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Chartered
Institute of
Environmental
Health



Food Safety First Principles *For Food Handlers*

Based on the 2009 FDA Food Code

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NOTE: This book uses the principles and recommendations of the U.S. Food & Drug Administration (FDA) 2009 *Food Code*. The danger zone temperatures used in this book are 5°C (41°F) to 57°C (135°F).

Welcome to the Food Safety First Principles for Food Handlers Program

Food Safety First Principles for Food Handlers Program provides food handlers with the basic knowledge they need to safely handle food for human consumption. Successful completion of the program assures food managers, regulators and trainers that the certificate holder has completed a basic course in food safety. The Food Safety First Principles for Food Handlers Certificate Program is based on the US Food and Drug Administration (FDA) Food Code and is recommended for workers involved in the preparation, handling, serving and displaying of food. Formal food safety training is not uniformly required by law in all local and state health jurisdictions. Check with the local or state health department in your area.

Food handlers play a major role in keeping food safe. This program will help you understand food safety and how to apply this understanding in the workplace.

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Privacy statement

Environmental Health Testing (EHT) will safeguard the privacy of candidates, where applicable, and will hold in confidence and in a secure manner the information obtained in the course of certificate program activities at all levels of the organization, including those of the Certificate Advisory Panel and subcontractors acting on its behalf. Information about a particular candidate will not be disclosed to a third party by EHT personnel without the written consent of the candidate, except when mandated by law. Where the law requires the information to be disclosed to a third party, the candidate will be notified of the information provided.

Non-discrimination

EHT endorses the principles of equal opportunity to each candidate who takes the course and assessment, by applying the general principles of fairness and equality relative to a candidate's age, sex, race, religion, ethnic origin, disabilities or marital status.

Special accommodations

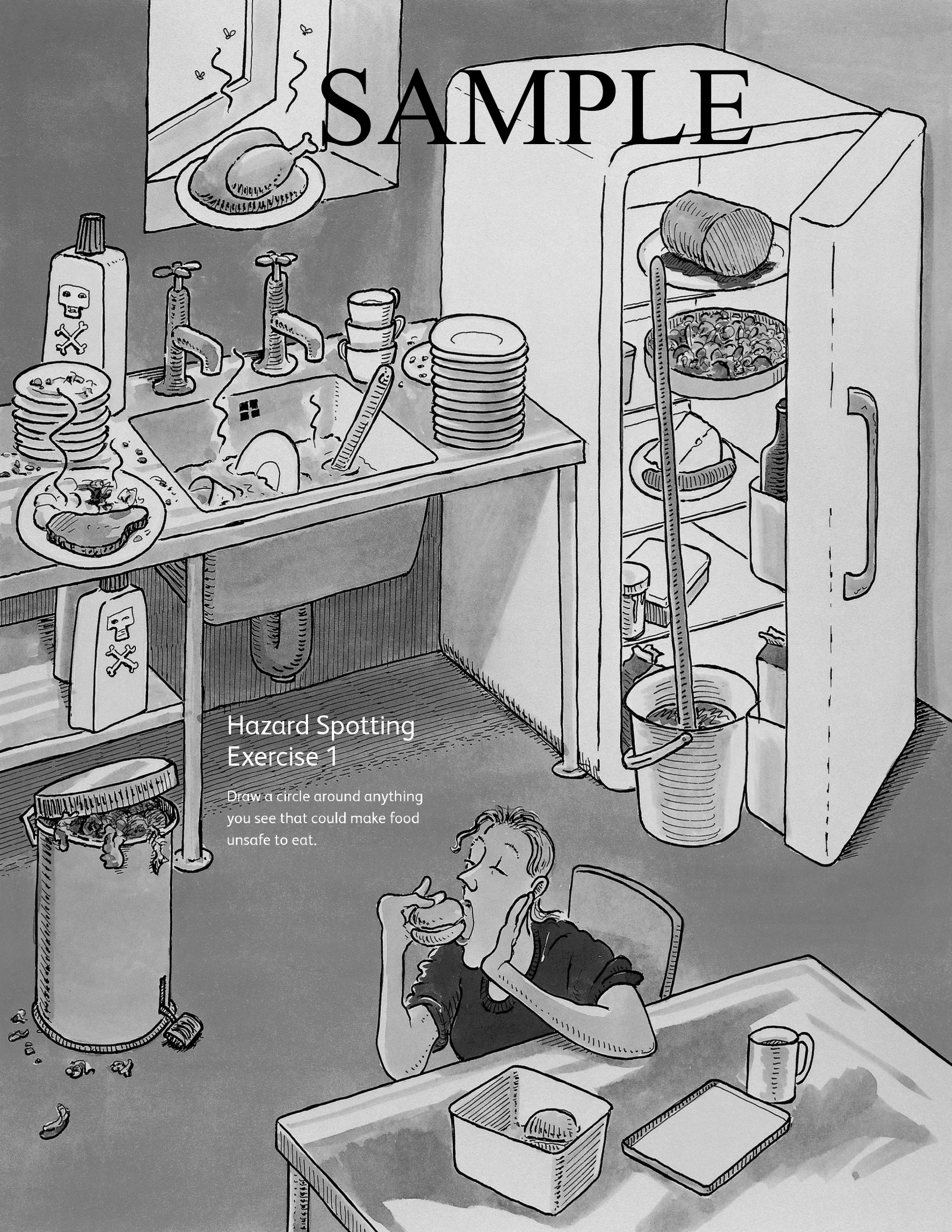
Reasonable accommodations for the course and assessment will be provided at no cost to a candidates with disabilities covered by the Americans with Disabilities Act. The candidate may request a form from their Approved Program Provider or download it from the NRFSP website. An appropriate licensed professional must complete the form in order for a candidate's accommodation request to be processed.

Course and assessment rules

The following are the rules enforced at all course and assessment sites:

- All candidates must have government issued photo identification to be admitted
- Candidates arriving five minutes late for the course and assessment will not be admitted and may forfeit their fees at the discretion of the Approved Program Provider
- Candidates must be present throughout the entire course and pass the assessment to receive a certificate of completion
- No guests are permitted to 'sit in' on the course or assessment
- Candidates are not permitted to assist or solicit assistance from other candidates
- Candidates who fail the assessment may review the course materials and retake the assessment at the discretion of the Approved Program Provider

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Hazard Spotting Exercise 1

Draw a circle around anything you see that could make food unsafe to eat.

The First Principles

key words

Food – anything that people normally eat or drink, including water and ice.

Foodborne illness – the occurrence of two or more cases of a similar illness, that results from eating a common food.

Foodborne illness outbreak – two or more people with a foodborne illness.

Food safety – the safeguarding, or protection, of food from anything that could harm consumers' health. This includes all the practical measures involved in keeping food safe and wholesome through all the stages of production to point of sale or consumption.

Food service employee – anyone who works with food, or whose action or inaction could compromise the safety of food. In this book the term is generally used to include people who work directly with food as well as people whose work could affect food – such as managers, supervisors, maintenance staff, pest controllers and delivery drivers.

Legislation – the general term for laws, regulations and rules.

We all need to eat and drink to stay alive, so it is important that our food does not harm us in any way. People whose work involves food have special responsibilities for safeguarding the health of consumers. They must ensure that the food they handle does not cause illness, injury or any other problem. There are many laws regulating the production and sale of food but this book concentrates on the basic principles of good practice that are involved in working safely with food.

The importance of food safety

Food safety involves safeguarding food from anything that could harm the health of consumers. High standards enable everyone to enjoy their food without illness, injury or other problems, but poor standards can lead to all kinds of harm – and even death. As food safety is so important to everyone, the people who work with food have legal, ethical and economic responsibilities for keeping food safe to eat. This chapter looks at the impact of food safety and introduces the part food service employees play in it.

Consumer awareness

Outbreaks of foodborne illness and questions about food and health have often been in the headlines in recent years. But despite better public awareness, the number of cases of foodborne illnesses are still a cause for concern. In the United States of America, for example, it is estimated that there are 76 million cases, 325,000 hospitalizations and 5,000 deaths every year. No single reason has been identified for these high figures, but factors may include:

- changes in eating habits, including eating out more often and eating more reheated and raw or lightly cooked foods
- changes in shopping habits, including more bulk-buying so that food is stored at home for longer periods
- changes in farming practices, with food produced in massive quantities rather than at a small farm or by local industry
- more interstate shipping, so that food spends longer in transit, increasing the possibility of temperature abuse
- more importation of food items
- a reduction in the use of preservatives
- increased reporting of cases because of greater public awareness.

It is important to remember that official estimates for foodborne illnesses are still unlikely to show the true extent of the problem because so many cases are not reported.



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The impact of foodborne illnesses

High standards of food safety bring important benefits to everyone – consumers, employees, managers, supervisors, owners and the community in general. But there are high costs for poor food safety including pain and distress for individuals and a financial burden and loss of reputation for businesses and employees. The annual cost for the United States in terms of pain, suffering, reduced productivity and medical expenses was estimated in 1994 to be between \$10 billion and \$83 billion.

Benefits of effective food safety	Costs of poor food safety
<ul style="list-style-type: none">• Satisfied customers.• Loyal customers.• A good reputation. • Less food waste. • A pleasant place to work.• Compliance with food safety laws.• Better job security.	<ul style="list-style-type: none">• Foodborne illnesses.• Hospitalization of consumers.• A bad reputation.• Customer complaints and possible loss of revenue.• Higher operating costs because food has to be thrown away.• Poor working conditions.• Legal action and penalties.• Possible layoffs and closure of the business.

Food safety and the law

Rules about preparing food have existed for centuries. In modern times laws have been developed to cover every aspect of the handling and sale of food. Generally speaking, the legislation aims to protect consumers from illness and injury and to ensure that food is wholesome and safe to eat.

Employers have legal obligations to provide various facilities at work, such as handwashing sinks, in the interests of food safety. They should also ensure that all food service employees are given instruction and/or training and supervision that is appropriate to the work they do.

In recent years, in order to reduce the occurrence of foodborne illness risk factors, food codes have emphasized the need for operators of retail and food service establishments to focus their efforts on achieving 'active managerial control'. This term is used to describe industry's responsibility for developing and implementing food safety management systems to prevent, eliminate or reduce the occurrence of foodborne illness risk factors. The best known and most widely-used food safety management system is called Hazard Analysis Critical Control Point (HACCP).

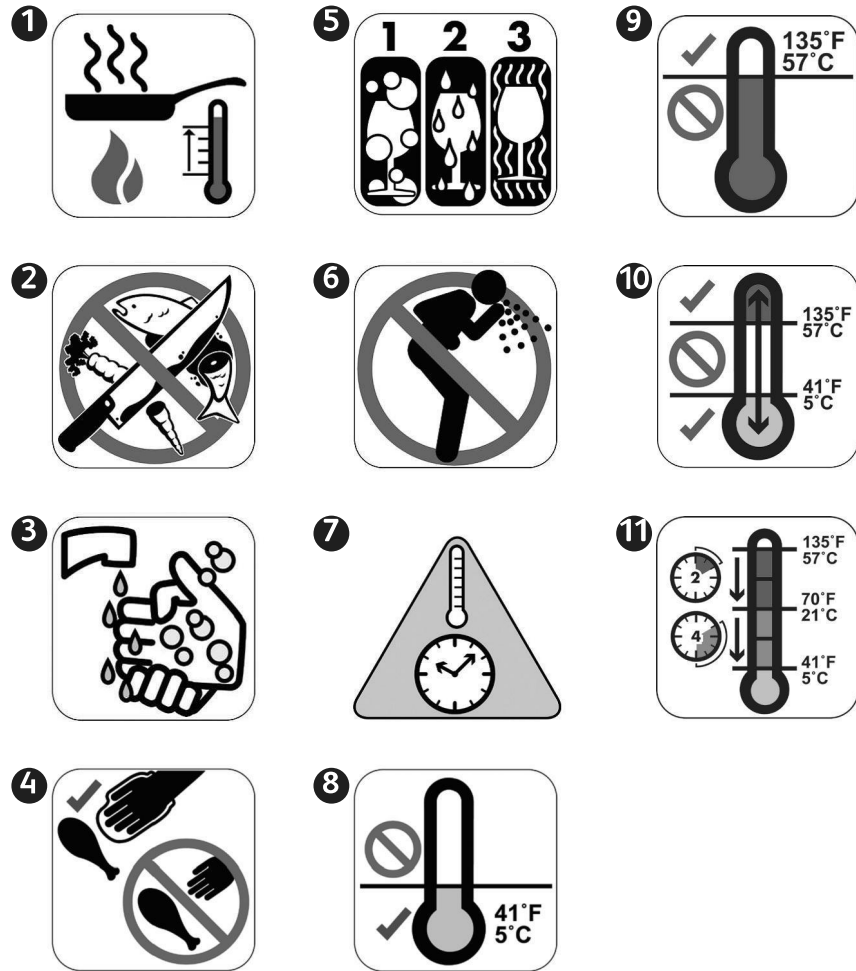
Hazard analysis involves identifying and analyzing the food safety hazards in a particular type of work so that steps can be taken to control those hazards. Employers, managers, supervisors and staff must keep a constant check on the effectiveness of the steps taken and make any necessary adjustments to the way work is carried out. There is more information about legal requirements on pages 50 to 52.

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New International Food Safety Icons

The 11 international food safety icons below were published in 2005 by the International Association for Food Protection (IAFP). The purpose of the icons is to provide an easily recognizable symbol that conveys a specific food safety message to food handlers of all nationalities.

The IAFP icons are consistent with the standards presented in the FDA *Food Code*.

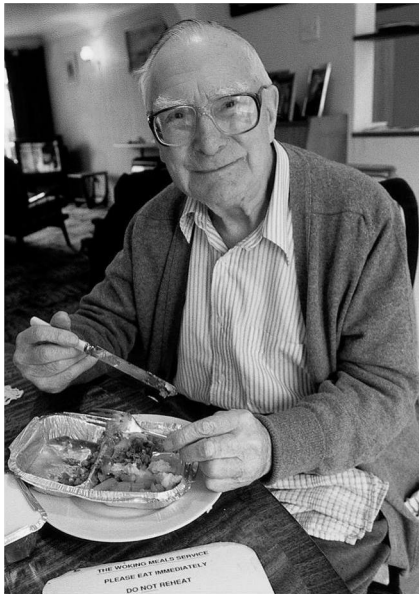


1. Thoroughly cook foods to appropriate temperatures.
2. Do not cross-contaminate between raw and ready-to-eat or cooked foods.
3. Wash hands with soap and warm running water.
4. Do not touch ready-to-eat foods with bare hands.
5. Food contact surfaces and utensils must be properly washed, rinsed, and sanitized.
6. Do not work with food or beverage if you are ill or experiencing gastrointestinal symptoms.
7. A food that requires time and temperature control for safety.
8. Cold foods must be held at 5°C (41°F) or below.
9. Hot foods must be held at 57°C (135°F) or above.
10. Do not allow foods to stay in the temperature danger zone.
11. Hot foods must be cooled from 57°C to 21°C (135°F to 70°F) within two hours and from 57°C to 5°C (135°F to 41°F) within the next 4 hours for a total cooling time of six hours.

IAFP encourages the use of the icons in training and educational materials, stickers, signs, posters or similar products. A license from IAFP to use the icons for commercial uses is required, but the icons may be reproduced free of charge (with proper copyright acknowledgement) in certain types of educational materials. The icons can be downloaded in digital format from <http://www.foodprotection.org/>

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A foodborne illness is always unpleasant and may be very painful. For some people, such as the elderly, the symptoms and their consequences can be life-threatening.

People most at risk

Anyone can be affected by a foodborne illness but some people are particularly at risk. The most vulnerable groups are:

- the very young
- the elderly
- people who are ill or recovering from illness
- people who have weakened immunity to disease
- pregnant women and nursing mothers.

Examples of foodborne illness

This chart shows typical symptoms and incubation periods for some of the pathogenic bacteria that cause foodborne illness. You are not expected to memorize all the details, but you should certainly try to remember the main sources of the bacteria.

INTOXICATION			
Pathogenic Bacteria	Source	Typical Symptoms	Average Onset Time
<i>Staphylococcus aureus</i>	Human body – especially skin, nose, mouth, cuts and boils – and raw milk	Abdominal pain, or abdominal cramp, vomiting, low temperature	1-6 hours
<i>Clostridium botulinum</i> (Botulism)	Soil, canned food, vacuum-packed fish, meat products, raw fish, meat and vegetables, smoked fish	Difficulties in breathing and swallowing, paralysis	12-36 hours
<i>Bacillus cereus</i>	Cereals (especially rice), soil and dust	Abdominal pain, some diarrhea, vomiting	1-5 hours or 8-16 hours depending on the form* of the illness.
INFECTION			
<i>Salmonella</i>	Raw poultry, eggs, raw meat, milk, animals (including pets), insects and sewage	Abdominal pain, diarrhea, vomiting, fever	12-36 hours
<i>Campylobacter</i>	Raw poultry, raw meat, milk and animals (including pets)	Diarrhea, often bloody, abdominal pain, nausea, fever	48-60 hours
<i>Listeria</i>	Soft cheese, cheese made from unpasteurized milk, salad vegetables and pâté	Symptoms like 'flu	1-70 days
<i>Shigella</i> (Bacillary dysentery, shigellosis)	Water, milk, salad vegetables, beans, shrimp, turkey, apple cider	Diarrhea, sometimes bloody, fever, abdominal pain, vomiting	1-7 days
INFECTION/INTOXICATION			
<i>Escherichia coli</i> (<i>E. coli</i> 0157)*	Human and animal gut, sewage, water and raw meat	Abdominal pain, fever, diarrhea, vomiting, kidney damage or failure	12-24 hours or longer
<i>Clostridium perfringens</i> *	Animal and human excreta, soil, dust, insects and raw meat	Abdominal pain, diarrhea	12-18 hours

*Sometimes classified as toxin-mediated infections.

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Bacteria

key words

Ambient temperature – ordinary room temperature.

Bacteria – more than one bacterium.

Bacteriology – the study of bacteria.

Bacterium – a simple life form with one cell.

Binary fission – the process by which bacteria multiply by splitting in two.

Contamination – the presence in food of pathogenic microorganisms or objectionable substances.

Danger zone – the temperature range most suitable for bacterial growth.

Dehydrate – to dry out.

Dormant – a period of inactivity when bacteria do not multiply.

Multiply – to reproduce.

Pathogen – an organism that causes disease.

Potentially hazardous foods or time/temperature control for safety foods – foods which are ideal for bacteria to live on.

Spoilage – the process of causing damage. Spoilage bacteria make food spoil.

Spore – a protective coating formed by some bacteria to help them to survive adverse conditions such as cooking or drying.

Source – where something comes from.

Bacteria are invisible life forms that live on and in our bodies and throughout the natural world. There are thousands of different types of bacteria, many serving useful purposes. However, a very small proportion are harmful and cause foodborne illnesses or make food spoil. This chapter looks more closely at the helpful and harmful bacteria and the parts they play in our lives.

Living with bacteria

Bacteria are single celled microorganisms that are too small to see without the help of a powerful microscope. Even when food is contaminated, it is impossible to see bacteria with the naked eye or to taste or smell them. Food that appears to be safe could make you ill or even cause death.

Bacteria are found throughout the natural world and survive under many conditions. Although bacteria are responsible for most foodborne illnesses, it is important to remember that not all types of bacteria are harmful. Indeed, most types are beneficial and humans would find it difficult to survive without them. Bacteriology is a complex subject, so this book divides bacteria into just three headings – helpful bacteria, pathogenic bacteria and spoilage bacteria.



Helpful bacteria

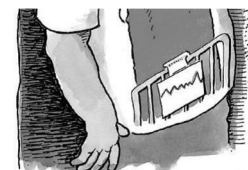
These are the types of bacteria that help us to:

- grow crops
- digest the food we eat
- treat sewage to make it safe
- develop new foods
- create medicinal drugs
- make foods, including yogurt, cheese and carbonated drinks
- manufacture laundry and cleaning products.



Pathogenic bacteria

These are the types of illness and are responsible for foodborne illness.



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The danger zone

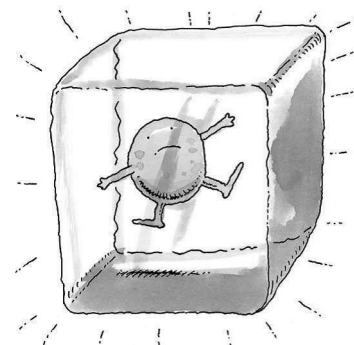
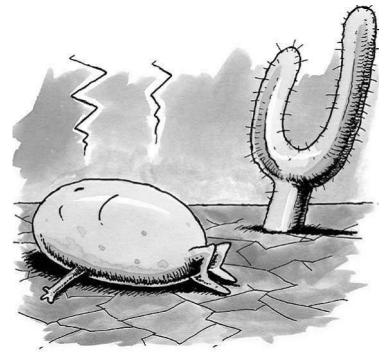
As most pathogenic bacteria multiply rapidly at temperatures between 41°F and 135°F, potentially hazardous and perishable foods should be kept out of the danger zone as much as possible. Foods are likely to be at danger zone temperatures when they are:

- left on work surfaces
- left in sunlight, for instance in a display window
- heated slowly
- cooled slowly.

Food is also likely to be in the danger zone when hot and cooler foods are combined – for instance, when hot gravy is poured on cold food.

There is more detailed information about controlling food temperatures later in the book but it is important to remember the basic rules, which are often called the time and temperature rules:

- minimize the time that potentially hazardous foods or (time/temperature control for safety) foods are kept at danger zone temperatures
- keep cold foods cold
- keep frozen foods frozen
- keep hot foods hot.



135°F

D
A
N
G
E
R

Z
O
N
E

98.6°F

41°F

32°F

0°F

? Activity

How is food production organized at your workplace to minimize the time that food is at a danger zone temperature?

What can you do to prevent bacterial multiplication during your work activities or at your workplace in general?

Suggest two ways of reminding employees at your workplace about the time and temperature rules.

first principles

- You cannot see, smell or taste pathogenic bacteria even when they have contaminated food.
- Pathogenic bacteria need food, acidity, temperature, time, oxygen and moisture to multiply.
- The bacteria responsible for foodborne illness can multiply to harmful levels every 10 to 20 minutes in ideal conditions.
- Pathogenic bacteria multiply at temperatures between 41°F and 135°F, the temperature range known as the danger zone.
- Effective temperature control helps to prevent foodborne illness.

Minimum cooking temperatures for common foods (based on the FDA *Food Code*)

<p>Eggs for immediate service Minimum internal temperature: 63°C (145°F) Minimum holding time: 15 seconds</p> <p>Eggs for later service Minimum internal temperature: 68°C (155°F) Minimum holding time: 15 seconds</p> <p>Fish Minimum internal temperature: 63°C (145°F) Minimum holding time: 15 seconds</p> <p>Ground beef and pork Minimum internal temperature: 68°C (155°F) Minimum holding time: 15 seconds</p>	<p>Pork Minimum internal temperature: 63°C (145°F) Minimum holding time: 15 seconds</p> <p>Poultry Minimum internal temperature: 74°C (165°F) Minimum holding time: 15 seconds</p> <p>Roast (rare) beef Minimum internal temperature: 54.4°C (130°F) Minimum holding time: 112 minutes</p> <p>Steaks Minimum surface temperature: 63°C (145°F) External surface must have cooked color change Minimum holding time: none</p>
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Keeping food at safe temperatures

There are slightly different rules for food temperature and time controls in different states, so it is important to check and to follow the regulations governing the establishment where you work. You can fill out the correct temperatures and time limits, where relevant, in the right-hand column on the chart below. Owners, managers and supervisors must ensure that everyone who works with food knows the relevant temperature and time requirements for their work activities. They must also ensure that violations do not occur.

General guidance for the time and temperature control of PHF/TCS food

Stage of food handling	When to check temperature	Required safe temperatures
DELIVERY	Every time food is delivered.	
STORAGE Refrigeration Refrigerated display Freezer	Daily, at least. Daily, at least. Daily, at least.	
THAWING	Whenever food is thawed.	
COOKING Exceptions	Whenever food is cooked.	
COOLING	Whenever food is cooled.	
REHEATING	Whenever food is reheated.	
HOT HOLDING	Frequently throughout the holding period.	
COLD HOLDING	Frequently throughout the holding period.	

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