



SERVSAFE[®] MANAGER 6th EDITION BOOK

CHAPTER 2



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chapter 2

Forms of Contamination



Shigella Outbreak

Sixteen guests and three catering hall staff got sick with *Shigella* spp. The guests were part of a large group of National Guard veterans at a reunion. They ate at a large and popular catering hall located in the southeastern United States.

Within one to three days after the catered event, reports began to come into the local regulatory authority. Those who had gotten sick reported very similar symptoms. Each had experienced stomach cramps, fever, and diarrhea. Three people went to the emergency room to seek treatment.

The specific food involved was never determined. But the regulatory authority confirmed that the outbreak was likely caused by the catering hall's lead cook. He was not feeling well the morning of the luncheon when he reported to work. He also had failed to wash his hands many times during his morning shift. The cook had prepped the food that was served at the luncheon.

The catering hall's owners and management team worked with the local regulatory authority to change procedures about staff illnesses. They also started an aggressive training program that focused on correct handwashing.

You Can Prevent This

Illnesses such as the one in the story above can be prevented if you understand how pathogens contaminate food. In this chapter, you will learn about the following topics.

- Biological, chemical, and physical contaminants and how to prevent them
- How to prevent the deliberate contamination of food
- How to respond to a foodborne-illness outbreak
- Common food allergens and how to prevent reactions to them



Biological, Chemical, and Physical Contaminants

One of the foodservice manager's most important roles is to prevent any type of contamination of food from occurring. Contamination is the presence of harmful substances in food. Those substances can be biological, chemical, or physical. Most contaminants cause foodborne illness. Others can result in physical injury.

How Contamination Happens

Contaminants come from a variety of places. Many contaminants are found in the animals we use for food. Others come from the air, contaminated water, and dirt. Some contaminants occur naturally in food, such as the bones in fish.

Food can be contaminated on purpose. But most food contamination happens accidentally. Most contaminants get into food and onto food-contact surfaces because of the way that people handle them. For example, food handlers who don't wash their hands after using the restroom may contaminate food and surfaces with feces from their fingers. Once the food that the food handler touched is eaten, a foodborne illness may result. This is called the fecal-oral route of contamination.

Food handlers can also pass on contaminants when they are in contact with a person who is ill. Some contaminants are passed very easily in any of these ways.

- From person to person
- Through sneezing or vomiting onto food or food-contact surfaces
- From touching dirty food-contact surfaces and equipment, and then touching food



Simple mistakes can result in contamination. For example, allowing ready-to-eat food to touch surfaces that have come in contact with raw meat, seafood, and poultry can lead to contamination. An example is shown in the photo at left. Storing food incorrectly or cleaning produce incorrectly can also lead to contamination. So can the failure to spot signs of pests in the establishment, because pests are a major source of disease.

Biological Contamination

Microorganisms are small, living organisms that can be seen only through a microscope. Many microorganisms are harmless, but some can cause illness. Harmful microorganisms are called pathogens. Some pathogens make you sick when you eat them. Others produce poisons—or toxins—that make you sick.

Understanding these biological contaminants is the first step to preventing foodborne-illness outbreaks. There are four types of pathogens that can contaminate food and cause foodborne illness. These are bacteria, viruses, parasites, and fungi.







Symptoms of Foodborne Illness

The symptoms of a foodborne illness vary, depending on which illness a person has. But most victims of foodborne illness share some common symptoms.

- Diarrhea
- Vomiting
- Fever
- Nausea
- Abdominal cramps
- Jaundice (a yellowing of the skin and eyes)

Not every person who is sick with a foodborne illness will have all of these symptoms. Nor are the symptoms of a foodborne illness limited to this list.

How quickly foodborne-illness symptoms appear in a person is known as the onset time of the illness. Onset times depend on the type of foodborne illness a person has. They can range from 30 minutes to as long as six weeks. How severe the illness is can also vary, from mild diarrhea to death.

Number of Cells	Time
 1 cell	0 min.
 2 cells	20 min.
 4 cells	40 min.
 8 cells	1 hr.
 16 cells	1 hr. 20 min.
 > 1 billion	10 hrs.

Bacteria

Bacteria that cause foodborne illness have some basic characteristics.

Location Bacteria can be found almost everywhere. They live in and on our bodies. Some types of bacteria keep us healthy, while others cause illness.

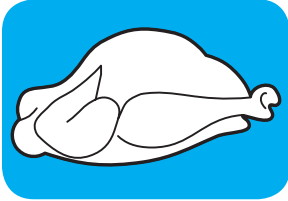
Detection Bacteria cannot be seen, smelled, or tasted.

Growth If FAT TOM conditions are correct, bacteria will grow in rapid numbers, as shown in the illustration at left.

Prevention The most important way to prevent bacteria from causing a foodborne illness is to control time and temperature.

What Bacteria Need to Grow

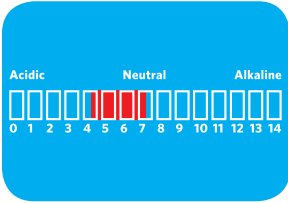
Bacteria need six conditions to grow. You can remember these conditions by thinking of the words FAT TOM.



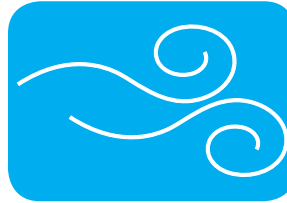
Food Most bacteria need nutrients to survive. TCS food supports the growth of bacteria better than other types of food.



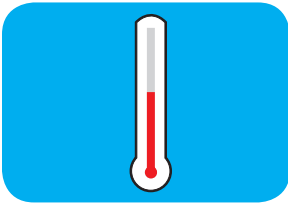
Time Bacteria need time to grow. The more time bacteria spend in the temperature danger zone, the more opportunity they have to grow to unsafe levels.



Acidity Bacteria grow best in food that contains little or no acid. pH is the measure of acidity. The pH scale ranges from 0 to 14.0. A value of 0 is highly acidic, while a value of 14 is highly alkaline. A pH of 7 is neutral. Bacteria grows best in food that is neutral to slightly acidic.



Oxygen Some bacteria need oxygen to grow. Others grow when oxygen is not there.



Temperature Bacteria grow rapidly between 41°F and 135°F (5°C and 57°C). This range is known as the temperature danger zone. Bacteria grow even more rapidly from 70°F to 120°F (21°C to 49°C). Bacteria growth is limited when food is held above or below the temperature danger zone.



Moisture Bacteria grow well in food with high levels of moisture. The amount of moisture available in food for this growth is called water activity (a_w). The a_w scale ranges from 0.0 to 1.0. The higher the value, the more available moisture in the food. For example, water has a water activity of 1.0.

You can help keep food safe by controlling FAT TOM. In your operation, however, you will most likely be able to control only time and temperature. To control temperature, you must do your best to keep TCS food out of the temperature danger zone. To control time, you must limit how long food spends in the temperature danger zone.

Major Bacteria that Cause Foodborne Illness

Many types of bacteria can cause a foodborne illness. The Food and Drug Administration (FDA) has identified three in particular that are highly contagious and can cause severe illness.

- *Salmonella Typhi*
- *Shigella* spp.
- Enterohemorrhagic and shiga toxin-producing *Escherichia coli*

Food handlers diagnosed with illnesses from these bacteria can **NEVER** work in a foodservice operation while they are sick.

Bacteria: *Salmonella Typhi* (SAL-me-NEL-uh TI-fee)

Source	Food Linked with the Bacteria	Prevention Measures
<i>Salmonella Typhi</i> lives only in humans. People with typhoid fever carry the bacteria in their bloodstream and intestinal tract. Eating only a small amount of these bacteria can make a person sick. The severity of symptoms depends on the health of the person and the amount of bacteria eaten. The bacteria are often in a person's feces for weeks after symptoms have ended.	<ul style="list-style-type: none"> • Ready-to-eat food • Beverages 	<ul style="list-style-type: none"> • Exclude food handlers who have been diagnosed with an illness caused by <i>Salmonella Typhi</i> from the operation. • Wash hands. • Cook food to minimum internal temperatures.

Bacteria: *Shigella* spp. (shi-GEL-uh)

Source	Food Linked with the Bacteria	Prevention Measures
<i>Shigella</i> spp. is found in the feces of humans with the illness. Most illnesses occur when people eat or drink contaminated food or water. Flies can also transfer the bacteria from feces to food. Eating only a small amount of these bacteria can make a person sick. High levels of the bacteria are often in a person's feces for weeks after symptoms have ended.	<ul style="list-style-type: none"> • Food that is easily contaminated by hands, such as salads containing TCS food (potato, tuna, shrimp, macaroni, and chicken) • Food that has made contact with contaminated water, such as produce 	<ul style="list-style-type: none"> • Exclude food handlers who have been diagnosed with an illness caused by <i>Shigella</i> spp. from the operation. • Exclude food handlers who have diarrhea from the operation. • Wash hands. • Control flies inside and outside the operation.

Bacteria: Enterohemorrhagic and shiga toxin-producing *Escherichia coli* (ess-chur-EE-kee-UH-KO-LI)

Source	Food Linked with the Bacteria	Prevention Measures
Enterohemorrhagic and shiga toxin-producing <i>E. coli</i> can be found in the intestines of cattle. It is also found in infected people. The bacteria can contaminate meat during slaughtering. Eating only a small amount of the bacteria can make a person sick. Once eaten, it produces toxins in the intestines, which cause the illness. The bacteria are often in a person's feces for weeks after symptoms have ended.	<ul style="list-style-type: none"> • Ground beef (raw and undercooked) • Contaminated produce 	<ul style="list-style-type: none"> • Exclude food handlers who have diarrhea or who have been diagnosed with a disease from the bacteria. • Cook food, especially ground beef, to minimum internal temperatures. • Purchase produce from approved, reputable suppliers. • Prevent cross-contamination between raw meat and ready-to-eat food.

Viruses

Viruses share some basic characteristics.

Location Viruses are carried by human beings and animals. They require a living host to grow. While viruses do not grow in food, they can be transferred through food and still remain infectious in food.

Sources People can get viruses from food, water, or any contaminated surface. Foodborne illnesses from viruses typically occur through fecal-oral routes. Norovirus is one of the leading causes of foodborne illness. It is often transmitted through airborne vomit particles.

Destruction Viruses are not destroyed by normal cooking temperatures. That's why it is important to practice good personal hygiene when handling food and food-contact surfaces. The quick removal and cleanup of vomit is also important.

Major Viruses that Cause Foodborne Illness

The FDA has identified two viruses in particular that are highly contagious and can cause severe illness.

- Hepatitis A
- Norovirus

Food handlers diagnosed with hepatitis A or Norovirus must not work in a foodservice operation while they are sick.

Virus: Hepatitis A

Source	Food Linked with the Virus	Prevention Measures
<p>Hepatitis A is mainly found in the feces of people infected with it. The virus can contaminate water and many types of food. It is commonly linked with ready-to-eat food. However, it has also been linked with shellfish from contaminated water.</p> <p>The virus is often transferred to food when infected food handlers touch food or equipment with fingers that have feces on them. Eating only a small amount of the virus can make a person sick. An infected person may not show symptoms for weeks but can be very infectious. Cooking does not destroy hepatitis A.</p>	<ul style="list-style-type: none"> • Ready-to-eat food • Shellfish from contaminated water 	<ul style="list-style-type: none"> • Exclude staff who have been diagnosed with hepatitis A from the operation. • Exclude staff who have jaundice from the operation. • Wash hands. • Avoid bare-hand contact with ready-to-eat food. • Purchase shellfish from approved, reputable suppliers.

Virus: Norovirus

Source	Food Linked with the Virus	Prevention Measures
<p>Like hepatitis A, Norovirus is commonly linked with ready-to-eat food. It has also been linked with contaminated water. Norovirus is often transferred to food when infected food handlers touch food or equipment with fingers that have feces on them.</p> <p>Eating only a small amount of Norovirus can make a person sick. It is also very contagious. People become contagious within a few hours after eating it. The virus is often in a person's feces for days after symptoms have ended.</p>	<ul style="list-style-type: none"> • Ready-to-eat food • Shellfish from contaminated water 	<ul style="list-style-type: none"> • Exclude staff who have been diagnosed with Norovirus from the operation. • Exclude staff with diarrhea and vomiting from the operation. • Wash hands. • Avoid bare-hand contact with ready-to-eat food. • Purchase shellfish from approved, reputable suppliers.

Parasites

Parasites share some basic characteristics.

Location Parasites require a host to live and reproduce.

Sources Parasites are commonly associated with seafood, wild game, and food processed with contaminated water, such as produce.

Prevention The most important way to prevent foodborne illnesses from parasites is to purchase food from approved, reputable suppliers. Cooking food to required minimum internal temperatures is also important. Make sure that fish that will be served raw or undercooked has been correctly frozen by the manufacturer.

Fungi

Fungi include yeasts, molds, and mushrooms. Some molds and mushrooms produce toxins that cause foodborne illness. Throw out all moldy food, unless the mold is a natural part of the food. Because harmful mushrooms are difficult to recognize, you must purchase all mushrooms from approved, reputable suppliers.

Biological Toxins

Most foodborne illnesses are caused by pathogens, a form of biological contamination. But you also must be aware of biological toxins or poisons that can make people sick.

Origin Some toxins are naturally associated with certain plants, mushrooms, and seafood. Toxins are a natural part of some fish. Other toxins, such as histamine, are made by pathogens on the fish when it is time-temperature abused. This can occur in tuna, bonito, mackerel, and mahimahi. Some fish become contaminated when they eat smaller fish that have eaten a toxin. One of these toxins is the ciguatera toxin. It can be found in barracuda, snapper, grouper, and amberjack. Shellfish, such as oysters, can be contaminated when they eat marine algae that have a toxin.

Symptoms Many types of illnesses can occur from eating seafood toxins. Each of these has specific symptoms and onset times. In general, however, people will experience an illness within minutes of eating the toxin. Depending upon the illness, symptoms can include diarrhea or vomiting. Neurological symptoms may also appear, such as tingling in the extremities and the reversal of hot and cold sensations. People may also experience flushing of the face, difficulty breathing, burning in the mouth, heart palpitations, and hives.

Prevention Toxins cannot be destroyed by cooking or freezing. The most important way to prevent a foodborne illness is to purchase plants, mushrooms, and seafood from approved, reputable suppliers. It is also important to control time and temperature when handling raw fish.

Other Pathogens

The pathogens discussed throughout this chapter are not the only ones that can cause a foodborne illness. See the appendix for a comprehensive list of pathogens that can affect food safety.

Chemical Contaminants

Many people have gotten sick after consuming food and beverages contaminated with foodservice chemicals. To keep food safe, follow these guidelines.



Sources Chemicals can contaminate food if they are used or stored the wrong way. Cleaners, sanitizers, polishes, machine lubricants, and pesticides can be risks. Also included are deodorizers, first-aid products, and health and beauty products, such as hand lotions and hairsprays. Certain types of kitchenware and equipment can be risks for chemical contamination. These include items made from pewter, copper, zinc, and some types of painted pottery. An example is shown at left. These materials are not food grade and can contaminate food. This is especially true when acidic food, such as tomato sauce, is held in them.

Symptoms Symptoms vary depending on the chemical consumed. Most illnesses occur within minutes. Vomiting and diarrhea are typical. If an illness is suspected, call the emergency number in your area and the Poison Control number. Consult the chemical's Material Safety Data Sheet (MSDS), which contains important safety information about the chemical.

Prevention The chemicals you use must be approved for use in a foodservice operation. They must also be necessary for the maintenance of the facility. Here are some ways to protect food and food-contact surfaces from contamination by chemicals.

- Purchase chemicals from approved, reputable suppliers.
- Store chemicals away from prep areas, food-storage areas, and service areas. Chemicals must be separated from food and food-contact surfaces by spacing and partitioning. Chemicals must **NEVER** be stored above food or food-contact surfaces.
- Use chemicals for their intended use and follow manufacturer's directions.
- Only handle food with equipment and utensils approved for foodservice use.
- Make sure the manufacturer's labels on original chemical containers are readable, as shown in the photo at left.
- Keep MSDS current, and make sure they are accessible to staff at all times.
- Follow the manufacturer's directions and local regulatory requirements when throwing out chemicals.



Physical Contaminants

Food can become contaminated when objects get into it. It can also happen when natural objects are left in food, like bones in a fish fillet.

Sources Some common objects that can get into food include metal shavings from cans, wood, fingernails, staples, bandages, glass, jewelry, and dirt. Naturally occurring objects, such as fruit pits and bones, can also be contaminants.

Symptoms Mild to fatal injuries are possible. This could include cuts, dental damage, and choking. Bleeding and pain may be the most outward symptoms.

Prevention Purchase food from approved, reputable suppliers to prevent physical contamination. Closely inspect the food you receive. Take steps to make sure no physical contaminants can get into it. This includes making sure that food handlers practice good personal hygiene.

Apply Your Knowledge

Which Ones Are Contaminants?

Write an **X** next to each item that can be a physical contaminant.

①



②



③



For answers, please turn to page 2.25.

Apply Your Knowledge

What's Wrong with This Picture?

Write an **X** next to each picture that shows an unsafe practice when handling chemicals.

① _____



② _____



③ _____



What Have I Got?

Write an **X** next to the most common symptoms of foodborne illness.

① _____ Headache

⑤ _____ Vomiting

② _____ Diarrhea

⑥ _____ Nausea

③ _____ Muscle pain

⑦ _____ Jaundice

④ _____ Fever

⑧ _____ Sweating

What's It Stand For?

Each letter below stands for a condition that supports the growth of pathogens. Complete the word for each letter in the space provided.

① F _____

④ T _____

② A _____

⑤ O _____

③ T _____

⑥ M _____

For answers, please turn to page 2.25.

Apply Your Knowledge

Who Am I?

Identify the pathogen from the description given and write its name in the space provided.

① _____

- I am commonly linked with ready-to-eat food.
- I am found in the feces of infected people.
- Excluding staff with jaundice can stop me.
- Handwashing can prevent me.

② _____

- I am carried in the bloodstream and intestinal tract of humans.
- I am commonly linked with beverages and ready-to-eat food.
- Cooking food correctly can prevent me.
- Washing hands can stop me.

③ _____

- I am found in the intestines of cattle.
- I produce toxins in a person's intestines.
- Excluding staff with diarrhea can stop me.
- Cooking ground beef correctly can stop me.

④ _____

- Flies can spread me.
- I am linked to salads containing TCS food.
- I am found in the feces of infected people.
- Excluding staff with diarrhea can stop me.

What's the Best Way to Control Them?

Write the letter of the most important prevention measure for each pathogen in the space provided. Some letters may be used more than once.

① _____ Bacteria

Ⓐ Control time and temperature

② _____ Viruses

Ⓑ Practice correct personal hygiene

③ _____ Parasites

Ⓒ Purchase from approved, reputable suppliers

④ _____ Fungi

⑤ _____ Plant toxins

⑥ _____ Mushroom toxins

⑦ _____ Seafood toxins

For answers, please turn to page 2.25.



Deliberate Contamination of Food

So far, you have learned about methods to prevent the accidental contamination of food. But you also must take steps to stop people who are actually trying to contaminate it. This may include the following groups.

- Terrorists or activists
- Disgruntled current or former staff
- Vendors
- Competitors

These people may try to tamper with your food using biological, chemical, or physical contaminants. They may even use radioactive materials. Attacks might occur anywhere in the food supply chain. But they are usually focused on a specific food item, process, or business.

The best way to protect food is to make it as difficult as possible for someone to tamper with it. For this reason, a food defense program should deal with the points in your operation where food is at risk. The FDA has created a tool that can be used to develop a food defense program. It is based on the acronym A.L.E.R.T. It can be used to help you identify the points in your operation where food is at risk.

Assure Make sure that products you receive are from safe sources.

- Supervise product deliveries.
- Use approved suppliers who practice food defense.
- Request that delivery vehicles are locked or sealed.

Look Monitor the security of products in the facility.

- Limit access to prep and storage areas. Locking storage areas is one way to do this, as shown in the photo at left.
- Create a system for handling damaged products.
- Store chemicals in a secure location.
- Train staff to spot food defense threats.

Employees Know who is in your facility.

- Limit access to prep and storage areas.
- Identify all visitors, and verify credentials.
- Conduct background checks on staff.



Reports Keep information related to food defense accessible.

- Receiving logs
- Office files and documents
- Staff files
- Random food defense self-inspections

Threat Identify what you will do and who you will contact if there is suspicious activity or a threat at your operation.

- Hold any product you suspect to be contaminated.
- Contact your regulatory authority immediately.
- Maintain an emergency contact list.

Something to Think About...

The 1984 Rajneeshee Bioterror Attack

In the fall of 1984, the single largest bioterrorist attack in the United States occurred in Oregon. It was carried out by members of a cult who had hoped to influence the turnout of a local election. They sprinkled *Salmonella* Typhi on salad bars at 10 local restaurants. As a result, over 750 people got sick, with 45 being hospitalized. The victims suffered from symptoms including fever, chills, diarrhea, nausea, and vomiting. Most had abdominal pain, diarrhea, and bloody stools. Fortunately, there were no fatalities.

Those responsible for the attacks spread a liquid containing the pathogen over the food on the salad bars. They also poured the liquid into the salad dressing.

Apply Your Knowledge

The Best Defense

Write an **X** next to the practices that may be a risk to food defense.

- ① _____ Allowing delivery drivers to store products in coolers
- ② _____ Purchasing produce from local farmers markets
- ③ _____ Giving tours of the kitchen to the general public
- ④ _____ Giving staff access to all storage areas
- ⑤ _____ Installing a screen door at the back of the establishment to allow cool air inside
- ⑥ _____ Allowing vendors to deliver food from trucks that have been unlocked
- ⑦ _____ Locking storage areas
- ⑧ _____ Holding products you suspect are contaminated
- ⑨ _____ Storing chemicals in a locked storage area
- ⑩ _____ Limiting access to prep areas

For answers, please turn to page 2.25.



Responding to a Foodborne-Illness Outbreak

Despite your best efforts, a foodborne-illness outbreak may occur. Here are some things you should consider when responding to an outbreak.

Gathering information Ask the person making the complaint for general contact information and to identify the food that was eaten. Also ask for a description of symptoms and when the person first became sick.

Notifying authorities Contact the local regulatory authority if you suspect an outbreak.

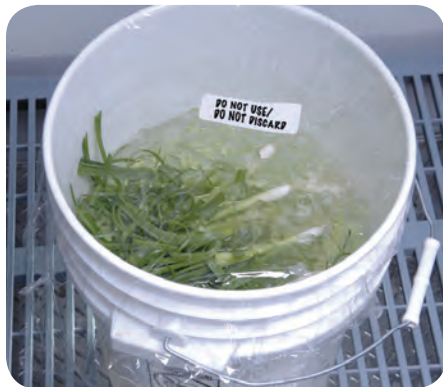
Segregating product Set the suspected product aside if any remains. Include a label with Do Not Use and Do Not Discard on it, as shown in the photo at left.

Documenting information Log information about the suspected product. This might include a product description, production date, and lot number. The sell-by date and pack size should also be recorded.

Identifying staff Maintain a list of food handlers scheduled at the time of the suspected contamination. These staff members may be subject to an interview and sampling by investigators. They should also be interviewed immediately by management about their health status.

Cooperating with authorities Cooperate with regulatory authorities in the investigation. Provide appropriate documentation. You may be asked to provide temperature logs, HACCP documents, staff files, etc.

Reviewing procedures Review food handling procedures to identify if standards are not being met or procedures are not working.



Apply Your Knowledge

What Did Phillip Do Wrong?

Read the story below and determine what Phillip did wrong.

Phillip was the kitchen manager at Stacy's on 44, a diner just off of Route 44 in upstate Wisconsin. His boss, the owner/operator, had taken the day off to visit her family. So, on Monday afternoon, Philip was the manager on duty.

Just after the lunch shift slowed down, the calls began to come in. Customers were complaining that they had gotten sick after eating at the diner on Saturday. The cashier turned over the phone calls to Philip. He became a little panicked after the third call came in.

Callers told Phillip that they were experiencing diarrhea and fever. Many complained about severe vomiting as well. All of the callers had eaten the meat loaf platter. Phillip didn't know what to say. He asked them to call back the next day when the owner could help. Phillip tried to reach the owner, but his calls went straight to voice mail.

Phillip tried to remember who was working on Saturday. He thought about the ingredients in the meat loaf and what might have happened. Just as he was about to write some information down, a health inspector arrived. The inspector told Phillip that they had received illness complaints from customers who had eaten at the diner. The inspector asked Philip what information he had received from the customers who had gotten sick. He also advised Phillip that they should work together to identify the source and take action immediately. Philip said he didn't know what had happened and that he was just the kitchen manager covering the shift for his boss. He told the inspector to come back on Tuesday when the owner would be back.

What did Philip do wrong?

For answers, please turn to page 2.26.



Food Allergens

A food allergen is a protein in a food or ingredient that some people are sensitive to. These proteins occur naturally. When enough of an allergen is eaten, an allergic reaction can occur. There are specific signs that a customer is having an allergic reaction. To protect your customers, you should be able to recognize these signs and know what to do. You also should know the types of food that most often cause allergic reactions to help prevent them from happening.

Allergy Symptoms

Depending on the person, an allergic reaction can happen just after the food is eaten or several hours later. This reaction could include some or all of these symptoms.

- Nausea
- Wheezing or shortness of breath
- Hives or itchy rashes, as shown in the photo at left
- Swelling of various parts of the body, including the face, eyes, hands, or feet
- Vomiting and/or diarrhea
- Abdominal pain



Initially symptoms may be mild, but they can become serious quickly. In severe cases, anaphylaxis—a severe allergic reaction that can lead to death—may result. If a customer is having an allergic reaction to food, call the emergency number in your area.

Common Food Allergens

Many food items can cause an allergic reaction. You and your staff must be aware of the most common food allergens and the menu items that contain them.

These food items are responsible for the majority of food allergies and can cause severe allergic reactions.

- | | |
|--|---|
| • Milk | • Wheat |
| • Eggs | • Soy |
| • Fish | • Peanuts |
| • Shellfish, including lobster, shrimp, and crab | • Tree nuts, such as almonds, walnuts, and pecans |

Preventing Allergic Reactions

Both service staff and kitchen staff need to do their parts to avoid serving food that can cause an allergic reaction. Note that these policies would also apply to addressing a food sensitivity that a customer mentions (for example, a gluten intolerance).

Service Staff

Your staff should be able to tell customers about menu items that contain potential allergens. At minimum, have one person available per shift to answer customers' questions about menu items. When customers say they have a food allergy, your staff should take it seriously. They must be able to do the following.

Describing dishes Tell customers how the item is prepared. Sauces, marinades, and garnishes often contain allergens. For example, peanut butter is sometimes used as a thickener in sauces or marinades. This information is critical to a customer with a peanut allergy.

Identifying ingredients Identify any "secret" ingredients. For example, your operation may have a house specialty that includes an allergen. While you may not want to share the recipe with the public, staff must be able to tell the secret ingredient to a customer who asks.

Suggesting items Suggest simple menu items. Complex items such as casseroles, soups, and some desserts may contain many ingredients. These can be difficult to fully describe to customers.

Delivering food Food should be hand-delivered to guests with allergies. Delivering food separately from the other food delivered to a table, as shown in the photo at left, will help prevent contact with food allergens.



Kitchen Staff

Staff must make sure that allergens are not transferred from food containing an allergen to the food served to the customer. This is called cross-contact. Here are a few examples of how it can happen.

- Cooking different types of food in the same fryer oil can cause cross-contact. In the photo at left, shrimp allergens could be transferred to the chicken being fried in the same oil.
- Putting food on surfaces that have touched allergens can cause cross-contact. For example, putting chocolate chip cookies on the same parchment paper that was used for peanut butter cookies can transfer some of the peanut allergen.





How to Avoid Cross-Contact

- Wash, rinse, and sanitize cookware, utensils, and equipment after handling a food allergen. For example, the tongs used to sauté a dish containing slivered almonds in the photo at left are then washed, rinsed, and sanitized before being reused.
- Wash your hands and change gloves before prepping food.
- Use separate fryers and cooking oils when frying food for customers with food allergies.
- Prep food for customers with food allergies in a separate area from other food.
- Label food packaged on site for retail sale. Name all major allergens on the label and follow any additional labeling requirements.

Apply Your Knowledge

Identify the Symptoms

Write an **X** next to the symptoms that could indicate a customer is having an allergic reaction.

- | | | |
|--------------------|----------------------------|---------------------------------|
| ① _____ Nausea | ⑥ _____ Hives | ⑪ _____ Shortness of breath |
| ② _____ Bruising | ⑦ _____ Swollen face | ⑫ _____ Tightening in the chest |
| ③ _____ Sneezing | ⑧ _____ Abdominal pain | ⑬ _____ Tingling in arms |
| ④ _____ Coughing | ⑨ _____ Swollen abdomen | ⑭ _____ Diarrhea |
| ⑤ _____ Itchy rash | ⑩ _____ Increased appetite | |

The Most Common Food Allergens

Write an **X** next to a food if it is or has a common food allergen.

- | | | |
|-----------------------|-----------------------|--------------------------------|
| ① _____ Tea | ⑦ _____ Potatoes | ⑬ _____ Squash and eggplant |
| ② _____ Cod | ⑧ _____ Mushrooms | ⑭ _____ Soybeans |
| ③ _____ Wheat flour | ⑨ _____ Tomatoes | ⑮ _____ Rice and rice products |
| ④ _____ Melons | ⑩ _____ Pecan pie | ⑯ _____ Omelet |
| ⑤ _____ Peanut butter | ⑪ _____ Citrus fruit | ⑰ _____ Vanilla ice cream |
| ⑥ _____ Crab legs | ⑫ _____ Green peppers | |

For answers, please turn to page 2.26.

Chapter Summary

- Contamination is the presence of harmful substances in food. Those substances can be biological, chemical, or physical.
- Pathogens are disease-causing microorganisms that make you sick when you eat them. Others produce poisons—or toxins—that make you sick. There are four types of pathogens that can contaminate food and cause foodborne illness. These are viruses, bacteria, parasites, and fungi.
- Some common symptoms of foodborne illness include diarrhea, vomiting, fever, nausea, abdominal cramps, and jaundice. Onset times will depend on the type of foodborne illness a person has.
- Bacteria cannot be seen, smelled, or tasted. If conditions are correct, bacteria will grow rapidly. The most important prevention measure is to control time and temperature. Bacteria need six conditions to grow. They can be remembered by the word FAT TOM. It stands for food, acidity, temperature, time, oxygen, and moisture. You will most likely be able to control only time and temperature.
- *Salmonella* Typhi, *Shigella* spp., and enterohemorrhagic and shiga toxin-producing *Escherichia coli* are highly contagious and can cause severe illness. Food handlers diagnosed with illnesses from these bacteria can never work in a foodservice operation while they are sick.
- Viruses require a host to grow. People can get viruses from food, water, or contaminated surfaces. Many viruses are transferred through the fecal-oral route. Most are not destroyed by normal cooking temperatures. That's why it's important to practice good personal hygiene when handling food and food-contact surfaces.
- Hepatitis A and Norovirus are highly contagious and can cause severe illness. Food handlers diagnosed with illnesses from these viruses can never work in a foodservice operation while they are sick.
- Parasites require a host to live and reproduce. They are commonly associated with seafood and food processed with contaminated water. The most important measure for preventing parasites from causing a foodborne illness is to purchase food from approved, reputable suppliers. Fungi include mold, yeasts, and mushrooms. Like parasites, they are prevented by purchasing food from approved, reputable suppliers.
- Some toxins cannot be destroyed by cooking or freezing. The most important way to prevent a foodborne illness is to purchase plants, mushrooms, and seafood from approved, reputable suppliers. It is also important to control time and temperature when handling raw fish.

- Chemical contaminants include toxic metals, cleaners, sanitizers, polishes, and machine lubricants. To help prevent chemical contamination, store chemicals away from prep areas, food storage areas, and service areas. Always follow the manufacturers' directions when using chemicals.
- Physical contamination can happen when objects get into food. Naturally occurring objects, such as bones in a fish fillet, are a physical hazard. Closely inspect the food you receive. Make sure no physical contaminants can get into it at any point during the flow of food.
- People may try to tamper with food using biological, chemical, physical, or even radioactive contaminants. The key to protecting food is to make it hard for someone to tamper with it.
- A food allergen is a naturally occurring protein in a food or ingredient that some people are sensitive to. The most common food allergens include milk, eggs, fish, shellfish, wheat, soy, peanuts, and tree nuts. Service staff must be able to tell customers about menu items that contain potential allergens. Kitchen staff must make sure that allergens are not transferred from food containing an allergen to the food served to the customer with allergies.

Chapter Review Case Study

Now, take what you have learned in this chapter and apply it to the following case study.

An e-mail alert had just come from company headquarters. It seemed that a foodborne-illness outbreak had occurred at two company operations in the southern district.

Byron was the general manager of the highest volume operation in the chain's northern district. When he got the e-mail alert, he became very concerned. All of the food, recipes, and food handling procedures were the same company-wide. All of the food products came from the company's central commissary. Recipes came down from the corporate chef. And, food safety policies and procedures were taught by the same instructors. Byron was worried. He wondered if something could happen in his operation. Because everything was done the same way company-wide, he was very concerned about a potential outbreak.

Byron decided to gather his team of managers and discuss what was going on. He filled them in on the details of the outbreak at the other stores. He then asked the team what they thought could be done to prevent it from occurring in their operation.

Byron's executive chef, Amelia, said that she would double-check if all of the food safety procedures were being followed by her staff. She also suggested taking a closer look at how they could set up barriers to foodborne illness. She suggested that they review FAT TOM.

Byron and the other managers looked at each other and wondered what she was talking about. Chef Amelia explained that the words FAT TOM were a good way of remembering the conditions bacteria need to grow. She said that if FAT TOM could be controlled, then foodborne illness could be prevented. She went on to explain what each letter of FAT TOM meant. The team began to work on a complete review of all the aspects of FAT TOM with Byron's and Amelia's supervision. They focused specifically on time and temperature control.

① What did Byron do correctly?

② Why was Chef Amelia's review of FAT TOM important in helping keep food safe in the operation?

For answers, please turn to page 2.26.

Study Questions

Circle the best answer to each question.

- ① **What are the most common symptoms of a foodborne illness?**
 - A Diarrhea, vomiting, fever, nausea, abdominal cramps, and dizziness
 - B Diarrhea, vomiting, fever, nausea, abdominal cramps, and headache
 - C Diarrhea, vomiting, fever, nausea, abdominal cramps, and jaundice
 - D Diarrhea, vomiting, fever, nausea, abdominal cramps, and tiredness
- ② **What is the most important way to prevent a foodborne illness from bacteria?**
 - A Control time and temperature.
 - B Prevent cross-contamination.
 - C Practice good personal hygiene.
 - D Practice good cleaning and sanitizing.
- ③ **Enterohemorrhagic and shiga toxin-producing *E. coli* are commonly linked with what type of food?**
 - A Potato salad
 - B Thick stews
 - C Dairy products
 - D Raw ground beef
- ④ **What is the most important way to prevent a foodborne illness from viruses?**
 - A Control time and temperature.
 - B Prevent cross-contamination.
 - C Practice good personal hygiene.
 - D Practice good cleaning and sanitizing.
- ⑤ **A guest called a restaurant and told the manager about getting sick after eating there. The guest complained of vomiting and diarrhea a few hours after eating the raw oysters. What pathogen probably caused the illness?**
 - A Norovirus
 - B *Shigella* spp.
 - C *Salmonella* Typhi
 - D Enterohemorrhagic and shiga toxin-producing *E. coli*

Continued on the next page ►

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- ⑥ Parasites are commonly linked with what type of food?
- A Rice
 - B Poultry
 - C Seafood
 - D Canned food
- ⑦ A guest had a reversal of hot and cold sensations after eating seafood. What most likely caused the illness?
- A Toxin
 - B Virus
 - C Bacteria
 - D Parasite
- ⑧ A food handler stored a sanitizer spray bottle on the shelf above the prep table that had just been sanitized. Throughout the day, the food handler used the sanitizer on the prep table, storing it in the same spot. What should the food handler have done differently?
- A Stored the sanitizer bottle away from the prep area
 - B Stored the sanitizer bottle on the floor between uses
 - C Stored the sanitizer bottle on the prep table between uses
 - D Stored the sanitizer bottle with food supplies below the prep table
- ⑨ To prevent the deliberate contamination of food, a manager should know who is in the facility, monitor the security of products, keep information related to food security on file, and know
- A when to register with the EPA.
 - B how to fill out an incident report.
 - C where to find MSDS in the operation.
 - D who to contact about suspicious activity.
- ⑩ What should food handlers do to prevent food allergens from being transferred to food?
- A Clean and sanitize utensils after use.
 - B Buy from approved, reputable suppliers.
 - C Store cold food at 41°F (5°C) or lower.
 - D Label chemical containers correctly.

For answers, please turn to page 2.26.

Answers**2.10 Which Ones Are Contaminants?**

1, 2, and 3 should be marked. The container of Chinese food in photo 1 has been stapled shut. The staple can easily end up in the food. The can opener has left metal shavings in the canned food in photo 2. The food handler is pulling out bones from a fish filet in photo 3. All of these are physical contaminants.

2.11 What's Wrong with This Picture?

1, 2, and 3 should be marked. The food handler in photo 1 is using the glass cleaner incorrectly by spraying it near food. The chemical spray bottle in photo 2 does not contain a label with the common name of the chemical. The chemicals in photo 3 are being stored above food.

2.11 What Have I Got?

2, 4, 5, 6, and 7 should be marked.

2.11 What's It Stand For?

- ① Food
- ② Acidity
- ③ Temperature
- ④ Time
- ⑤ Oxygen
- ⑥ Moisture

2.12 Who Am I?

- ① Hepatitis A
- ② *Salmonella* Typhi
- ③ Enterohemorrhagic and shiga toxin-producing *E. coli*
- ④ *Shigella* spp.

2.12 What's the Best Way to Control Them?

- ① A ⑤ C
- ② B ⑥ C
- ③ C ⑦ C
- ④ C

2.14 The Best Defense

1 thru 6 should be marked.

Continued on the next page ►

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2.16 What Did Philip Do Wrong?

- He failed to gather general contact information from the customers who called.
- He failed to notify the local regulatory authority of the suspected outbreak.
- He failed to segregate any suspected product.
- He failed to document information about the suspected product.
- He failed to identify staff who may have been in contact with the suspected product.
- He failed to cooperate with authorities.

2.19 Identify the Symptoms

1, 5, 6, 7, 8, 11, and 14 should be marked

2.19 The Most Common Food Allergens

2, 3, 5, 6, 10, 14, 16, and 17 should be marked

2.22 Chapter Review Case Study

① What did Byron do correctly?

- He was concerned about reports of foodborne illness from other company operations.
- He gathered his team to review food safety procedures and see if anything extra could be done to help keep food safe.

② Why was Chef Amelia's review of FAT TOM important in helping keep food safe in the operation?

- Bacteria need six conditions to grow which are represented by the six letters in the words, FAT TOM. They stand for Food, Acidity, Time, Temperature, Oxygen, and Moisture. Chef Amelia realized that by controlling FAT TOM in her operation, she could control the growth of bacteria. This could help prevent foodborne illness.
- You can help keep food safe by controlling FAT TOM. In most operations, however, you will most likely be able to control only time and temperature. To control temperature, you must do your best to keep TCS food out of the temperature danger zone. To control time, you must limit how long food spends in the temperature danger zone.

2.23 Study Questions

- | | | |
|-----|-----|-----|
| ① C | ⑤ A | ⑨ D |
| ② A | ⑥ C | ⑩ A |
| ③ D | ⑦ A | |
| ④ C | ⑧ A | |

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