



# Epidemiology of Foodborne Diseases

Center for Acute Disease Epidemiology  
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 Visit our web site at [www.idph.state.ia.us/Cade/Foodborne.aspx](http://www.idph.state.ia.us/Cade/Foodborne.aspx)



PATHOGEN	INCUBATION PERIOD / COMMUNICABILITY	ASSOCIATED FOODS/ TRANSMISSION	SIGNS AND SYMPTOMS	TREATMENT	PUBLIC HEALTH (PH) RESPONSE
<b><i>Bacillus anthracis</i></b> * (anthrax - gastrointestinal)	3-7 days, although up to 60 days possible. Not communicable person-to-person.	Ingestion of contaminated undercooked food.	Nausea, vomiting, malaise, bloody diarrhea, acute abdominal pain followed by fever, septicemia.	Ciprofloxacin is 1st line treatment. Alternatives are doxycycline and amoxicillin if susceptible. Begin therapy with two intravenous antimicrobials. Cephalosporins and trimethoprim-sulfamethoxazole should not be used.	Anthrax is a potential bioterrorism agent.
<b><i>Bacillus cereus</i></b> (diarrheal toxin)	6-24 hours. Not communicable person-to-person.	Food kept at room temperature after cooking, commonly meats, stews and gravies.	Abdominal cramps, watery diarrhea, nausea. Fever is rare.	Rehydration. Illness is self-limiting. Antibiotics are of no use.	Foods should not remain at room temperature after cooking. Refrigerate leftover food promptly and reheat thoroughly.
<b><i>Bacillus cereus</i></b> (preformed enterotoxin)	0.5-6 hours. Not communicable person-to-person.	Food kept at room temperature after cooking, commonly fried rice.	Sudden onset of severe nausea and vomiting, abdominal cramps. Fever is rare. Usually last < 24 hours.	Rehydration. Illness is self-limiting. Antibiotics are of no use.	Proper cooking and storage of foods, particularly rice cooked for later use.
<b><i>Brucella abortus</i>, <i>Brucella melitensis</i>, and <i>Brucella suis</i></b> *	Highly variable; usually 1-2 months with a range of 5-60 days. Rare person-to-person transmission.	Ingestion of raw milk and dairy products (unpasteurized cheese) from infected animals. Contact of non-intact skin with body fluids of infected animals.	Acute or insidious onset. Fever, chills, sweating, weakness, headache, muscle and joint pain, weight loss, diarrhea (may be bloody), sacroiliitis, epididymitis, orchitis.	Rifampicin or streptomycin AND doxycycline for at least 6 weeks. Corticosteroids may be helpful in severely ill patients.	<i>Brucella</i> is a potential bioterrorism agent. PH follow-up to determine source of infection. Pasteurization of milk and milk products.
<b><i>Campylobacter</i></b> *	Usually 2-5 days, with a range of 1-10 days. Communicable through the course of infection (usually several days to several weeks), though person-to-person transmission appears to be uncommon.	Ingestion of undercooked chicken and pork, contaminated food and water, or unpasteurized milk.	Diarrhea, abdominal pain, fever, malaise and vomiting; diarrhea may be bloody. Less commonly: typhoid-like syndrome, febrile convulsions, meningial syndrome. May mimic acute appendicitis or irritable bowel syndrome.	Rehydration and electrolyte replacement. Antibiotics are not generally indicated. For severe cases, antibiotics may be indicated early in the course of illness.	Thorough cooking of pork and poultry. Pasteurization of milk and milk products. Chlorination of water. Exclude symptomatic people from food handling, childcare, and direct patient care.
<b><i>Clostridium botulinum</i></b> <b>children and adults</b> ** (preformed toxin)	Neurological symptoms usually appear within 12-36 hours. Not communicable person-to-person.	Ingestion of food in which toxin has formed, and not destroyed due to inadequate heating during preservation and without subsequent adequate cooking, (e.g. home canned vegetables and fruits, garlic in oil).	Early signs are marked fatigue, weakness, vertigo, constipation, vomiting, and diarrhea, followed by blurred vision, diplopia, dysphagia, dry mouth and symmetrical descending muscle weakness with respiratory muscle paralysis.	Intravenous administration as soon as possible of polyvalent botulism antitoxin. Supportive care, especially for respiratory failure, which is the usual cause of death.	Notify the Center for Acute Disease Epidemiology (CADE) immediately at 1-800-362-2736 to obtain the botulism antitoxin. Botulism is a potential bioterrorism agent. Do not use food containers that bulge.

<b><i>Clostridium botulinum</i> intestinal (formerly infant) **</b>	Incubation is unknown. Not communicable person-to-person.	Ingestion of botulinum spores. Possible sources of spores are multiple, and include the following foods: honey, home-canned vegetables and fruits, light and dark corn syrup.	Lethargy, weakness, poor feeding, constipation, hypotonia, poor head control, poor gag and suck mechanism, "failure to thrive." Disease can range from mild, with a gradual onset, to sudden infant death. Some studies suggest the cause of an estimated five percent of sudden infant death.	Supportive care; assisted respiration may be required. Botulism IG has been shown to improve the course of illness. Botulism antitoxin is generally not recommended for infants. Antibiotics do not improve the course of disease, and aminoglycosides can worsen the disease. Rehydration.	Contact CADE immediately at 1-800-362-2736. Do not give infants honey.
<b><i>Clostridium perfringens</i> (toxin)</b>	6-24 hours, usually 10-12 hours. Not communicable person-to-person.	Ingestion of food that has been contaminated by soil or feces and then held under conditions that permits multiplication of organism. Specific foods may include meat, poultry, gravy, and dried or precooked foods.	Sudden onset of abdominal cramps followed by diarrhea and usually nausea; fever and vomiting are usually absent. Mild disease of short duration (1 day or less).	Rehydration. Antibiotics are of no use.	Do not leave food at room temperature to cool. Roast, stews, and gravies should be thoroughly cooked and divided into smaller quantities for cooling and reheating.
<b><i>Cryptosporidium</i>*</b>	Incubation not precisely known; 1-12 days is the likely range, with an average of about 7 days. Communicable from onset of illness to several weeks after symptoms resolve.	Person to person and fecal-oral transmission. Contaminated food or water. Outbreaks have been associated with child care centers, swimming pools and lakes, and unpasteurized beverages (apple cider) contaminated with animal manure.	Diarrhea, which may be profuse and watery, cramping abdominal pain. General malaise, fever, anorexia, nausea, and vomiting occur less often. Symptoms often wax and wane. Asymptomatic infections are common.	Rehydration. Nitazoxanide for immunocompetent. In immunocompromised persons, experimental treatments include paromomycin and orally administered human serum immunoglobulin or bovine colostrum. Stop or reduce immunosuppressive drugs if possible.	Specific O&P testing must be requested. Persons with diarrhea should not use public recreational water. Hand hygiene after handling animals.
<b><i>Cyclospora cayetanensis</i> *</b>	Median incubation 1 week with a 1-2 week range. No evidence of communicability person-to-person.	Ingestion of contaminated water and foods such as imported berries, lettuce, and basil fruits and vegetables.	Profuse watery diarrhea, nausea, anorexia, abdominal cramping, fatigue, and weight loss; fever is rare. Symptoms lasts 10-24 days	Trimethoprim-sulfamethoxazole for 7-10 days may shorten the course of illness. Ciprofloxacin if sulfa allergy.	Consider this diagnosis in persons with prolonged diarrheal illness. Specific O&P testing must be requested. Hand hygiene after handling animals
<b><i>Entamoeba histolytica</i></b>	Variable, from a few days to several months or years; commonly 2-4 weeks. Communicable during the period the cysts are passed, which may continue for years.	Ingestion of fecally contaminated foods or water containing cysts.	Varies from acute fulminating dysentery with fever, chills, and bloody or mucoid diarrhea to mild abdominal discomfort with diarrhea alternating with periods of constipation or remission. Dissemination via the bloodstream may occur and produce abscesses of the liver or, less commonly, the lung or brain.	Antiparasitic drugs such as metronidazole. Asymptomatic carriers may be treated. Corticosteroids and antimotility drugs can worsen symptoms. Additional antiparasitic drugs can be added for refractory or extra-intestinal disease.	Handwashing, sanitary disposal of feces, and treatment of drinking water. Contact public health if an outbreak is suspected.
<b>Enterohemorrhagic <i>Escherichia coli</i> (EHEC) * #</b> Includes <i>E. coli</i> O157:H7 and other Shiga toxin producing <i>E. coli</i> (STEC)	2-10 days with a median of 3-4 days. Communicable from onset of illness to a week later in adults; can be up to 3 weeks in one third of children.	Person to person and fecal-oral. Ingestion of contaminated foods such as undercooked ground meats, unpasteurized milk, fruits or vegetables contaminated with feces and contaminated water.	Diarrhea that may range from mild and non-bloody to stools that are virtually all blood, abdominal pain, and vomiting. Usually little or no fever present. More common in children <5 years of age. Severe clinical manifestations include hemolytic uremic syndrome (HUS) and thrombotic thrombocytopenic purpura (TTP).	Rehydration. Antimotility drugs may worsen illness. Most experts would not treat because no benefit has been proven and harm is possible.	Exclude patients and symptomatic contacts from high-risk settings (food handling, direct patient care, child care) until 2 negative stools are collected at least 24 hours apart and at least 48 hours after antibiotics are discontinued. If high-risk setting is involved, immediately contact CADE at 1-800-362-2736. Hand hygiene after handling animals.
<b>Enterotoxigenic <i>Escherichia coli</i> (ETEC) (Travelers' diarrhea)</b>	Usually 24-72 hours, may be as short as 10-12 hours. Communicable for duration of excretion of pathogenic ETEC, which may be prolonged.	Ingestion of water or food contaminated with human feces. Primarily an infection of developing countries.	Watery diarrhea, abdominal cramps, some vomiting. May have low grade fever. Range from mild watery diarrhea to profuse cholera-like. Symptoms last > 5 days.	Rehydration. Most cases do not require additional treatment. Ciprofloxacin or norfloxacin for severe cases.	When traveling internationally, drink carbonated beverages or sealed bottled water and avoid ice, salads, and fruits that are not peeled. Eat foods hot.

<b><i>Giardia lamblia</i> *</b>	Usually 3-25 days or longer; median 7-10 days. Communicable for entire period of infection, often months.	Person-to-person and fecal-oral transmission, especially in child care centers. May also be transmitted through contaminated water.	1) Acute diarrhea or 2) chronic diarrhea, flatulence, bloating, fatigue, pale greasy stools, malabsorption, weight loss. Reactive arthritis may occur.	Antiparasitic drugs, such as metronidazole, are available for treatment. Treatment of asymptomatic carriers is not necessary.	
<b>Hepatitis A *</b>	15-50 days, average 28-30 days. Communicable approximately 2 weeks before and 1 week after onset of jaundice.	Person to person and fecal oral transmission. Sources include raw produce, undercooked foods and cooked foods that are not reheated after contact with infected food handler, and shellfish harvested from contaminated waters.	Diarrhea, dark urine, jaundice, and generalized symptoms such as fever, headache, nausea, and abdominal pain. Many cases, especially infants and children, will be asymptomatic. Can last weeks to months.	Supportive care. Can be prevented by administration of vaccine or IG after exposure.	Immediate patient interview and assessment by PH. Contact investigation and post-exposure prophylaxis - vaccine or IG - if warranted. Counseling. If case is in high-risk situation (food-handling, direct patient care or child care, contact CADE at 1-800-362-2736 immediately. Can be prevented with vaccine.
<b><i>Listeria monocytogenes</i> * #</b>	Variable; 3-70 days. Median incubation is estimated to be 3 weeks. Communicable for duration of excretion of organism, this may be several months. Transmission is unlikely after diarrhea has stopped.	Ingestion of fresh soft cheeses, unpasteurized milk, ready-to-eat deli meats, hot dogs, undercooked poultry, unwashed raw vegetables.	Fever, muscle aches, and nausea or diarrhea. Infection in pregnant women can lead to premature delivery or stillbirth. Elderly, immunocompromised, and neonates are at risk for septicemia or meningitis.	Penicillin or ampicillin alone or together with aminoglycosides. For penicillin-allergic patients, trimethoprim-sulfamethoxazole or erythromycin is preferred.	If pregnant or immunocompromised, avoid high-risk foods. Contact PH if an outbreak is suspected.
<b>Norovirus (Norwalk virus)</b>	Usually 24-48 hours with a range of 10-50 hours. Communicable during acute stage of disease and up to 48 hours after diarrhea stops.	Person to person and fecal oral transmission. Ingestion of ready-to-eat foods, such as salads, sandwiches, ice, cookies, and fruit that are handled by infected persons; poorly cooked shellfish.	Nausea, vomiting, and large-volume of watery diarrhea, malaise, headache, myalgia, and low grade fever. GI symptoms usually last 1-2 days.	Rehydration and electrolyte replacement. Children < 5 year of age, give 20 mg elemental zinc daily for 10-14 days. Illness is self-limiting. Antibiotics are of no use.	The State Hygienic Laboratory at the University of Iowa is the only lab in the state that can identify noroviruses, a common cause of foodborne outbreaks. Exclude ill food handlers, healthcare providers and child care staff and attendees from work and child care for 48 hours after diarrhea and vomiting stops; everyone else, 24 hours.
<b>Rotavirus</b>	Approximately 1-3 days. Communicable during acute stage of disease and later while viral shedding continues (around 8 days).	Person to person and fecal oral. Ingestion of fecally contaminated foods.	Vomiting, watery diarrhea, low-grade fever. Infants and children, elderly, and immunocompromised are especially vulnerable.	Rehydration. Children < 5 years of age, give 20 mg elemental zinc daily for 10-14 days. Antibiotics and antimotility drugs should not be given.	Vaccine is available.
<b><i>Salmonella</i> spp. * #</b>	6-72 hours, average 12-36 hours. Communicability is usually several days to several weeks, throughout the course of infection. Note: antibiotic therapy may prolong excretion.	Contaminated eggs, poultry, beef, unpasteurized milk or juice, cheese, contaminated raw fruits and vegetables (alfalfa sprouts, melons, etc.). Contact with infected animals.	Diarrhea, fever, abdominal cramps, vomiting. Can cause extra intestinal infections in 2% of cases (septic arthritis, endocarditis, pericarditis, etc).	Rehydration and electrolyte replacement. Antibiotics may not eliminate the carrier state and may lead to resistant strains or more severe infections. However, in some high-risk groups antibiotics therapy should be used. Consult CADE.	Cook eggs until firm. Thoroughly cook poultry and do not cross-contaminate raw poultry with other ready-to-eat foods.
<b><i>Salmonella Typhi</i> * # (typhoid fever)</b>	Depends on size of dose ingested; from 3 days to over 60 days, usual range of 8-14 days. Communicable as long as bacilli appear in excreta, usually from the first week throughout convalescence. 2-5% become carriers.	Person to person and fecal oral transmission. Fecal contamination of water supplies or street-vended foods with feces or urine of infected patients or carriers. Rare in developed countries.	Insidious onset of sustained fever, marked headache, constipation, malaise, chills, bradycardia, splenomegaly, and myalgia; diarrhea is uncommon, and vomiting is usually not severe.	Oral fluoroquinolone is the drug of choice for adults but resistance is emerging. Oral chloramphenicol, amoxicillin or trimethoprim-sulfamethoxazole (particularly in children) have comparable high efficacy for acute infections. Vaccinate those traveling to high risk areas.	Exclude patients and symptomatic contacts from high-risk settings (food handling, direct patient care, child care) until 3 negative stools are collected at least 1 month apart and at least 48 hours after antibiotics are discontinued. If asymptomatic contacts work in a high risk setting, evaluation is required. Contact CADE at 1-800-362-2736 immediately.

<b><i>Shigella</i> spp. * #</b>	12-96 hours, average 1-3 days. Up to one week with <i>Shigella dysenteriae</i> . Communicable during acute infection and up to 4 weeks after onset of illness.	Usually person to person spread, fecal-oral transmission. Food or water contaminated with fecal material. Ready-to-eat foods touched by infected food workers.	Abdominal cramps, fever, and diarrhea. Stools may contain blood and mucus. Children may get convulsions.	Rehydration and electrolyte replacement. If illness is severe, or if epidemiologically indicated, antibiotics (based on antibiogram) may be given to shorten the duration and severity of illness and the duration of the pathogen excretion. Antimotility agents are contraindicated as these drugs may prolong the illness.	Exclude patients and symptomatic contacts from high-risk settings (food handling, direct patient care, child care) until 2 negative stools are collected at least 24 hours apart and at least 48 hours after antibiotics are discontinued. If high-risk setting is involved, immediately contact CADE at 1-800-362-2736.
<b><i>Staphylococcus aureus</i> (preformed enterotoxin)</b>	30 minutes to 8 hours, average 2-4 hours. Not communicable person-to-person.	Foods that come in contact with hands of infected food handlers, either without subsequent cooking or with inadequate heating or refrigeration, such as pastries, custards, salad dressing, sandwiches, poultry, sliced meat, and meat products.	Abrupt and sometime violent onset of severe nausea, abdominal cramps, vomiting, and prostration, often accompanied by diarrhea. Sometimes with subnormal temperature and low blood pressure.	Rehydration. Antibiotics are of no use.	Hold cooked food for no more than 4 hours at room temperature. Cooked foods should be refrigerated at temperatures less than 41° F in containers no greater than 4 inches deep. People with boils, abscesses, and other lesions of the hands, face, or nose should be excluded from handling food until they are non-infectious.
<b><i>Toxoplasma gondii</i></b>	Approximately 7 days, with a range of 4-23 days. Not directly transmitted person-to-person except in utero.	Ingestion of raw or undercooked infected meat (pork or mutton, more rarely beef) containing tissue cysts or by ingestion of infected oocysts in food or water contaminated with cat feces.	Usually asymptomatic. Twenty percent may develop cervical lymphadenopathy and or an infectious mononucleosis-like illness. Central nervous system disease, myocarditis, skeletal involvement or pneumonia is often seen in the immunocompromised.	Asymptomatic healthy, but infected people do not require treatment. In specific cases spiramycin or pyrimethamine plus sulfadiazine and folic acid may be used for immunocompromised persons, pregnant women, or those with organ system involvement.	Wash hands thoroughly after handling raw meat, after contact with soil that may be contaminated with cat feces, and after cleaning litter boxes.
<b><i>Trichinella spiralis</i> * (trichinosis)</b>	GI symptoms within a few days. Systemic symptoms within a range of 5-45 days, usually 8-15 days. Not communicable person-to-person.	Ingestion of raw or insufficiently cooked contaminated meat, usually pork or wild game meat (e.g. bear or moose).	Clinical illness ranges from unapparent infection to a fulminating, fatal disease, depending on the number of larvae ingested. Sudden appearance of muscle soreness and pain together with edema of the upper eyelids fever and ocular hemorrhage are early characteristic signs. Other symptoms are thirst, chills, diarrhea, and weakness.	Albendazole and mebendazole. Corticosteroids delay elimination of the adult worms from the intestine, but may be needed to alleviate inflammatory reactions in the CNS or heart.	Cook all pork and wild game meat thoroughly.
<b><i>Vibrio cholerae</i> ** (cholera)</b>	From a few hours to 5 days, usually 2-3 days. Communicable as long as stools are positive; usually only a few days after recovery.	Ingestion of contaminated water or food (particularly raw or undercooked shellfish), moist grains held at room temperature, and raw or partially dried fish.	Painless profuse diarrhea without abdominal cramps or fever. Stools are colorless, with small flecks of mucus ("rice-water"). Nausea and profuse vomiting occur early.	Aggressive oral and IV rehydration and electrolyte replacement. In case of confirmed cholera, tetracycline, or doxycycline for adults. Alternate antibiotics include furazolidone, erythromycin, ciprofloxacin for children <8 years of age.	Contact CADE immediately at 1-800-362-2736. Lab testing for <i>Vibrio</i> must be specifically asked for. Cook all shellfish thoroughly.
<b><i>Vibrio parahaemolyticus</i></b>	Usually 12-24 hours but can range from 4-96 hours. Not normally communicable person-to-person except fecal-oral transmission.	Ingestion of undercooked or raw seafood, such as fish and shellfish or food prepared with contaminated water.	Watery diarrhea, abdominal cramps, nausea, vomiting, fever, and headache. Symptoms usually last 1-7 days.	Rehydration. Antibiotics are recommended for septicemia - tetracycline, aminoglycosides, 3rd generation cephalosporins, fluoroquinolones.	Lab testing for <i>Vibrio</i> must be specifically asked for. Cook all seafood thoroughly. Wash hands, surfaces, and cooking utensils after handling raw seafood.
<b><i>Vibrio vulnificus</i></b>	Usually 12-72 hours after eating raw or undercooked seafood. Not communicable person-to-person.	Ingestion of undercooked or raw seafood, especially oysters. Open wounds exposed to seawater can also be infected.	Vomiting, diarrhea, abdominal pain, bacteremia, and wound infections. Bullous skin lesions often present, disseminated intravascular coagulation (DIC), thrombocytopenia. More common in patients with chronic liver disease or in the immunocompromised. One third of patients are in shock when they present.	Rehydration. Tetracycline, doxycycline, and ceftazidime are recommended antibiotics.	Lab testing for <i>Vibrio</i> must be specifically asked for. Cook all seafood thoroughly. Do not eat raw oysters, especially if at high-risk. Any open wound should be rinsed with clean fresh water.

***Yersinia enterocolitica*  
and *Yersinia pseudo-  
tuberculosis***

Probably 3-7 days, generally less than 10 days. Communicability is probably for the duration of excretion of the organism, which averages 2-3 weeks after diagnosis. However, secondary transmission appears to be rare.

Ingestion of contaminated food or water. Pathogenic strains are most commonly isolated from raw pork and pork products. In the US, chitterlings (pig intestines) are a common source of infection.

Appendicitis-like symptoms (diarrhea and vomiting, fever, and abdominal pain) occur primarily in older children and young adults. In young children, acute febrile diarrhea (sometimes with blood and mucus) with abdominal pain. Systemic infections can occur.

Rehydration. Illness is usually self-limiting. If septicemia or other invasive disease occurs, antibiotic treatment with aminoglycosides and TMP/SMX. Quinolones, such as ciprofloxacin, are also highly effective.

Thoroughly cook pork products.

\* Disease is reportable to Center for Acute Disease Epidemiology (CADE)

\*\* Disease is IMMEDIATELY reportable to CADE: 1-800-362-2736

# Disease for which isolates are required to be sent to the State Hygienic Laboratory at the University of Iowa: 319- 335-4500

Contact public health of any suspected outbreak

Immediately report any disease when there is reasonable suspicion that it may be the result of a deliberate such as terrorism

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**REMEMBER: HANDWASHING IS THE MOST IMPORTANT ACT A PERSON CAN DO TO PREVENT TRANSMISSION OF DISEASE!!!!**