

Food Contamination and Poisoning



Course Information

Data Source: Centers for Disease Control
Medline Plus

Course Format: Teresa Patton

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Course Credit: 30 minutes

Performance Objectives

At the conclusion of this course, students will be able to:

1. Identify the symptoms from the most common types of food poisoning.
2. Discuss the many causes of food poisoning.
3. Understand how food can become contaminated.
4. Discuss possible complications from food poisoning.
5. Explain precautions that can be practiced to reduce the risk of food poisoning.
6. Describe treatment and when to contact a medical professional.

Food Contamination and Poisoning

An estimated 76 million cases of foodborne disease occur each year in the United States. The great majority of these cases are mild and cause symptoms for only a day or two. Some cases are more serious, and the Centers for Disease Control and Prevention (CDC) estimates that there are 325,000 hospitalizations and 5,000 deaths related to foodborne disease each year. The most severe cases tend to occur in the very old, the very young, those who have an illness already that reduces their immune system function, and in healthy people exposed to a very high dose of an organism.

Food Contamination and Poisoning

Food poisoning is the result of eating organisms or toxins in contaminated food. Most cases of food poisoning are from common bacteria like Staphylococcus or E. coli.

Foods may have some bacteria on them when you buy them. Raw meat may become contaminated during slaughter. Fruits and vegetables may become contaminated when they are growing or when they are processed. But it can also happen in your kitchen if you leave food out for more than two hours at room temperature.

Food poisoning can affect one person or it can occur as an outbreak in a group of people who all ate the same contaminated food.

Symptoms

The symptoms from the most common types of food poisoning generally start within two to six hours of eating the food responsible. That time may be longer (even a number of days) or shorter, depending on the toxin or organism responsible for the food poisoning. Symptoms range from mild to serious. Possible symptoms include:

- Upset stomach
- Nausea and vomiting
- Abdominal cramps
- Diarrhea
- Fever and chills
- Dehydration
- Headache
- Weakness (may be serious and lead to respiratory arrest, as in the case of botulism)



Botulism is a very serious form of food poisoning that can be fatal. It can come from improper home canning.

How Food Becomes Contaminated

We live in a microbial world, and there are many opportunities for food to become contaminated as it is produced and prepared. Many foodborne microbes are present in healthy animals (usually in their intestines) raised for food. Meat and poultry carcasses can become contaminated during slaughter by contact with small amounts of intestinal contents. Similarly, fresh fruit and vegetables can be contaminated if they are washed or irrigated with water that is contaminated with animal manure or human sewage.



Some types of Salmonella can infect a hen's ovary so that the internal contents of a normal looking egg can be contaminated with Salmonella even before the shell is formed.

How Food Becomes Contaminated



Later in food processing, other foodborne microbes can be introduced from infected humans who handle the food, or by cross contamination from some other raw agricultural product.

In the kitchen, microbes can be transferred from one food to another food by using the same knife, cutting board or other utensil to prepare both without washing the surface or utensil in between. A food that is fully cooked can become re-contaminated if it touches other raw foods or drippings from raw foods that contain pathogens.

How Food Becomes Contaminated

The way that food is handled after it is contaminated can also make a difference in whether or not an outbreak occurs. Many bacterial microbes need to multiply to a larger number before enough are present in food to cause disease. Given warm moist conditions and an ample supply of nutrients, one bacterium that reproduces by dividing itself every half hour can produce 17 million progeny in 12 hours. As a result, lightly contaminated food left out overnight can be highly infectious the next day. If the food were refrigerated promptly, the bacteria would not multiply at all.

How Food Becomes Contaminated

In general, refrigeration or freezing prevents virtually all bacteria from growing, but generally preserves them in a state of suspended animation. This general rule has a few surprising exceptions. Two foodborne bacteria, *Listeria monocytogenes* and *Yersinia enterocolitica*, can actually grow at refrigerator temperatures. High salt, high sugar or high acid levels keep bacteria from growing, which is why salted meats, jam, and pickled vegetables are traditional preserved foods.



Microbes are killed by heat. If food is heated to an internal temperature above 160°F, or 78°C, for even a few seconds, this is sufficient to kill most parasites, viruses or bacteria.

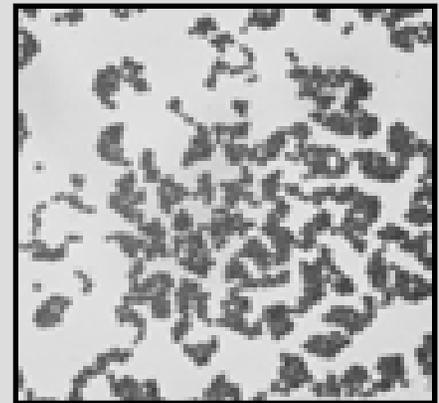
Food Contamination and Poisoning

Bacteria that can cause food poisoning:

Staph aureus - Toxin produced when food contaminated with the bacteria is left too long at room temperature. Meats, poultry, egg products, tuna, potato and macaroni salads, and cream-filled pastries are good environments for these bacteria to produce toxin.

Onset: Generally 30 minutes to 8 hours after eating.

Symptoms: Diarrhea, vomiting, nausea, abdominal pain, cramps, and prostration. Lasts 24-48 hours. Rarely fatal.

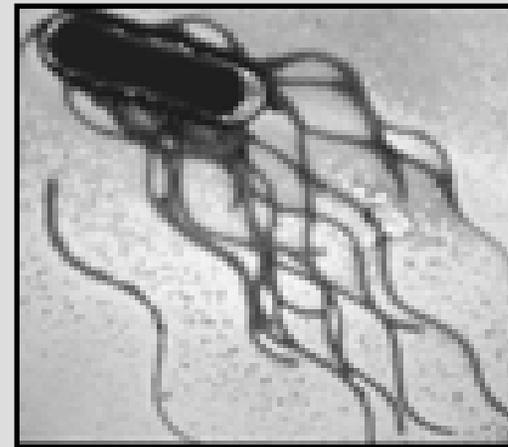


Food Contamination and Poisoning

Salmonella - Most common cause of foodborne deaths. Responsible for millions of cases of foodborne illness a year; Sources: raw and undercooked eggs, undercooked poultry and meat, dairy products, seafood, fruits and vegetables, chocolate.

Onset: Generally 8-12 hours after eating.

Symptoms: Abdominal pain and diarrhea, and sometimes nausea and vomiting. Symptoms last a day or less and are usually mild. Can be more serious in older or debilitated people.

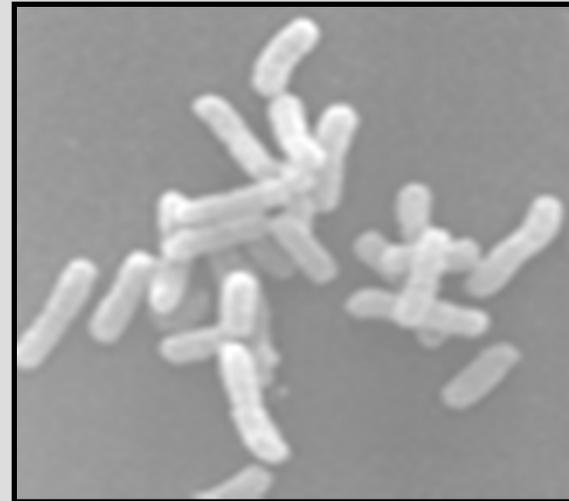


Food Contamination and Poisoning

Shigella - Found in milk and dairy products, poultry, and potato salad. Food becomes contaminated when a human carrier does not wash hands and then handles liquid or food that is not thoroughly cooked afterwards. Organisms multiply in food left at room temperature.

Onset: 1-7 days after eating

Symptoms: Abdominal cramps, diarrhea, fever, sometimes vomiting, and blood, pus, or mucus in stool.

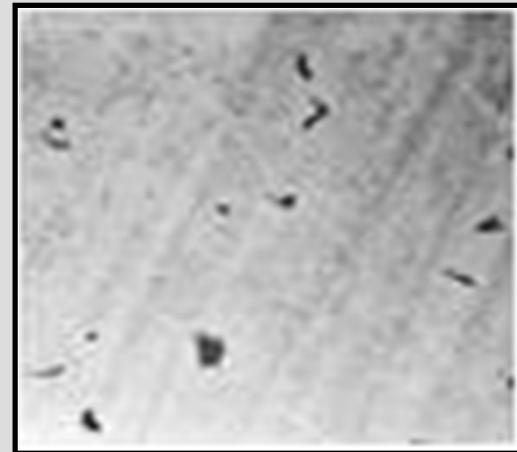


Food Contamination and Poisoning

Campylobacter – Most common bacterial cause of diarrhea in the United States. Bacteria on poultry, cattle, and sheep can contaminate meat and milk of these animals. Chief raw food sources: raw poultry, meat and unpasteurized milk.

Onset: Generally 2-5 days after eating

Symptoms: Diarrhea, abdominal cramping, fever, and sometimes bloody stools. Lasts 7-10 days.

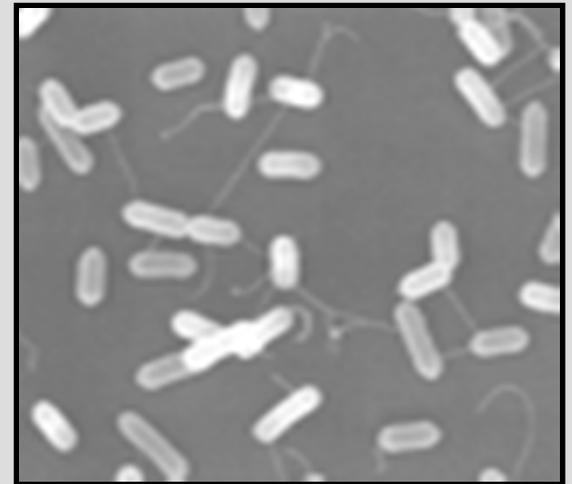


Food Contamination and Poisoning

Listeria - Found in soft cheese, unpasteurized milk, hot dogs and deli meats, imported seafood products, frozen cooked crab meat, cooked shrimp, and cooked surimi (imitation shellfish). The *Listeria* bacteria resist heat, salt, and acidity better than many other micro-organisms. They survive and grow at refrigeration temperatures.

Onset: From 7-30 days after eating, but most symptoms have been reported 48-72 hours after consumption of contaminated food.

Symptoms: Fever, headache, nausea, and vomiting. Primarily affects pregnant women and their fetuses, newborns, the elderly, people with cancer, and those with impaired immune systems. Can cause fetal and infant death.

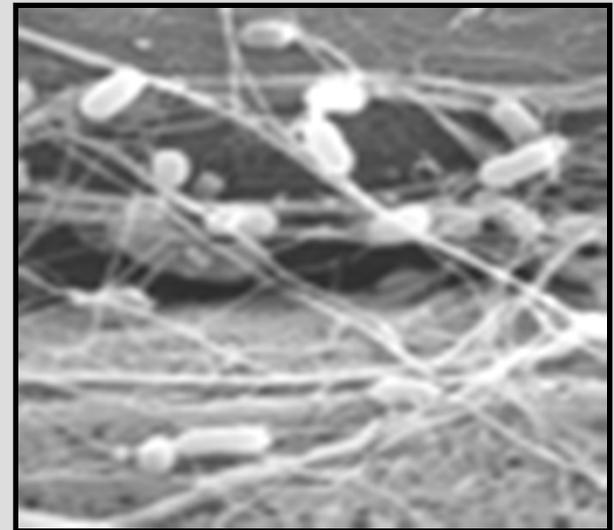


Food Contamination and Poisoning

E-coli O157:H7 - A bacterium that can produce a deadly toxin and causes approximately 73,000 cases of foodborne illness each year in the U.S. Sources: meat, especially undercooked or raw hamburger, produce and raw milk. Bacteria in diarrheal stools of infected persons can be passed from one person to another if hygiene or handwashing habits are inadequate.

Onset: Generally 2-5 days after eating.

Symptoms: Severe bloody diarrhea and abdominal cramps; sometimes the infection causes non-bloody diarrhea or no symptoms. Usually little or no fever is present, and the illness resolves in 5 to 10 days.

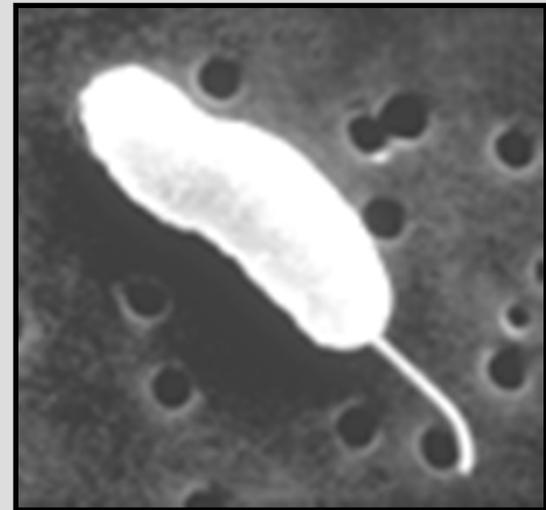


Food Contamination and Poisoning

Vibrio vulnificus - The bacteria live in coastal waters and can infect humans either through open wounds or through consumption of contaminated seafood. The bacteria are most numerous in warm weather.

Onset: Abrupt.

Symptoms: Chills, fever, and/or prostration. At high risk are people with liver conditions, low gastric (stomach) acid, and weakened immune systems.



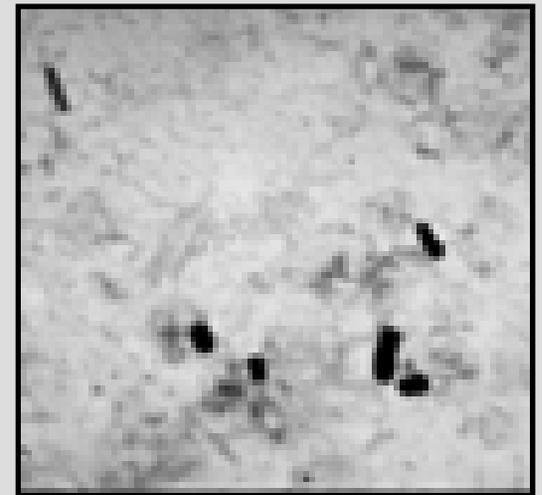
Food Contamination and Poisoning

Botulism – A life-threatening illness that can prevent the breathing muscles from moving air in and out of the lungs. The spores are heat resistant and can survive in foods that are incorrectly or minimally processed. Most of the small number of outbreaks reported annually in the U.S. are associated with inadequately processed, home-canned foods, but occasionally commercially-produced foods have been involved in outbreaks. Sources: home-prepared foods and herbal oils; honey should not be fed to children less than 12 months old.

Onset: Generally 4-36 hours after eating.

Symptoms: Neurotoxic symptoms, including double vision, inability to swallow, speech difficulty, and progressive paralysis of the respiratory system.

Get Medical Help Immediately. Botulism Can Be Fatal.



Foods Most Associated with Foodborne Illness

Raw foods of animal origin are the most likely to be contaminated; that is, raw meat and poultry, raw eggs, unpasteurized milk, and raw shellfish.

Because filter-feeding shellfish strain microbes from the sea over many months, they are particularly likely to be contaminated if there are any pathogens in the seawater. Food that mingles the products of many individual animals, such as bulk raw milk, pooled raw eggs, or ground beef, are particularly hazardous because a pathogen present in any one of the animals may contaminate the whole batch.

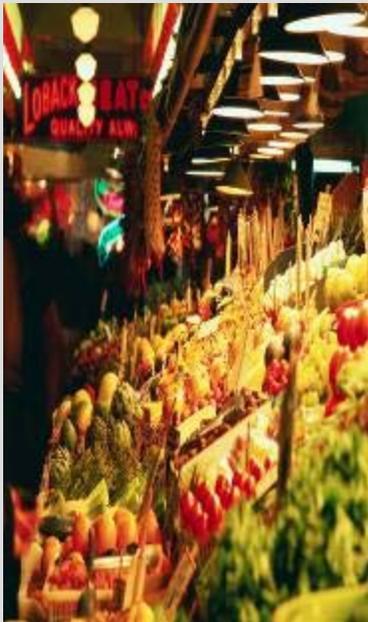


Foods Most Associated with Foodborne Illness

A single hamburger may contain meat from hundreds of animals. A single restaurant omelet may contain eggs from hundreds of chickens. A glass of raw milk may contain milk from hundreds of cows. A broiler chicken carcass can be exposed to the drippings and juices of many thousands of other birds that went through the same cold water tank after slaughter.



Foods Most Associated with Foodborne Illness



Fruits and vegetables consumed raw are a particular concern. Washing can decrease but not eliminate contamination, so consumers can do little to protect themselves. Recently, a number of outbreaks have been traced to fresh fruits and vegetables that were processed under less than sanitary conditions. These outbreaks show that the quality of the water used for washing and chilling the produce after it is harvested is critical. Using water that is not clean can contaminate many boxes of produce. Fresh manure used to fertilize vegetables can also contaminate them. Unpasteurized fruit juice can also be contaminated if there are pathogens in or on the fruit that is used to make it.



Prevention

A few simple precautions can reduce the risk of food poisoning:

- Carefully wash your hands and clean dishes, utensils, and cutting boards.
- Cook meat, poultry and eggs thoroughly. Use a thermometer to measure the internal temperature of meat. Cook beef to at least 160°F, poultry to at least 180°F, and fish to at least 140°F. Eggs should be cooked until the yolk is firm.
- Do not cross-contaminate one food with another. Do not place cooked meat or fish back onto the same plate or container that held the raw meat. Put cooked meat on a clean platter.
- Wash produce. Rinse fresh fruits and vegetables in running tap water to remove visible dirt and grime. Remove and discard the outermost leaves of a head of lettuce or cabbage.
- Refrigerate leftovers promptly. Keep the refrigerator set to around 40°F and your freezer at or below 0°F. Do not eat meat, poultry, or fish that has been refrigerated uncooked for longer than 1 to 2 days.
- Do not use outdated foods, packaged food with a broken seal, or cans that are bulging or have a dent.
- Do not use foods that have an unusual odor or a spoiled taste.

Prevention

Other steps to take:

- If you take care of young children, wash your hands often and dispose of diapers carefully so that bacteria can't spread to other surfaces or people.
- If you make canned food at home, be sure to follow proper canning techniques to prevent botulism.
- Do not feed honey to children under 1 year of age.
- Do not eat wild mushrooms.
- When traveling where contamination is more likely, eat only hot, freshly cooked food. Drink water only if it's been boiled. Do not eat raw vegetables or unpeeled fruit.
- Do not eat shellfish exposed to red tides.
- If you are pregnant or have a weakened immune system. Do not eat soft cheeses, especially imported from countries outside the U.S.

Eating in Restaurants

You can protect yourself by choosing which restaurant to patronize. Restaurants are inspected by the local health department to make sure they are clean and have adequate kitchen facilities. Find out how restaurants did on their most recent inspections and use that score to help guide your choice. In many jurisdictions, the latest inspection score is posted in the restaurant. Some restaurants have specifically trained their staff in principles of food safety. This is also good to know in deciding which restaurant to patronize.



Eating in Restaurants

You can also protect yourself from foodborne disease when ordering specific goods, just as you would at home. When ordering a hamburger, ask for it to be cooked to a temperature of 160°F and send it back if it is still pink in the middle. Before you order something that is made with many eggs pooled together, such as scrambled eggs, omelets or French toast, ask the waiter whether it was made with pasteurized egg and choose something else if it was not.



Send the burger back if it's still pink in the middle!

Treatment

You will usually recover from the most common types of food poisoning within a couple of days. The goal is to make you feel better and avoid dehydration. Drink any fluid (except milk or caffeinated beverages) to replace fluids lost by diarrhea and vomiting. Children should be given electrolyte drinks (sold in drugstores). Do not eat solid foods until the diarrhea has passed, and avoid dairy, which can worsen diarrhea.

If you have diarrhea and are unable to drink fluids (for example, due to nausea or vomiting), you may need medical attention and intravenous fluids. This is especially true for young children.

If you have eaten toxins from mushrooms or shellfish, you will need to be seen right away. The emergency room doctor will take steps to empty out your stomach and remove the toxin.

Possible Complications

Full recovery from the most common types of food poisoning usually occurs within 12 and 48 hours. Serious complications can arise, however, from certain types of food poisoning.

Dehydration is the most common complication. This can occur from any of the causes of food poisoning.

Less common but much more serious complications include:

- Respiratory distress, including the need for support on a breathing machine (botulism)
- Kidney problems (Shigella, E. coli)
- Bleeding disorders (E. coli and others)
- Arthritis (Yersinia and Salmonella)
- Nervous system disorders (Botulism, Campylobacter)
- Death – 50% of people with mushroom or certain fish poisonings (like puffer fish) die and 10% with botulism

When to Contact a Medical Professional

Call your doctor if:

- You have diarrhea and are unable to drink fluids due to nausea or vomiting.
- You are on diuretics and have diarrhea, nausea, or vomiting.
- Diarrhea lasts for more than 2 to 3 days.
- There is blood in your stools.
- You have a fever over 101°F.

Call 911 if:

- You have signs of dehydration (thirsty, dizzy, lightheaded, faint).
- Bleeding is excessive or your stools are maroon or black.
- You are short of breath or having trouble breathing.

Course Review

Self-Test

Course Review Self-Test

1. True or False – An estimated 76 million cases of foodborne disease occur each year in the United States.

True

[Click for answer](#)

Course Review Self-Test

2. Botulism is a very serious form of food poisoning that can be fatal.

True. It can come from improper home canning.

[Click for answer](#)

Course Review Self-Test

3. Food poisoning can affect one person or it can occur as an outbreak in a group of people who all ate the same contaminated food.

True

[Click for answer](#)

Course Review Self-Test

4. Foodborne microbes are only present in animals that are not healthy.

False. Many foodborne microbes are present in healthy animals raised for food.

[Click for answer](#)

Course Test

5. Lightly contaminated food left out overnight can be highly infectious the next day.

True

[Click for answer](#)

Course Review Self-Test

6. If food is heated to an internal temperature above 160°F, or 78°C, for even a few seconds, this is sufficient to kill most parasites, viruses or bacteria.

True

[Click for answer](#)

Course Test

7. A single hamburger may contain meat from hundreds of animals.

True

[Click for answer](#)

Course Test

8. An upset stomach is the most common complication from food poisoning.

False. Dehydration is the most common complication.

[Click for answer](#)

Food Contamination and Poisoning

End of Course

