

1.1

Sanitary Food Handling

READING PREVIEW

Key Concepts

- Learning the importance of food safety
- Developing good grooming and personal hygiene habits
- Cleaning and sanitizing
- Disposing of waste and recycling
- Controlling pests

Vocabulary

- bacteria
- biological hazards
- chemical hazards
- cross-contamination
- direct contamination
- foodborne illness
- fungi (fungus)
- parasites
- pathogen
- pest management
- physical hazards
- potentially hazardous foods
- safe foods
- sanitizing
- sanitizing solution
- temperature danger zone
- viruses
- water activity (Aw)

Food safety has become a global concern. Every individual working in the foodservice profession needs to take it seriously, every working minute.

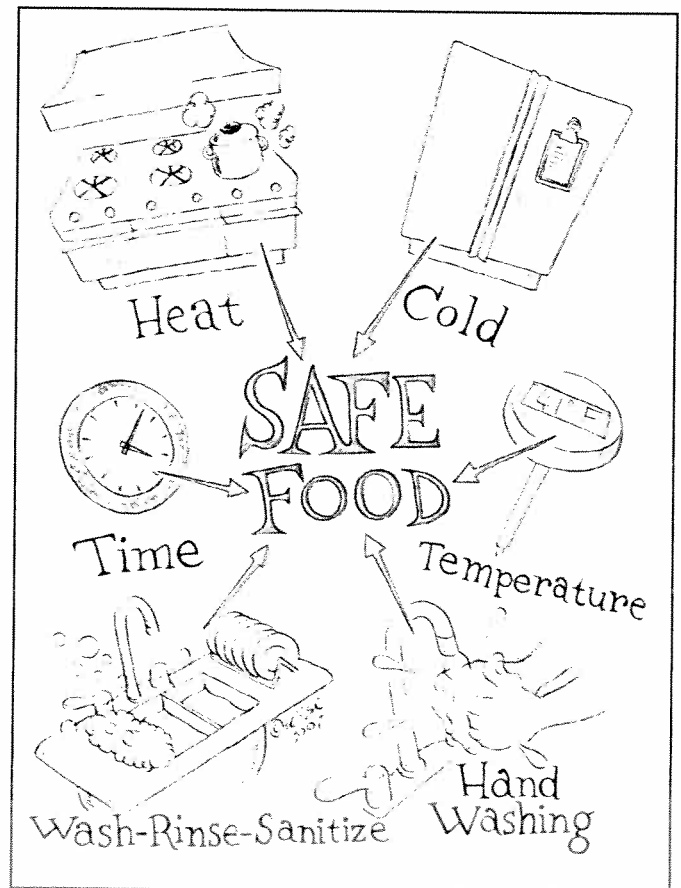
— Richard Vergili
The Culinary Institute of America

Importance of Food Safety

Safe foods are foods that won't make you sick or hurt you when you eat them. Unsafe foods, or foods that have been contaminated by various hazardous materials, can make you sick or injure you. An illness that results from eating contaminated foods is referred to as a **foodborne illness**.

Guests expect safe food when they come to a restaurant. They typically don't think about food safety. However, if a restaurant serves unsafe food and someone gets sick or hurt, the consequences can be enormous. Both the restaurant's profits and reputation can be hurt.

If someone can prove they got sick from eating unsafe food in a restaurant, they might sue. The incident could become public and the restaurant might be named in an unflattering news report.



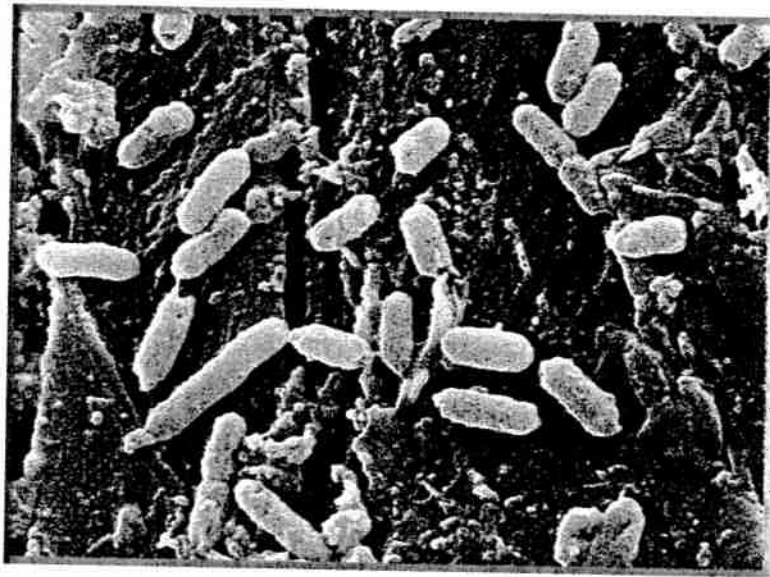


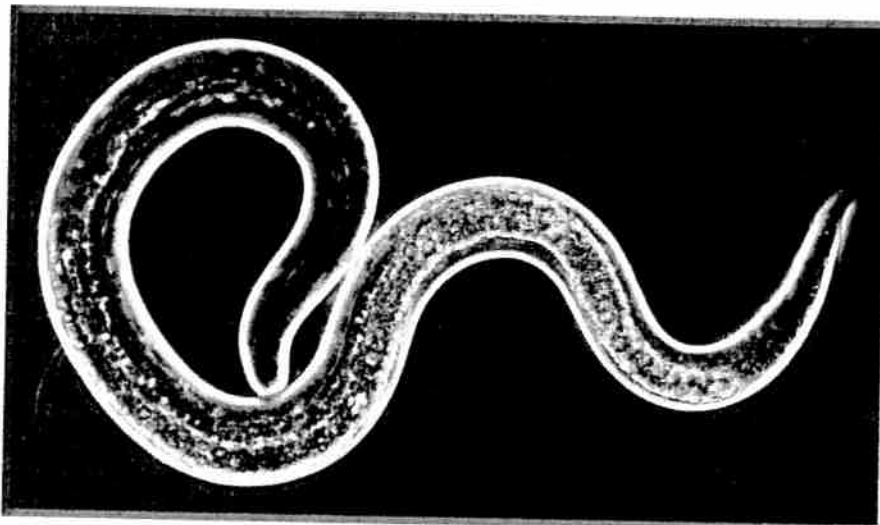
FIGURE 1-1
Bacteria

Magnified view of bacteria (rod shapes) on a cutting board.
Drawing Conclusions *What would happen to food cut on this cutting board?*

FIGURE 1-2
Roundworms (Parasite)

Pork is the most common vehicle for the foodborne roundworm *Trichinella spiralis*.

Applying Concepts *Why would you make certain there are no signs of pink color in cooked pork?*



If a restaurant is found to have served unsafe food, it might be charged more for insurance. When people feel your food is unsafe, they talk about it. They may stop coming and the restaurant will lose customers. Eventually, the business could fail.

Food-service establishments of all sorts, whether they are fine dining restaurants, diners, or cafeterias, have a responsibility to their customers and to themselves to serve safe foods. Cooks and chefs play a critical part in making

sure the foods their customers get are as safe and wholesome as can be. Taking a course in food safety, such as the “ServSafe Essentials” program from the Educational Foundation of the National Restaurant Association, teaches food handlers safe practices. Getting a certificate in food safety is an important part of your culinary education.

There are three potential hazards that can contaminate food and produce foodborne illnesses:

- Biological hazards
- Physical hazards
- Chemical hazards

Biological Hazards Biological hazards are the living organisms found in or on foods that can make us sick. There are four basic types of biological hazards:

- Bacteria
- Viruses
- Parasites
- Fungi (including molds)

Bacteria are single-celled organisms that can live in food or water and also on our skin or clothing. Not all bacteria make you sick. If there is only a very small amount of bacteria in or on food, the bacteria may not make you sick. However, a contaminated food contains a great many bacteria. It is the volume of bacteria in a contaminated food that makes us sick.

Viruses invade living cells, including those in foods. Once a virus invades a cell, it tricks the host into making another virus and the process continues. The living cell is known as the host for the virus. A virus needs a host in order to reproduce.

Parasites are multi-celled organisms that are far larger than either bacteria or viruses. Some are actually large enough to see without a microscope. Similar to bacteria, they reproduce on their own. But similar to a virus, they need a host to provide a home and nourishment. Parasites include roundworms, tapeworms, and various insects. When we eat foods that contain parasites, the eggs or larvae take up residence in our bodies.

Fungi can be single-celled or multi-celled organisms. (“Fungi” is the plural of “fungus.”) A mold is an example of a fungus you can find in foods. Yeast is another example. We rely on some molds and yeasts to produce foods such as cheese or bread. However, harmful molds can contaminate foods. As a fungus grows and reproduces, it creates by-products, including various toxins, alcohol, and gases that can cause foodborne illness or foodborne intoxication.

Physical Hazards If you find a hair, a piece of a food’s packaging, a bandage, or a piece of metal or glass in your food, you’ve found a physical hazard. **Physical hazards** are foreign objects, usually large enough to see or feel while you are eating. They are often responsible for injuries such as chipped teeth or cuts.

Chemical Hazards Cleaning compounds, bug sprays, food additives, and fertilizer are all examples of man-made **chemical hazards**. Any of these products, if not used properly, can contaminate food. Symptoms from eating chemically contaminated food can often be felt immediately and might include hives; swelling of the lips, tongue, and mouth; difficulty breathing or wheezing; and vomiting, diarrhea, and cramps.

Another chemical hazard involves toxic metals. Mercury and cadmium are toxic metals that have found their way into our food and water, often as a result of industrial pollution. The effects of these toxic metals can range from subtle symptoms to serious diseases.

CHEF’S TIP

MOLDY FOOD

Moldy food may not make you sick, but it has certainly started to spoil. Because molds can penetrate deeply into food without being visible, it is best to throw moldy foods away.



FIGURE 1-3
Moldy Tomato

Mold is a type of fungus found in spoiled food.

Drawing Conclusions Some kitchens cut off the moldy parts of food and use the remainder. Would you want to eat food from such a kitchen?

Biological Hazards

BACTERIA	Bacillus cereus	Found in: soil, foods Incubation*: 8 to 16 hours
Symptoms: cramps, diarrhea, nausea, vomiting	Foods: cereal products, cornstarch, rice, custards, sauces, meat loaf	Prevention: Cool hot foods quickly. Reheat foods evenly to 165°F. Don't store precooked foods in refrigerator for too long.

BACTERIA	Campylobacter jejuni	Found in: animals Incubation*: 3 to 5 days
Symptoms: diarrhea, fever, nausea, abdominal pain, headache	Foods: unpasteurized milk and dairy products, poultry, beef, pork, lamb	Prevention: Thoroughly cook food. Avoid cross-contamination.

BACTERIA	Clostridium botulinum	Found in: animals, water, soil Incubation*: 12 to 36 hours
Disease: Botulism Symptoms: blurred vision, cramps, diarrhea, difficulty breathing, central nervous system damage; fatality rate up to 70%	Foods: refrigerated or improperly canned foods; low-acid foods (spinach, tuna, green beans, beets, fermented foods), smoked products	Prevention: Maintain a high temperature while canning food. Boil 20 minutes before serving. Don't use food from swollen cans. Don't use home-canned food commercially.

BACTERIA	Clostridium perfringens	Found in: soil, dust, animals Incubation*: 9 to 15 hours
Symptoms: diarrhea, nausea, cramps, fever, vomiting	Foods: reheated meats, raw meat, raw vegetables, soups, gravies, stews	Prevention: Cool meat quickly. Reheat to 165°F. Avoid cross-contamination of raw meat and cooked meat.

BACTERIA	Escherichia coli (E. coli)	Found in: animals, humans Incubation*: 12 to 72 hours
Symptoms: nausea, vomiting, diarrhea	Foods: raw and undercooked ground beef and other meats, imported cheeses, unpasteurized milk	Prevention: Thoroughly cook ground beef. Avoid cross-contamination and fecal contamination. Practice strict personal hygiene.

* "Incubation" refers to the period between infection and onset of symptoms.

BACTERIA <i>Listeria monocytogenes</i> Found in: soil, water, humans, animals Incubation*: 1 day to 3 weeks		
Disease: Listeriosis Symptoms: nausea, vomiting, headache, fever, chills, backache, meningitis, miscarriage	Foods: unpasteurized milk and cheese, vegetables, poultry, meats, seafood, chilled ready-to-eat foods	Prevention: Use only pasteurized dairy products. Cook foods thoroughly. Avoid cross-contamination. Clean and disinfect surfaces. Avoid pooling of water.

BACTERIA <i>Salmonella</i> Found in: humans, animals, birds, insects Incubation*: 6 to 48 hours		
Disease: Salmonellosis Symptoms: headache, diarrhea, cramps, fever. Can lead to arthritis, meningitis, typhoid. May be fatal.	Foods: eggs, poultry, shellfish, meat, soup, sauces, gravies, milk products, warmed-over food	Prevention: Cook to proper temperatures and reheat leftovers to 165°F. Eliminate rodents and flies. Practice strict personal hygiene. Avoid cross-contamination.

BACTERIA <i>Shigella</i> Found in: humans, food, water Incubation*: 12 to 48 hours		
Disease: Shigellosis Symptoms: diarrhea, fever, cramps, dehydration	Foods: beans; contaminated milk; tuna, turkey, macaroni salads; apple cider; mixed moist foods	Prevention: Use safe water sources. Control insects and rodents. Practice strict personal hygiene.

BACTERIA <i>Staphylococcus aureus</i> (Staph) Found in: humans Incubation*: 2 to 4 hours		
Symptoms: vomiting, nausea, diarrhea, cramps	Foods: foods high in protein, moist, handled much, left too warm (milk, egg custards, turkey stuffing, chicken/tuna/potato salads, gravies, reheated foods)	Prevention: Store foods below 41°F and reheat thoroughly to 165°F. People with infected cuts, burns, or respiratory illnesses shouldn't handle food.

BACTERIA <i>Streptococcus pyogenes</i> Found in: animals, humans Incubation*: 1 to 4 days		
Symptoms: nausea, vomiting, diarrhea	Foods: milk, pudding, ice cream, eggs, meat pie, egg and potato salads, poultry	Prevention: Cook foods thoroughly and cool quickly. Practice strict personal hygiene. Use pasteurized dairy products.

*Incubation" refers to the period between infection and onset of symptoms.

Biological Hazards

VIRUS	Hepatitis A	Found in: humans, water Incubation*: 10 to 50 days	
Symptoms: jaundice, fever, cramps, nausea, lethargy	Foods: shellfish from polluted water, milk, whipped cream, cold cuts, potato salad	Prevention: Cook shellfish thoroughly, to over 150°F. Heat-treat or otherwise disinfect suspected water and milk. Practice strict personal hygiene.	

VIRUS	Norwalk virus	Found in: humans Incubation*: 24 to 48 hours	
Symptoms: nausea, vomiting, diarrhea, abdominal pain, headache, low-grade fever	Foods: raw shellfish, raw vegetable salads, prepared salads, water with fecal contamination	Prevention: Obtain shellfish from approved certified sources. Practice strict personal hygiene. Thoroughly cook foods. Use chlorinated water.	

PARASITE	Anisakidae (roundworms)	Found in: fish Incubation*: 1 hour to 2 weeks	
Disease: Anisakiasis Symptoms: nausea, cramps, fever, abscesses	Foods: raw or undercooked seafood	Prevention: Cook fish to a minimum of 140°F. Freeze fish for 24 hours. Purchase fish from reliable supplier.	

PARASITE	Giardia lamblia (protozoa)	Found in: humans, animals, soil, water Incubation*: 7 to 14 days	
Disease: Girardiasis Symptoms: diarrhea, cramps, nausea, weight loss	Foods: uncooked food, contaminated water or ice	Prevention: Practice strict personal hygiene. Use safe water sources. Wash raw fruits and vegetables well.	

PARASITE	Trichinella spiralis (roundworm)	Found in: swine, wild game, rats Incubation*: 4 to 28 days	
Disease: Trichinosis Symptoms: fever, diarrhea, sweating, muscle pain, vomiting, skin lesions	Foods: improperly cooked pork	Prevention: Cook pork to 150°F. Avoid cross-contamination of raw meats. If frying, cook to 170°F.	

FUNGUS	Mycotoxins	From: molds and yeasts Incubation*: Time varies	
Symptoms: hemorrhage, fluid buildup, cancer	Foods: moldy grains, corn, corn products, peanuts, pecans, walnuts, milk	Prevention: Keep grains and nuts dry.	

* "Incubation" refers to the period between infection and onset of symptoms.

FAT TOM Some foods offer a friendly environment for **pathogens**, disease-producing organisms. These foods are referred to as **potentially hazardous foods**. If these foods become contaminated, the pathogen will grow easily. When you know what a pathogen needs to grow, you can take steps to keep foods safe. “FAT TOM” stands for each of the conditions that pathogens need for growth.

Pathogens first need a food source in order to grow and reproduce. Meats, dairy products, fish, and eggs are rich in protein. Cooked beans, grains, pasta, and starchy vegetables are a food source for pathogens. They contain some protein as well as carbohydrates. Sweet foods, such as fruits, are also a good food source for pathogens.

Pathogens grow rapidly when conditions are right. The length of time they are permitted to grow is a major factor in determining whether there are enough pathogens to make you sick.

FAT TOM

Food

Acidity

Temperature

Time

Oxygen

Moisture

Food Allergies

People have allergies to a wide array of foods. Some have mild reactions; others can have severe, even fatal, reactions to certain foods.

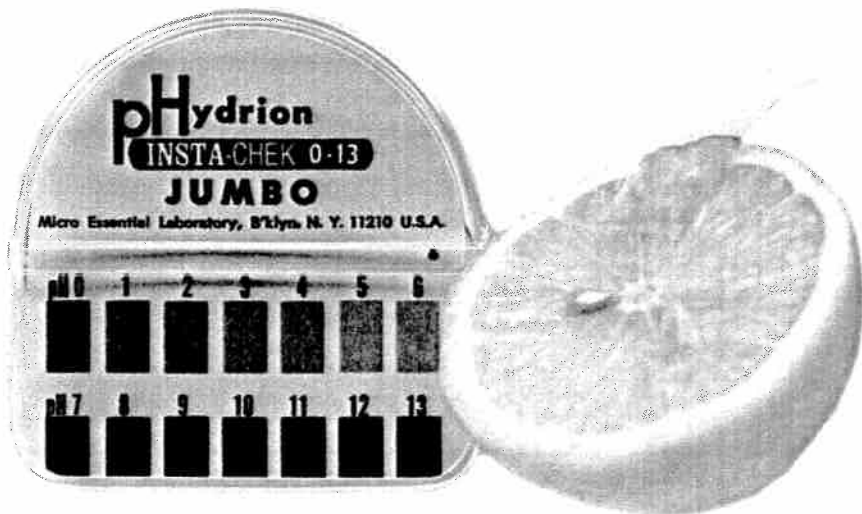
The following foods account for nearly 90 percent of allergic reactions:

- Milk
- Eggs
- Wheat
- Peanuts
- Soy
- Other nuts
- Fish/Shellfish

CULINARY SCIENCE

The pH Scale

Some foods, such as vinegar or citrus juice, are highly acidic. Others, such as baking soda, are alkaline. The acidity or alkalinity of a food is measured on the pH scale. On that scale, 0 to 7 is acidic and 7 to 14 is alkaline. A pH of 7 is neutral; this is the pH of distilled water. The most favorable pH range for pathogens to grow is between 4.6 and 7.5, a range into which most foods fall. To measure the pH of a substance, scientists used strips of specially treated paper that change color depending on the acidity or alkalinity of the substance.



Research

1. Research the pH of various common foods and condiments.
2. Research the development of the pH scale.

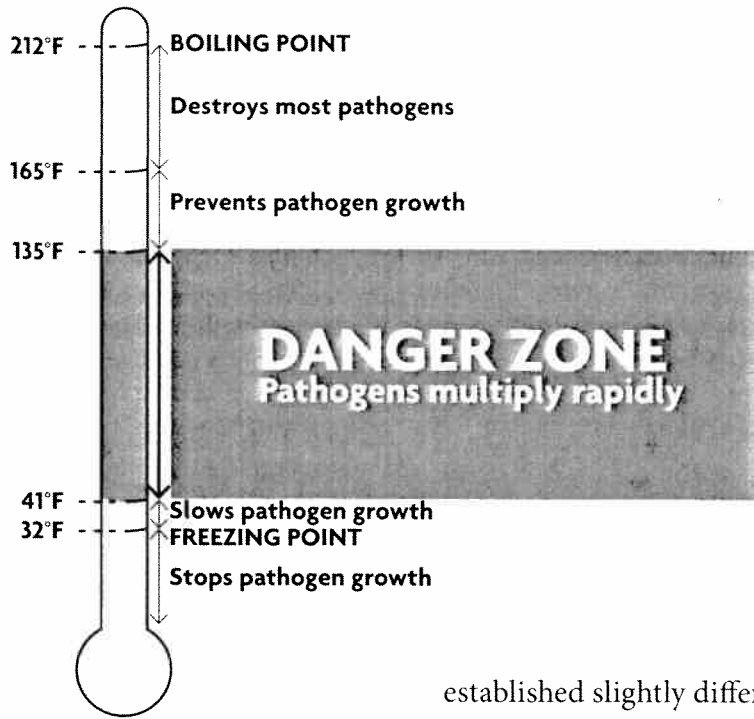


FIGURE 1-4
Temperature Danger Zone
Pathogens thrive and reproduce between 41°F and 135°F.
Predicting Why do you think chefs rapidly cool food to below 41°F as a preparation for storing the food?

Bacteria reproduce by dividing in two once the cell becomes large enough. One bacterium becomes two, two become four, and four become eight, and so on. A single bacterium can become nearly ten billion bacteria in just ten hours.

Pathogens also prefer to live in conditions that are warm, very similar to the conditions humans need to survive. They need foods that are at the right temperature. For most pathogens, a temperature close to our own body temperature of 98.6°F is desirable. However, pathogens can grow in temperatures from 41°F to 135°F. This range is known as the **temperature danger zone**. (Some states have

established slightly different ranges for the temperature danger zone.

Specific types of pathogens have specific oxygen requirements. Some pathogens need oxygen to stay alive, others do not, and others can live with or without oxygen.


Water activity (abbreviated as Aw) is a measurement of the amount of moisture available in a food. The scale runs from 0 to 1.0, with water having an Aw measurement of 1.0. Potentially hazardous foods have a measurement of .85 Aw or higher.


Sources of Contamination A food can become unsafe in two ways, by direct contamination or by cross-contamination. With **direct contamination**, when food is received by the restaurant it already contains enough bacteria, fungi, viruses, or parasites to make you sick.

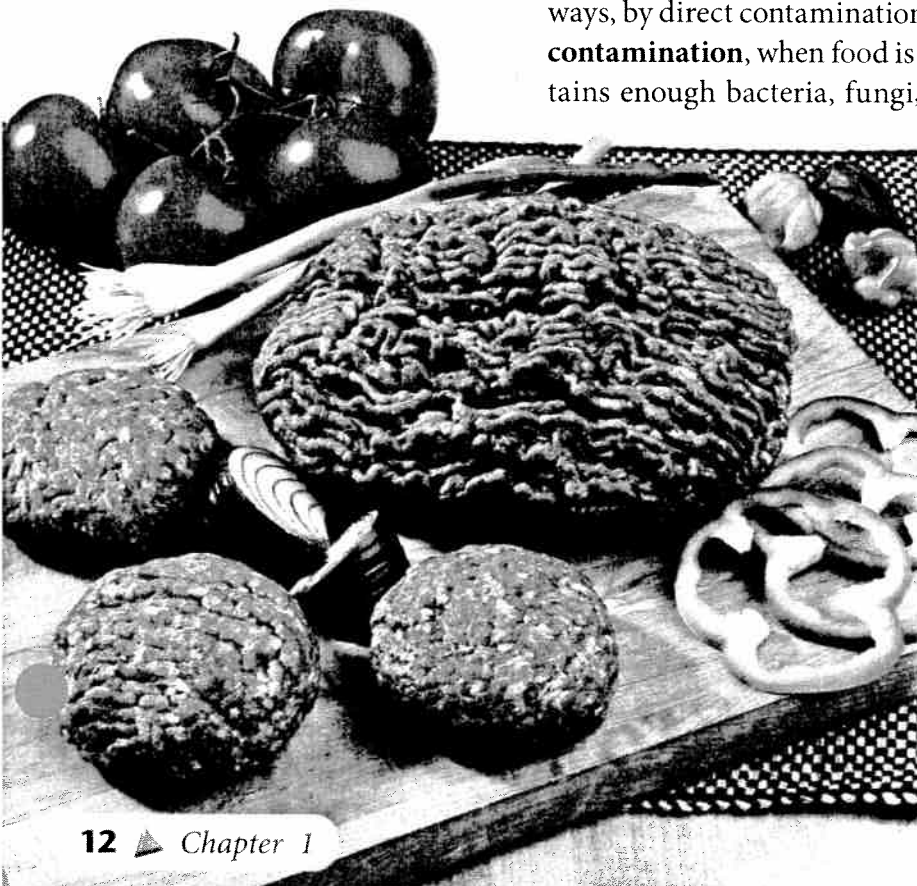
Storing foods properly, cooking them to safe temperatures, and serving them properly are all important ways to control the contamination in food.

Cross-contamination occurs when a food that is safe comes in contact with biological, physical, or chemical contaminants while it is being prepared, cooked, or served.

FIGURE 1-5
Cross-Contamination
Raw meat and raw vegetables on the same work surface.

 **Drawing Conclusions** *What's wrong with this picture?*

In this book, the symbol  means something is wrong with the picture.



One of the most common causes of cross-contamination occurs when pathogens from raw foods are transferred to cooked or ready-to-eat foods through a chef's contaminated hands, equipment, or utensils. For example, bacteria from a raw chicken can be transferred to a ready-to-eat food such as lettuce or a tomato when the same cutting board is used without being washed and sanitized between foods.



What are the three types of hazards that can contaminate foods?

Fingernails

Many food-service businesses do not allow fake fingernails or painted fingernails.

Grooming and Hygiene

Everyone who works with food needs to make an effort to avoid cross-contaminating food. Keeping yourself clean, well-groomed, and healthy is a vital part of keeping foods safe from contamination.

Hand Washing Washing your hands conscientiously and frequently is one of the most important elements in keeping foods safe. Every kitchen must have a proper hand-washing station, outfitted with hot and cold running water, soap, a nailbrush, and single-use paper towels.

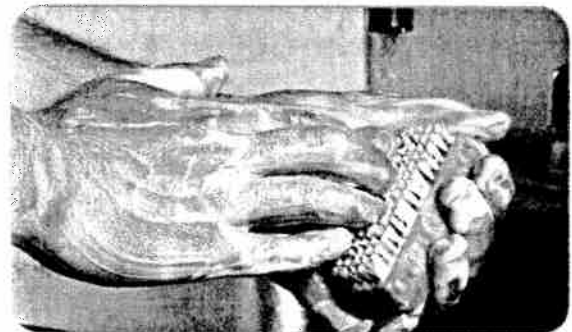
BASIC CULINARY SKILLS

Proper Hand Washing

- 1 Wet hands, using hot running water.
- 2 Apply soap and work it into a lather.



- 3 Scrub hands, between fingers, and forearms for at least 20 seconds.
- 4 Scrub under your fingernails with a brush.



- 5 Rinse hands and forearms under warm running water.
- 6 Dry hands with clean single-use paper towels.
- 7 Turn off water, using towel.
- 8 Open door, using towel if necessary.
- 9 Discard towel in waste container.

CHEF'S TIP

FITS LIKE A GLOVE

Disposable gloves are available in various sizes. Choose a size that fits snugly, but without pinching.

FOCUS ON SANITATION

Latex Allergy

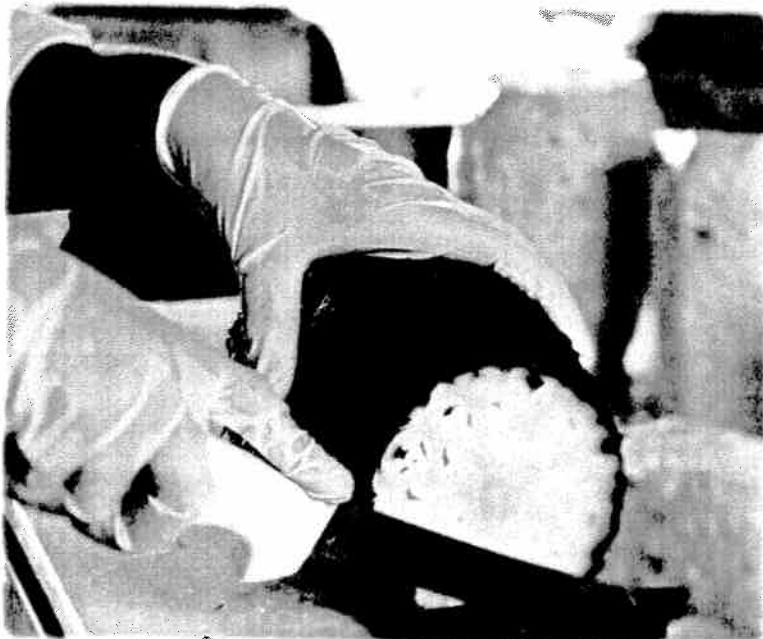
Some people are allergic to the latex used in most disposable gloves.

FIGURE 1-6

Disposable Gloves

Gloves act as a barrier between your hands and ready-to-eat foods.

Applying Concepts *Why is it still important to wash your hands before putting on gloves?*



You should wash your hands:

- ✓ When arriving at work or returning to the kitchen
- ✓ After using the bathroom
- ✓ After sneezing
- ✓ After touching your hair, face, or clothing
- ✓ After eating, drinking, or smoking
- ✓ After taking off, and before putting on, a new pair of gloves
- ✓ Before handling food that will not be cooked again or ready-to-eat food, such as salads and sandwiches
- ✓ After handling garbage
- ✓ After handling dirty equipment, dishes, or utensils
- ✓ After touching raw meats, poultry, and fish
- ✓ After caring for or touching animals
- ✓ Anytime you change from one task to another

Disposable Gloves In addition to washing your hands frequently, you should wear disposable gloves to prevent your bare hands from coming in contact with ready-to-serve foods. For instance, if you are cutting up an onion to cook in a stew, you don't need to wear gloves, because the onion will be cooked before being served to a guest. However, if you are slicing scallions to serve raw on a salad, you need to wear gloves.

Gloves act as a barrier to keep any microorganism on your hand from getting into the food. But, gloves can become contaminated if they touch other foods or a dirty surface. If your hands aren't clean when you put the gloves on, contamination from your hands can get on the gloves. Once your gloves are contaminated, they can contaminate the foods you are preparing.

Wash your hands thoroughly before putting on gloves. Change your gloves whenever they become ripped or dirty. If you are handling raw meats, fish, poultry, or eggs, change your gloves after you are finished handling them and before you start working with cooked or ready-to-eat foods. Never handle money with gloved hands unless you immediately remove and discard the gloves. Money is highly contaminated from handling.

Treat disposable gloves as a second skin. Whatever can contaminate a human hand can also contaminate your gloves. Whenever your hands should be washed, you should put on a new pair of disposable gloves. Never reuse or wash disposable gloves.

Grooming Your uniform is a potential source of pathogens that can get into foods and cause foodborne illness. Start each shift in a clean uniform. Whenever possible, put your uniform on at work, rather than wearing it from your home to the workplace. Do not use aprons or towels hung on the apron string to dry or wipe down hands, tools, or equipment.

Control your hair (this includes beards) by wearing hairnets, hats, or beard restraints. Otherwise, your hair could fall into the food. Hairnets also reduce the need to touch your hair while on the job.

If jewelry falls into the food you are preparing or serving, it can be a physical hazard in the kitchen. It can also be a source of cross-contamination. Pathogens can contaminate jewelry and be transferred from the jewelry to food. In many kitchens, the only piece of jewelry that is allowed is a plain wedding band. Even watches are a potential source of contamination.

Personal Hygiene If you are sick with a contagious cold or disease, you should not come to work until the chance that you might infect others has passed. Keep your fingernails trimmed and do not wear polish. Keep makeup to a minimum, if you wear any at all.

Wear a bandage to cover any cuts or burns on your skin. Change bandages frequently so they don't become a breeding ground for bacteria. Wear gloves to prevent bandages on your hands from falling into food.

What are the steps in proper hand washing?



FIGURE 1-7
Good Grooming

Hairnets are required by most food establishments.

Predicting How would you feel if you were in a restaurant and saw a kitchen worker without a hairnet?

FIGURE 1-8
Bandaged Finger

You should wear gloves to prevent bandages from falling into the food.

Classifying What two types of hazards does this picture represent?

CHEF'S TIP

FILL IT UP

Some kitchens have "fill-to" lines in their three-compartment sinks. If your sink has fill-to lines, use them.

Cleaning and Sanitizing

In a professional kitchen, you must both clean and sanitize anything that comes in contact with foods. Cleaning and sanitizing your tools and work area is one of the most important ways to prevent cross-contamination. It is actually a three-step process. First, clean the surface by washing it. Then, rinse it thoroughly. Once it is rinsed, sanitize the surface.

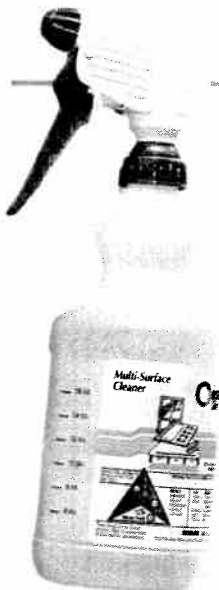
Cleaning involves removing soil or food particles from surfaces such as cutting boards, knives, pots, pans, and other preparation and cooking equipment and utensils. It also involves sweeping the floor and removing grease and dirt from the stove's ventilation hoods, the walls, and the refrigerator doors.

Once an object is cleaned, it can be sanitized. In a professional kitchen, **sanitizing** means that you have used either heat or chemicals to reduce the number of pathogens on a surface to a safe level.

You can sanitize surfaces by using hot water (180°F) or a chemical sanitizer. Small tools and dishes can be submerged in hot water or a mixture of water and a sanitizer. Larger surfaces and appliances, such as meat slicers, can be sanitized after they are cleaned by wiping or spraying them with a **sanitizing solution**, a solution made by mixing water and a chemical sanitizer.

Sanitizing can be done manually. Small tools, containers, pots, and pans can be washed by hand, or manually, in a three-compartment sink. The first compartment is filled with hot water and a detergent. The detergent helps to loosen food particles or grease so they can be rinsed away. The second compartment contains clean water to rinse away the dirt as well as the detergent. The third compartment

Types of Cleansing Agents



Type of Cleaner

Description

Detergent

Penetrates quickly and softens soil so the soil can be scrubbed and rinsed away.

Degreaser

Special type of detergent that contains a grease-dissolving agent. Also known as solvent cleaners.

Acid cleaner

Used to remove mineral buildup in coffee makers, steam tables, and dishwashing machines. Not for use on aluminum.

Abrasive cleaner

Used carefully to scour dirt or grease that has baked or burned onto pots and pans.