult<br>orga<br>test<br>perf<br>som  |

| Etiology  | Incubation Period | Signs and Symptoms  | Duration of Illness | Associated Foods  | L   |
|---|-------------------|---|---------------------|---|---|
|   |                   |   |                     |   | heal<br>depa<br>labo<br>the   |
| <i>Clostridium perfringens</i> toxin  | 8 to 16 hours     | Watery diarrhea, nausea, abdominal cramps; fever is rare.   | 24 to 48 hours      | Meats, poultry, gravy, dried or precooked foods, time- and/or temperature-abused food.  | Stoc<br>test<br>ente<br>cult<br>orga<br>Beca<br><i>Clos</i><br><i>perfr</i><br>norm<br>foun<br>quan<br>cult<br>done   |
| Enterohemorrhagic <i>Escherichia coli</i> (EHEC) including <i>Escherichia coli</i> 0157:H7 and other Shiga toxin-producing <i>Escherichia coli</i> (STEC) | 1 to 8 days       | Severe diarrhea that is often bloody, abdominal pain and vomiting. Usually little or no fever is present. More common in children <4 years. | 5 to 10 days        | Undercooked beef especially hamburger, unpasteurized milk and juice, raw fruits and vegetables (e.g. sprouts), salami (rarely), and contaminated water. | Stoc<br><i>Esch</i><br>015<br>spec<br>grow<br><i>Esch</i><br>015<br>susp<br>spec<br>mus<br>requ<br>toxin<br>be d<br>com<br>posi<br>shou<br>forw<br>publ<br>labo<br>conf<br>sero |

| Etiology                                       | Incubation Period   | Signs and Symptoms  | Duration of Illness | Associated Foods   | L  |
|--|---|---|---------------------|--|--|
| Enterotoxigenic <i>Escherichia coli</i> (ETEC) | 1 to 3 days   | Watery diarrhea, abdominal cramps, some vomiting.   | 3 to >7 days        | Water or food contaminated with human feces.   | Stoo<br>ETEC<br>spec<br>labo<br>tech<br>iden<br>susp<br>requ<br>testi  |
| <i>Listeria monocytogenes</i>                  | 9 to 48 hours for gastrointestinal symptoms, 2 to 6 weeks for invasive disease. | Fever, muscle aches, and nausea or diarrhea. Pregnant women may have mild flu-like illness, and infection can lead to premature delivery or stillbirth. Elderly or immunocompromised patients may have bacteremia or meningitis.  | Variable            | Fresh soft cheeses, unpasteurized milk, inadequately pasteurized milk, ready-to-eat deli meats, hot dogs.  | Bloo<br>cere<br>fluid<br>Asyn<br>feca<br>occu<br>ther<br>cultu<br>not<br>Anti<br>liste<br>may<br>iden<br>retro |
|  | At birth and infancy  | Infants infected from mother at risk for sepsis or meningitis.  |                     |  |  |
| <i>Salmonella</i> species                      | 1 to 3 days   | Diarrhea, fever, abdominal cramps, vomiting. <i>Salmonella typhi</i> and <i>Salmonella paratyphi</i> produce typhoid with insidious onset characterized by fever, headache, constipation, malaise, chills, and myalgia; diarrhea is uncommon, and vomiting is usually not severe. | 4 to 7 days         | Contaminated eggs, poultry, unpasteurized milk or juice, cheese, contaminated raw fruits and vegetables (alfalfa sprouts, melons). <i>Salmonella typhi</i> epidemics are | Rou<br>cultu   |

| Etiology   | Incubation Period | Signs and Symptoms   | Duration of Illness                               | Associated Foods   | L  |
|--|-------------------|--|---|--|--|
|  |                   |  |   | often related to fecal contamination of water supplies or street-vended foods.   |  |
| <i>Shigella</i> species                              | 24 to 48 hours    | Abdominal cramps, fever, and diarrhea. Stools may contain blood and mucus.                         | 4 to 7 days                                       | Food or water contaminated with fecal material. Usually person-to-person spread, fecal-oral transmission. Ready-to-eat foods touched by infected food workers(e.g., raw vegetables, salads, sandwiches). | Rout<br>cultu  |
| <i>Staphylococcus aureus</i> (preformed enterotoxin) | 1 to 6 hours      | Sudden onset of severe nausea and vomiting. Abdominal cramps. Diarrhea and fever may be present.   | 24 to 48 hours                                    | Unrefrigerated or improperly refrigerated meats, potato and egg salads, cream pastries.  | Norm<br>clini<br>Stoo<br>and<br>test<br>and<br>india                       |
| <i>Vibrio cholerae</i> (toxin)                       | 24 to 72 hours    | Profuse watery diarrhea and vomiting, which can lead to severe dehydration and death within hours. | 3 to 7 days. Causes life-threatening dehydration. | Contaminated water, fish, shellfish, street-vended food typically from Latin America or Asia.  | Stoo<br><i>Vibr</i><br>requ<br>med<br><i>Vibr</i><br>susp<br>requ<br>testi |

| Etiology  | Incubation Period | Signs and Symptoms   | Duration of Illness                 | Associated Foods   | L  |
|---|-------------------|--|-------------------------------------|--|--|
|   |                   |  |                                     |  |  |
| <i>Vibrio parahaemolyticus</i>  | 2 to 48 hours     | Watery diarrhea, abdominal cramps, nausea, vomiting.   | 2 to 5 days                         | Undercooked or raw seafood, such as fish, shellfish.   | Stool<br><i>Vibrio parahaemolyticus</i> requires media enrichment. <i>Vibrio parahaemolyticus</i> is susceptible to muscimol. Specimens should be cultured on thiosulfate-citrate-bile salts agar (TCBS) or selenite F broth.  |
| <i>Vibrio vulnificus</i>  | 1 to 7 days       | Vomiting, diarrhea, abdominal pain, bacteremia, and wound infections. More common in the immunocompromised, or in patients with chronic liver disease (presenting with bullous skin lesions). Can be fatal in patients with liver disease and the immunocompromised. | 2 to 8 days                         | Undercooked or raw shellfish, especially oysters; other contaminated seafood, and open wounds exposed to seawater.                       | Stool, blood, and wound swabs. <i>Vibrio vulnificus</i> requires media enrichment. <i>Vibrio vulnificus</i> is susceptible to muscimol. Specimens should be cultured on TCBS or selenite F broth.  |
| <i>Yersinia enterocolitica</i> and <i>Yersinia pseudotuberculosis</i> | 24 to 48 hours    | Appendicitis-like symptoms (diarrhea and vomiting, fever, and abdominal pain) occur primarily in older children and young adults. May have a scarlatiniform rash with <i>Yersinia pseudotuberculosis</i> .   | 1 to 3 weeks, usually self-limiting | Undercooked pork, unpasteurized milk, tofu, contaminated water. Infection has occurred in infants whose caregivers handled chitterlings. | Stool, blood, and wound swabs. <i>Yersinia enterocolitica</i> and <i>Yersinia pseudotuberculosis</i> require media enrichment. Specimens should be cultured on growth-promoting media such as selenite F broth. <i>Yersinia enterocolitica</i> is avirulent in mice. <i>Yersinia pseudotuberculosis</i> is avirulent in mice. Reference laboratory testing is available. |

## Foodborne Illnesses (Viral)

| <b>Etiology</b>                       | <b>Incubation Period</b>        | <b>Signs and Symptoms</b>  | <b>Duration of Illness</b>    | <b>Associated Foods</b>   | <b>Laboratory Testing</b>   |
|---------------------------------------|---------------------------------|--|-------------------------------|---|---|
| Hepatitis A                           | 28 days average (15 to 50 days) | Diarrhea; dark urine; jaundice; and flu-like symptoms (i.e., fever, headache, nausea, and abdominal pain).   | Variable, 2 weeks to 3 months | Shellfish harvested from contaminated waters, raw produce, contaminated drinking water, uncooked foods and cooked foods that are not reheated after contact with infected food handler. | Increase in alanine transferase (ALT), bilirubin. Positive IgM and anti-hepatitis A antibodies.   |
| Noroviruses (and other caliciviruses) | 12 to 48 hours                  | Nausea, vomiting, abdominal cramping, diarrhea fever, myalgia, and some headache. Diarrhea is more prevalent in adults and vomiting is more prevalent in children. | 12 to 60 hours                | Shellfish, fecally contaminated foods, ready-to-eat foods touched by infected food workers (salads, sandwiches, ice, cookies, fruit).   | Routine reverse-transcriptase polymerase chain reaction (RT-PCR) and electron microscopy (EM) on fresh unpreserved stool samples. Clinical diagnosis, negative bacterial cultures. Stool is negative for white blood cells. |
| Rotavirus                             | 1 to 3 days                     | Vomiting, watery diarrhea, low-grade fever. Temporary lactose intolerance may occur. Infants and children, elderly,  | 4 to 8 days                   | Fecally contaminated foods. Ready-to-eat foods touched by   | Identification of virus in stool via immunoassay.   |

| <b>Etiology</b>  | <b>Incubation Period</b> | <b>Signs and Symptoms</b>  | <b>Duration of Illness</b> | <b>Associated Foods</b>  | <b>Laboratory Testing</b>   |
|--|--------------------------|--|----------------------------|--|---|
|  |                          | and immunocompromised are especially vulnerable.                     |                            | infected food workers (salads, fruits).  |   |
| Other viral agents (astroviruses, caliciviruses, adenoviruses, parvoviruses) | 10 to 70 hours           | Nausea, vomiting, diarrhea, malaise, abdominal pain, headache, fever | 2 to 9 days                | Fecally contaminated foods. Ready-to-eat foods touched by infected food workers. Some shellfish. | Identification of the virus in early acute stool samples. Serology. Commercial enzyme-linked immunosorbent assay (ELISA) kits are now available to adenoviruses and astroviruses. |

### **Foodborne Illnesses (Parasitic)**

| <b>Etiology</b>                    | <b>Incubation Period</b> | <b>Signs and Symptoms</b>   | <b>Duration of Illness</b>      | <b>Associated Foods</b>  | <b>Laboratory Testing</b>  |
|------------------------------------|--------------------------|---|---------------------------------|--|--|
| <i>Angiostrongylus cantonensis</i> | 1 week to $\geq 1$ month | Severe headaches, nausea, vomiting, neck stiffness, paresthesias, hyperesthesias, seizures, and other neurologic abnormalities. | Several weeks to several months | Raw or undercooked intermediate hosts (e.g., snails or slugs), infected paratenic (transport) hosts (e.g., crabs, fresh water shrimp), fresh produce contaminated with intermediate or transport | Examination of cerebrospinal fluid (CSF) for elevated pressure, protein, leukocytes, and eosinophils; serologic testing using ELISA to detect antibodies to <i>Angiostrongylus cantonensis</i> . |



| <b>Etiology</b>                 | <b>Incubation Period</b>              | <b>Signs and Symptoms</b>   | <b>Duration of Illness</b>                          | <b>Associated Foods</b>  | <b>Laboratory Testing</b>   |
|---------------------------------|---------------------------------------|---|---|--|---|
|                                 |                                       |   |   | hosts.   |   |
| <i>Cryptosporidium</i>          | 2 to 10 days                          | Diarrhea (usually watery), stomach cramps, upset stomach, slight fever.   | May be remitting and relapsing over weeks to months | Any uncooked food or food contaminated by an ill food handler after cooking, drinking water. | Request specific examination of the stool for <i>Cryptosporidium</i> . May need to examine water or food. |
| <i>Cyclospora cayentanensis</i> | 1 to 14 days, usually at least 1 week | Diarrhea (usually watery), loss of appetite, substantial loss of weight, stomach cramps, nausea, vomiting, fatigue. | May be remitting and relapsing over weeks to months | Various types of fresh produce (imported berries, lettuce)                                   | Request specific examination of the stool for <i>Cyclospora</i> . May need to examine water or food.      |
| <i>Entamoeba histolytica</i>    | 2 to 3 days to 1 to 4 weeks           | Diarrhea (often bloody), frequent bowel movements, lower abdominal pain.  | May be protracted (several weeks to several months) | Any uncooked food or food contaminated by an ill food handler after cooking, drinking water. | Examination of stool for cysts and parasites- at least 3 samples. Serology for long-term infections.      |
| <i>Giardia lamblia</i>          | 1 to 2 weeks                          | Diarrhea, stomach cramps, gas.  | Days to weeks                                       | Any uncooked food or food contaminated by an ill food handler after cooking, drinking water. | Examination of stool for ova and parasites- may need at least 3 samples.                                  |
| <i>Toxoplasma gondii</i>        | 5 to 23 days                          | Generally asymptomatic, 20% may develop cervical lymphadenopathy and/or a flu-like illness.                         | Months  | Accidental ingestion of contaminated substances (e.g., soil contaminated                     | Isolation of parasites from blood or other body fluids; observation of parasites in                       |

| Etiology   | Incubation Period          | Signs and Symptoms  | Duration of Illness | Associated Foods   | Laboratory Testing   |
|--|----------------------------|---|---------------------|--|--|
|  |                            | <p><u>In immunocompromised patients</u>: central nervous system (CNS) disease, myocarditis, or pneumonitis is often seen.</p> |                     | <p>with cat feces, on fruits and vegetables, raw or partly cooked meat [especially pork, lamb, or venison]).</p> | <p>patient specimens via microscopy or histology. Detection of organisms is rare, serology (reference laboratory needed) can be a useful adjunct in diagnosing toxoplasmosis. However, IgM antibodies may persist for 6 to 18 months and thus may not necessarily indicate recent infection. PCR of bodily fluids.</p> <p><u>For congenital infection</u>: isolation of <i>Toxoplasma gondii</i> from placenta, umbilical cord or infant blood. PCR of white blood cells, cerebrospinal fluid or amniotic fluid, or IgM and IgA serology, performed by reference laboratory.</p> |
| <p><i>Toxoplasma gondii</i> (congenital infection)</p> | <p>In infants at birth</p> | <p>Treatment of the mother may reduce severity and/or incidence of congenital infection. Most infected infants</p>            | <p>Months</p>       | <p>Passed from mother (who acquired acute infection during</p>   |  |

| <b>Etiology</b>             | <b>Incubation Period</b>  | <b>Signs and Symptoms</b>  | <b>Duration of Illness</b> | <b>Associated Foods</b>   | <b>Laboratory Testing</b>  |
|-----------------------------|---|--|----------------------------|---|--|
|                             |   | have few symptoms at birth. Later, they will generally develop signs of congenital toxoplasmosis (mental retardation, severely impaired eyesight, cerebral palsy, seizures) unless the infection is treated. |                            | pregnancy) to child.  |  |
| <i>Trichinella spiralis</i> | 1 to 2 days for initial symptoms; others begin 2 to 8 weeks after infection | Acute: nausea, vomiting, diarrhea, fatigue, fever, abdominal discomfort followed by muscle soreness, weakness, and occasional cardiac and neurologic complications.  | Months                     | Raw or undercooked contaminated meat, usually pork or wild game meat (e.g., bear or moose). | Positive serology or demonstration of larvae via muscle biopsy. Increase in eosinophils. |

### **Foodborne Illnesses (Non-Infectious)**

| <b>Etiology</b> | <b>Incubation Period</b>              | <b>Signs and Symptoms</b>              | <b>Duration of Illness</b> | <b>Associated Foods</b>           | <b>Laboratory Testing</b>                    |
|-----------------|---------------------------------------|--|----------------------------|-----------------------------------|--|
| Antimony        | 5 minutes to 8 hours; usually <1 hour | Vomiting, metallic taste.              | Usually self-limited       | Metallic container.               | Identification of metal in beverage or food. |
| Arsenic         | Few hours                             | Vomiting, colic, diarrhea.             | Several days               | Contaminated food.                | Urine. May cause eosinophilia.               |
| Cadmium         | 5 minutes to 8 hours; usually <1 hour | Nausea, vomiting, myalgia, increase in | Usually self-limited       | Seafood, oysters, clams, lobster, | Identification of metal in food.             |

| <b>Etiology</b>                            | <b>Incubation Period</b>              | <b>Signs and Symptoms</b>   | <b>Duration of Illness</b> | <b>Associated Foods</b>   | <b>Laboratory Testing</b>                             |
|--|---------------------------------------|---|----------------------------|---|---|
|  |                                       | salivation, stomach pain.   |                            | grains, peanuts.  |   |
| Ciguatera fish poisoning (ciguatera toxin) | 2 to 6 hours                          | <u>Gastrointestinal</u> : abdominal pain, nausea, vomiting, diarrhea.   | Days to weeks to months    | A variety of large reef fish. Grouper, red snapper, amberjack, and barracuda (most common). | Radioassay for toxin in fish or a consistent history. |
|  | 3 hours                               | <u>Neurologic</u> : paresthesias, reversal of hot or cold, pain, weakness.  |                            |   |   |
|  | 2 to 5 days                           | <u>Cardiovascular</u> : bradycardia, hypotension, increase in T wave abnormalities.   |                            |   |   |
| Copper                                     | 5 minutes to 8 hours; usually <1 hour | Nausea, vomiting, blue or green vomitus.  | Usually self-limited       | Metallic container.   | Identification of metal in beverage or food.          |
| Mercury                                    | 1 week or longer                      | Numbness, weakness of legs, spastic paralysis, impaired vision, blindness, coma. Pregnant women and the developing fetus are especially vulnerable. | May be protracted          | Fish exposed to organic mercury, grains treated with mercury fungicides.                    | Analysis of blood, hair.                              |
| Mushroom toxins, short-acting              | <2 hours                              | Vomiting, diarrhea,   | Self-limited               | Wild mushrooms  | Typical syndrome and                                  |

| <b>Etiology</b>  | <b>Incubation Period</b>                            | <b>Signs and Symptoms</b>  | <b>Duration of Illness</b> | <b>Associated Foods</b>  | <b>Laboratory Testing</b>   |
|--|---|--|----------------------------|--|---|
| (museinol, muscarine, psilocybin, coprinus artemetaris, ibotenic acid) |   | confusion, visual disturbance, salivation, diaphoresis, hallucinations, disulfiram-like reaction, confusion, visual disturbance.     |                            | (cooking may not destroy these toxins).                                | mushroom identified or demonstration of the toxin.                          |
| Mushroom toxin, long-acting (amanitin)                                 | 4 to 8 hours diarrhea; 24 to 48 hours liver failure | Diarrhea, abdominal cramps, leading to hepatic and renal failure.  | Often fatal                | Mushrooms.   | Typical syndrome and mushroom identified and/or demonstration of the toxin. |
| Nitrite poisoning  | 1 to 2 hours  | Nausea, vomiting, cyanosis, headache, dizziness, weakness, loss of consciousness, chocolate-brown colored blood.                     | Usually self-limited       | Cured meats, any contaminated foods, spinach exposed to nitrification. | Analysis of the food, blood.  |
| Pesticides (organophosphates or carbamates)                            | Few minutes to few hours                            | Nausea, vomiting, abdominal cramps, diarrhea, headache, nervousness, blurred vision, twitching, convulsions, salivation and meiosis. | Usually self-limited       | Any contaminated food.   | Analysis of the food, blood.  |
| Puffer Fish (tetrodotoxin)   | <30 minutes   | Paresthesias, vomiting, diarrhea,  | Death usually in 4 to 6    | Puffer fish.   | Detection of tetrodotoxin in fish.  |

| <b>Etiology</b>                                   | <b>Incubation Period</b>                                  | <b>Signs and Symptoms</b>   | <b>Duration of Illness</b> | <b>Associated Foods</b>  | <b>Laboratory Testing</b>  |
|---|---|---|----------------------------|--|--|
|   |   | abdominal pain, ascending paralysis, respiratory failure.   | hours                      |  |  |
| Scombroid (histamine)                             | 1 min to 3 hours  | Flushing, rash, burning sensation of skin, mouth and throat, dizziness, urticaria, paresthesias.  | 3 to 6 hours               | Fish: bluefin, tuna, skipjack, mackerel, marlin, escolar, and mahi mahi.   | Demonstration of histamine in food or clinical diagnosis.                |
| Shellfish toxins (diarrheic, neurotoxic, amnesic) | Diarrheic shellfish poisoning (DSP)-30 min to 2 hours     | Nausea, vomiting, diarrhea, and abdominal pain accompanied by chills, headache, and fever.  | Hours to 2-3 days          | A variety of shellfish, primarily mussels, oysters, scallops, and shellfish from the Florida coast and the Gulf of Mexico. | Detection of the toxin in shellfish; high pressure liquid chromatography |
|   | Neurotoxic shellfish poisoning (NSP)-few minutes to hours | Tingling and numbness of lips, tongue, and throat, muscular aches, dizziness, reversal of the sensations of hot and cold, diarrhea, and vomiting. |                            |  |  |
|   | Amnesic shellfish poisoning (ASP)-24 to 48 hours          | Vomiting, diarrhea, abdominal pain and neurological problems such as confusion, memory loss,  |                            |  |  |

| <b>Etiology</b>                                  | <b>Incubation Period</b>          | <b>Signs and Symptoms</b>   | <b>Duration of Illness</b> | <b>Associated Foods</b>  | <b>Laboratory Testing</b>   |
|--|-----------------------------------|---|----------------------------|--|---|
|  |                                   | disorientation, seizure, coma.  |                            |  |   |
| Shellfish toxins (paralytic shellfish poisoning) | 30 min to 3 hours                 | Diarrhea, nausea, vomiting leading to paresthesias of mouth, lips, weakness, dysphasia, dysphonia, respiratory paralysis. | Days                       | Scallops, mussels, clams, cockles.   | Detection of toxin in food or water where fish are located; high pressure liquid chromatography |
| Sodium fluoride                                  | Few min to 2 hours                | Salty or soapy taste, numbness of mouth, vomiting, diarrhea, dilated pupils, spasms, pallor, shock, collapse.             | Usually self-limited       | Dry foods (such as dry milk, flour, baking powder, cake mixes) contaminated with sodium fluoride-containing insecticides and rodenticides. | Testing of vomitus or gastric washings. Analysis of the food.                                   |
| Thallium   | Few hours                         | Nausea, vomiting, diarrhea, painful paresthesias, motor polyneuropathy, hair loss.  | Several days               | Contaminated food.   | Urine, hair.  |
| Tin  | 5 min to 8 hours; usually <1 hour | Nausea, vomiting, diarrhea.   | Usually self-limited       | Metallic container.  | Analysis of the food.   |
| Vomitoxin  | Few min to 3 hours                | Nausea, headache, abdominal pain, vomiting.   | Usually self-limited       | Grains, such as wheat, corn, barley.   | Analysis of the food.   |

| <b>Etiology</b> | <b>Incubation Period</b> | <b>Signs and Symptoms</b>                             | <b>Duration of Illness</b> | <b>Associated Foods</b> | <b>Laboratory Testing</b>                               |
|-----------------|--------------------------|---|----------------------------|-------------------------|---|
| Zinc            | Few hours                | Stomach cramps, nausea, vomiting, diarrhea, myalgias. | Usually self-limited       | Metallic container.     | Analysis of the food, blood and feces, saliva or urine. |

### **Surveillance and Reporting of Foodborne Illnesses**

The following lists current reporting requirements for foodborne diseases and conditions in the United States. National reporting requirements are determined collaboratively by the Council of State and Territorial Epidemiologists and the Centers for Disease Control and Prevention (CDC).

#### **Notifiable BACTERIAL Foodborne Diseases and Conditions**

- Anthrax
- Botulism
- Brucellosis
- Cholera
- *Enterohemorrhagic Escherichia coli*
- Hemolytic uremic syndrome, post-diarrheal
- Listeriosis
- Salmonellosis (other than *Salmonella Typhi*)
- Shigellosis
- Typhoid fever (*Salmonella Typhi* and *Salmonella Paratyphi* infections)

#### **Notifiable VIRAL Foodborne Diseases and Conditions**

- Hepatitis A

#### **Notifiable PARASITIC Foodborne Diseases and Conditions**

- Cryptosporidiosis
- Cyclosporiasis
- Giardiasis
- Trichinellosis

In the United States, additional reporting requirements may be mandated by state and territorial laws and regulations. Details on specific state reporting requirements are available from the:

- **Council of State and Territorial Epidemiologists.** Information is available electronically at <http://www.cste.org/nndss/reportingrequirements.htm>.
- **Centers for Disease Control and Prevention.** Information is available electronically at <http://www.cdc.gov/epo/dphsi/phs/infdis2003.htm>.



Typically, the appropriate procedure for physicians to follow in reporting foodborne illnesses is to contact the local or state health department whenever they identify a specific notifiable foodborne disease. However, it is often unclear if a patient has a foodborne illness prior to diagnostic tests, so health care professionals should also report potential foodborne illnesses, such as when two or more patients present with a similar illness that may have resulted from the ingestion of a common food. Local health departments then report the illnesses to the state health department and determine if further investigation is warranted.

In addition to reporting cases of potential foodborne illnesses, it is important for physicians to report noticeable increases in unusual illnesses, symptom complexes, or disease patterns (even without definitive diagnosis) to public health authorities. Prompt reporting of unusual patterns of diarrheal/gastrointestinal tract illness, for example, can allow public health officials to initiate an epidemiologic investigation earlier than would be possible if the report awaited definitive etiologic diagnosis.

### **CLINICAL ALGORITHM(S)**

None provided

## **EVIDENCE SUPPORTING THE RECOMMENDATIONS**

### **TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS**

Not applicable

## **BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS**

### **POTENTIAL BENEFITS**

#### **General benefits include:**

Prevent and control food-related disease outbreaks.

#### **Specific benefits include:**

Foodborne disease reporting is not only important for disease prevention and control, but more accurate assessments of the burden of foodborne illness in the community occur when physicians report foodborne illnesses to the local or state health department. In addition, reporting of cases of foodborne illness by practicing physicians to the local health department may help the health officer identify a foodborne disease outbreak in the community. This may lead to early identification and removal of contaminated products from the commercial market. Occasionally, reporting may lead to the identification of a previously unrecognized agent of foodborne illness. Reporting also may lead to identification and appropriate management of human carriers of known foodborne pathogens, especially those with high-risk occupations for disease transmission such as food workers.

**Subgroups Most Likely to Benefit:**

Young, elderly, and immunocompromised patients

**POTENTIAL HARMS**

Not stated

**QUALIFYING STATEMENTS****QUALIFYING STATEMENTS**

This primer is not a clinical guideline or definitive resource for the diagnosis and treatment of foodborne illness. Safe food handling practices and technologies (e.g., irradiation, food processing and storage) also are not addressed.

**IMPLEMENTATION OF THE GUIDELINE****DESCRIPTION OF IMPLEMENTATION STRATEGY**

An implementation strategy was not provided.

**INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES****IOM CARE NEED**

Getting Better  
Staying Healthy

**IOM DOMAIN**

Effectiveness

**IDENTIFYING INFORMATION AND AVAILABILITY****BIBLIOGRAPHIC SOURCE(S)**

American Medical Association, American Nurses Association, American Nurses Foundation, Centers for Disease Control and Prevention, Center for Food Safety and Applied Nutrition, U.S. Food and Drug Administration, Food Safety and Inspection Service, U.S. Department of Agriculture. Diagnosis and management of foodborne illnesses: a primer for physicians and other health care professionals. MMWR Recomm Rep 2004 Apr 16;53(RR-4):1-33. [PubMed](#)

**ADAPTATION**

Not applicable: The guideline was not adapted from another source.

**DATE RELEASED**

2001 Jan (revised 2004 Apr 16)

**GUIDELINE DEVELOPER(S)**

American Medical Association - Medical Specialty Society  
Center for Food Safety and Applied Nutrition - Federal Government Agency [U.S.]  
Centers for Disease Control and Prevention - Federal Government Agency [U.S.]  
Food Safety and Inspection Service - Federal Government Agency [U.S.]

**GUIDELINE DEVELOPER COMMENT**

This primer was developed collaboratively by the American Medical Association, the Centers for Disease Control and Prevention (CDC), the Center for Food Safety and Nutrition, Food and Drug Administration (U.S.), and the Food Safety and Inspection Service, Department of Agriculture (U.S.) as part of the National Food Safety Initiative implemented under former President William Jefferson Clinton.

**SOURCE(S) OF FUNDING**

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**GUIDELINE COMMITTEE**

Not stated

**COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE**

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**FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST**

Elaine F. Brainerd, R.N., M.A., has indicated that she has a financial relationship with Centers for Disease Control and Prevention (CDC) because she is the Director of a Food Safe Schools project that is funded under a cooperative agreement by CDC. The remaining preparers have signed a conflict of interest disclosure form that verifies no conflict of interest.

**GUIDELINE STATUS**

This is the current release of the guideline.

This guideline updates a previous version: Diagnosis and management of foodborne illnesses: a primer for physicians. *MMWR Recomm Rep* 2001 Jan 26;50 (RR-2):1-69.

## **GUIDELINE AVAILABILITY**

Electronic copies: Available from the [Centers for Disease Control and Prevention \(CDC\) Web site](#).

Print copies: Available from the Centers for Disease Control and Prevention, *MMWR*, Atlanta, GA 30333. Additional copies can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325; (202) 783-3238. Copies are also available from the American Medical Association, 515 North State Street, Chicago, IL 60610; Web site: [www.ama-assn.org](http://www.ama-assn.org).

## **AVAILABILITY OF COMPANION DOCUMENTS**

None available

## **PATIENT RESOURCES**

None available

## **NGC STATUS**

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