



Knowledge • Confidence • Success

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Introduction

Introduction

Knowledge of food safety is important to anyone who handles food. Whether you are a chef or a cook in a restaurant, a foodservice manager, a health care provider, a child care provider, a food server or a dishwasher, this manual includes information you need in order to handle food safely and to prevent foodborne illness.

Foodborne illness is a very big concern in Canada. Health Canada estimates that over 1 million Canadians suffer from foodborne illness each year! Foodborne illness results in millions of dollars in lost revenues to business owners, wages, and productivity. Sometimes the result is loss of lives.

Fortunately, foodborne illness can be prevented by following a few simple rules. These food safety rules and an understanding of why they are important are presented in this manual.

Finally, more and more municipalities and provinces are enacting laws that require food service personnel to understand food safety by becoming certified food handlers. This manual will help you meet those legal requirements and make you confident that the food you serve is not only tasty but also safe to eat.

How to Use This Manual

This manual provides the food safety information required to pass a food handler certification examination in most jurisdictions. The 7 food safety topics included are in keeping with the course requirements outlined in the Food Safety Protocol developed by the Ontario Ministry of Health and Long-Term Care. HPPA act 493/17 – according to the Food Premises regulations this information can be found online at: <https://www.ontario.ca/laws/regulations/170493>

This manual may also be used as a quick reference guide for the daily information needs that arise in most food premises.

There are 7 chapters in this manual with each chapter covering a different aspect of food safety. We have provided detailed subheadings that reflect the type of information covered in each chapter. For example, information about using a 3 compartment sink is found in chapter 6, Housekeeping and Sanitation, on page 39 and 40, Dishwashing Procedures.

Each chapter starts with a list of things you will learn.

Each chapter ends with a set of review questions so you can test yourself on what you have learned.

All of the correct answers are listed on page 49 to ensure that you can continue to use this guide as a future resource.

Chapter 1. Public Health Laws in Ontario

In this chapter you will learn about:

- **Laws that apply to everyone preparing and selling food in Ontario;**
- **Legal standards required for food premises;**
- **Inspections and the role of public health inspectors.**

What do public health laws say about food safety?

Laws in Ontario place a great deal of importance on food safety. For example, the Health Protection and Promotion Act (HPPA) R.R.O. Regulation 493/17 is provincial legislation that requires all food premises to be inspected in order to prevent, reduce or minimize illnesses that may be caused by food.

The HPPA gives Public Health Inspectors the authority to impose fines, to close a food business and to take food premises operators to court if they do not operate according to legal requirements. These laws also allow Public Health Inspectors to seize, destroy or discard food that is not safe for human consumption.

What are the Ontario Food Premises Regulations?

The Ontario Food Premises regulations contain the minimum standards that must be maintained by all food premises in Ontario. It details the type of construction, the equipment and the safe food handling practices to be followed in any establishment where food is sold.

What is the role of the Public Health Inspector in food safety?

Public Health Inspectors play an important role in food safety. They are very knowledgeable about preventing foodborne illness and inspect all food premises to ensure the safety and wholesomeness of food.

Public Health Inspectors use the food premises regulations to determine if a food premises is meeting all the requirements necessary to operate safely.

During an inspection of your food premises, the Public Health Inspector will check the following areas: equipment, food temperatures, employee hygiene, sanitation, hand washing, they will also look for signs of pests, pest control contract, adequate food storage, dish washing procedures, food handling.

Most common violations reported:

Potentially hazardous foods do not meet temperature requirements.

Problem: Perishable food, which consist in whole or part of eggs, meat, milk, poultry, fish, shellfish or other ingredients capable of supporting rapid bacterial growth, is found at room temperature

Solution: Keep all potentially hazardous food at safe temperatures – cold foods at 4C or below and hot foods at 60C or above.

Potentially hazardous foods are not properly thawed/ defrosted.

Problem: Meat, poultry and seafood thawed at room temperature this practice is extremely dangerous. The surface of the food rapidly warms in the danger zone (4C – 60 C) and after several hours can produce enough germs or toxins to cause illness.

Solution: Defrost foods safely in the refrigerator or under cold running water,
Please refer to chapter 4.

Thermometers are not provided or not easily located in refrigerated units and at heating units.

Problem: A major safeguard in handling safe food is the maintenance of proper temperatures.

Solution: it is a requirement that all cold holding units have a thermometer that is clearly visible just inside the door and monitored thru out the day, also metal stem thermometers for monitoring temperatures of hot holding foods.

Please refer to chapter 4.

Inadequate food protection.

Problem: Foods stored in the refrigerators and walk-in coolers are uncovered or wrapped. And food items stored on the floor.

Solution: All food and supplies must be covered and protected and stored at least 6 inches off the floor, for easy cleaning and to avoid chemicals or dirty water from contaminating food and supplies.

Food contact surfaces of equipment and utensils are not clean.

Problem: Unclean counters, shelves, insides of refrigerators, ovens, tables, exhaust hoods not properly maintained.

Solution: Develop a cleaning checklist.

Inadequate dishwashing procedures,

Problem: Manual dishwashing- improper sequence in a 3 compartment sink, no test kit for sanitizer solution, also not using a sanitizing solution, improper maintenance of mechanical dishwashers.

Solution: *Please refer to chapter 6.*

Chapter One

Storage of clean equipment and utensils is not appropriate.

Problem: Cups and glasses stored on toweling, pots and pans stored before drying, clean pots and pans stored on the floor.

Solution: store glasses and cups on rubber matting to ensure air circulation, pots and pans on storage racks.

Indoor and outdoor garbage storage is not properly maintained.

Problem: Garbage cans are not kept clean, or covered with tight fitting lids, dumpsters are dirty and lids left open.

Solution: Keep garbage containers clean and covered when not in continuous use, keep dumpster lids closed.

Construction of floors, walls and ceiling does not meet specifications

Problem: Broken tiles or cracks in flooring, dirty greasy walls and ceilings.

Solution: Keep floor in food preparation and storage areas smooth, non-absorbent and easily cleanable. Walls and ceilings clean and in good repair.

Improper lighting and fixtures

Problem: Inadequate lighting in food preparation area, storage and dish room.

Solution: Provide adequate lighting in dish room, and food preparation areas, including hand wash stations. Fixtures are to be covered and protected against broken glass.

Wiping cloths are not clean or use-restricted:

Problem: Wiping cloths on counter also used for spills on the floor.

Solution: Wiping cloth or dishrags used for wiping food spills must be used for no other purposes and should be rinsed in a sanitizing solution.

Table covers and multi service napkins/serviettes must be clean, in good repair and changed and laundered after each use.

Chapter One

The health department is also responsible for investigating complaints about foodborne illness. The Public Health Inspector interviews complainants and then inspects the food premises that may have served the contaminated food. If they are available, the inspector will take samples of suspected foods for laboratory analysis. It is very important to cooperate fully during a foodborne illness investigation.

In the event that someone reports getting sick from your food it is important that you obtain detailed information such as; their name and contact information, a list of what they ate, the time they ate, what were the symptoms, when their symptoms began. Keep records on file; notify management of the incident reported.

If possible save samples of the food mentioned and contact the health department, suggest the customer call the health department as well.

It is not always the last food consumed that made a person sick

The health department will ask them similar questions, they may also contact or visit you.

Operating a food premises according to the Food Premises Regulations is your responsibility to ensure the food you serve is safe and to avoid bad publicity, loss of business, fines and court appearances and possible law suits.

Chapter 1. Review Questions

1. True or false: The law says all food premises in Ontario must be inspected?
2. True or false: A public health inspector may throw food out if it is not safe to eat?
3. The Ontario Food Premises Regulations describes minimum standards for operating and maintaining food premises. Which of the following categories are included in the regulations?

Check all that apply:

- Construction
- Equipment
- Food handling
- Dishwashing
- Recipes

Chapter 2. Contaminants & Foodborne Illness (Food Poisoning)

In this chapter you will learn about:

- **The different types of food contaminants and how they are caused.**
- **The difference between food poisoning and food spoilage.**
- **Organisms that cause infections and intoxications.**
- **Common microorganisms that lead to foodborne illness.**
- **Risks associated with food allergies.**
- **A food handler's responsibility toward patrons with food allergies.**

What is food borne illness?

Foodborne illness is caused by eating or drinking foods contaminated with food poisoning organisms.

Foodborne illness is a very big problem in Canada. Health Canada estimates that over 11 million Canadians suffer from foodborne illness each year! Foodborne illness results in millions of dollars in lost revenues to business owners; lost wages and productivity and in some cases loss of life.

What are the symptoms of foodborne Illness?

Depending on the type of organism and the person affected symptoms of foodborne illness range from mild to very severe and include:

- Fever
- Nausea
- Stomach cramps
- Vomiting
- Headache
- Diarrhea
- Dizziness
- Death

Foodborne illness is particularly dangerous for people with weakened or compromised immune systems. For example, young children, the elderly, people who are sick or undergoing chemotherapy and pregnant women, are most vulnerable to food poisoning organisms.

What are the different types of food contamination?

- **Chemical contamination**
- **Physical contamination**
- **Biological contamination**

Chapter Two

Chemical Contamination

Chemical contamination of food occurs when chemicals such as cleaning products, pesticides, insecticides or any other chemical accidentally gets into the food being prepared.

Vomiting and other symptoms usually occur within one hour after eating chemically contaminated foods. Chemical contamination makes people extremely sick and can be fatal.

To Avoid Chemical Contamination:

- Store all chemicals separate away from food; be sure to use chemicals safely.
- Do not store chemicals in food containers.
- All chemicals must be properly labeled. Do not store food in containers previously used for chemicals, only use approved food safe sanitizers on food contact surfaces refer to page 34.

Physical Contamination

Physical contamination is caused by foreign objects falling into food during preparation. The object blends in with the food and remains unseen until a person eats the food with the object in it. Foreign objects may cause choking or may cause painful cuts inside the mouth or throat.

During preparation objects can easily get into food without being noticed.

Objects such as:

- Glass
- Hair
- Earrings
- Nail polish or false nails
- Bandages
- Staples from boxes
- Plastic bread tags
- Metal shavings from opening cans

To Avoid Physical Contamination:

- Do not wear dangling earrings or jewelry, always wear hair restraints.
- Always check equipment before using, being sure to look for broken pieces or foreign objects.
- Report or fix any plaster that is chipping from ceilings or walls.
- Carefully open cartons or packages, look for staples.
- Work in a clean and organized work area.
- Always wear a glove if you are wearing a bandage.
- Open cans carefully; fine bits of metal shavings can get into food.

Biological Contamination

Biological contamination refers to food contaminated by micro-organisms.

Micro-organisms are living cells that exist everywhere in the environment. They are invisible to the naked eye and can only be seen with a microscope. Types of microorganisms include:

- Bacteria
- Viruses
- Parasites
- Yeasts
- Moulds

Micro-organisms are found on people, animals, insects, equipment, work surfaces, utensils and in the air we breathe. It is good to remember that not all microorganisms are harmful such as, the types that help make cheese and yogurt. Regarding food safety, we are only concerned with those microorganisms that may make people sick.

Pathogens are harmful micro-organisms that cause illness including foodborne illness. They are dangerous because they are invisible, odorless and tasteless. Foodborne pathogens cannot be seen, tasted or smelled in contaminated food. Food may look, taste and smell fine but, it is impossible to know for sure if it is contaminated or not.

In other words harmful bacteria may not change the taste, smell or looks of food, food must be handled safely at all times, **Temperature control is the major key to safe food handling.**

Types of Biological Contamination:

- **Bacterial Infection**
- **Bacterial Intoxication**

Infection refers to the presence of pathogens inside the body which make a person ill. **These types of pathogens are destroyed by high heat and by cooking foods thoroughly.**

Examples of infection producing pathogens are Salmonella, Campylobacter, E. coli and Shigella.

Intoxication refers to organisms that release toxins or poison in food as well as inside the body. Toxins in food are particularly dangerous because they are not destroyed by heat or thorough cooking.

Most bacteria are destroyed by cooking & reheating foods to the correct temperatures, However **Spore forming bacteria** have the ability to protect themselves from undesirable conditions such as high cooking temperatures, freezing and some sanitizing chemicals. Spore forming bacteria can remain dormant for great lengths of time until the conditions are more favorable and then can turn back into bacteria, it then can multiply and produce toxins in foods that can make people very sick. *What are ideal conditions? (Page 19 Chapter 3) (Fattom)*

Examples of spore **forming bacteria** or toxin producing bacteria are Staphylococcus aureus, Bacillus cereus and Clostridium botulinum.

Chapter Two

Bacterial Infections:

Salmonella organisms are commonly found in eggs, cracked eggs, chicken, turkey and other meats.

Symptoms of a salmonella infection occur 12-72 hours after eating and include the sudden onset of diarrhea, severe stomach cramps, vomiting and fever.

E. coli organisms are commonly found in the intestinal tract and feces of humans and animals such as cattle.

E.coli 0157:H7 is a particularly harmful strain of E.coli and is responsible for foodborne and water borne outbreaks. Symptoms occur 3 to 10 days after eating or drinking and include diarrhea, sometimes bloody, and stomach cramps.

E.coli is found in raw meats such as ground beef (hamburgers) poultry, pork, unpasteurized apple juice and milk. "Hamburger Disease" is caused by this strain of E. coli. E.coli infections may also lead to kidney damage and death.

Bacterial Intoxications

The organism **Bacillus cereus** is a spore forming bacteria and most commonly found in cooked and fried rice. It may also be found in soups, custards, meat and poultry.

Symptoms of illness from Bacillus cereus occur 30 minutes to 8 hours after eating and usually within 2-4 hours. Symptoms vary depending on the food eaten and may include vomiting, stomach cramps and diarrhea.

The organism **Staphylococcus aureus** is also a spore forming bacteria and is **most** commonly found in the nose, throat, skin, pimples, hands and feces of humans and animals. They are associated with foods such as, ham, beef, poultry, cream sauces, custards and puddings.

Parasites - Protozoa

Some people can be carriers of diseases, while showing no symptoms but may carry disease such as bacteria, viruses, parasites and protozoa.

Parasites do not grow on food but may be transferred from person to person through food or contaminated water.

Especially when a person handles food after using the washroom without washing their hands, it is often acquired by travelers on vacation in foreign countries by contaminated food and water. Symptoms commonly include diarrhea, stomach cramps, bloating and general malaise. Examples of common parasites are Giardia lamblia, Trichinella spiralis or Entamoeba histolytica.

Transmission of parasites typically occurs through a fecal-oral route (for example, contaminated food or water or person-to-person contact)

Chapter Two

Viruses

Viruses are organisms that are much smaller than bacteria. In their pre-infective stage they are just like a chemical with none of the requirements for life, but once in a living cell they take over and begin to multiply. They can grow only in living tissue, but can be transferred from one person to another through food.

Although they cannot live outside of a person indefinitely, some can viruses survive on surfaces for long periods. In this way, by touching a surface contaminated with a virus, the virus travels on a person's hands and may end up in food.

Examples of viruses are Hepatitis A, and Norwalk virus.

Examples of foods implicated in outbreaks due to viruses, include:

- Raw oysters and clams
- Strawberries
- Sliced fruit
- Water
- Milk
- Sandwiches
- Sliced luncheon meats

Yeasts

Yeasts are single cell organisms found in the soil, on plants and on the skin and body of man. They multiply by forming offspring as buds which grow and then detach themselves.

Yeasts can cause illness, skin infections or diseases in plants and food spoilage. Yeasts are also used in the making of beer, wine and bread.

Moulds

Moulds are most often responsible for food spoilage. They grow as single cell filaments that can branch together making a strongly knit structure like a mat and can often be seen with the naked eye. Usually moulds look fluffy, being a familiar sight on foods like jam, cheese and bread. They multiply by producing clusters of dry spores which are blown by through the air like seeds. Although commonly associated with food spoilage, moulds also have beneficial uses in the ripening of cheeses and in the production of antibiotics.

Several types of mould, under the right conditions, produce poisons called "mycotoxins". It is important to remember that mycotoxins are invisible and can penetrate the food product. For this reason, scraping mould off the surface of food or cutting mouldy parts away before eating is not a guarantee that mycotoxins have been entirely removed.

What is Food Spoilage?

Food decays or goes off because of the micro-organisms that are always present. It is important to remember that food spoilage organisms are not the same organisms that cause food poisoning.

Signs of food spoilage are:

Odour - "off odours" are smells (sometimes like rotten eggs) that are produced when bacteria break down the protein in food, (usually fatty foods). This process is called putrefaction. The flavour of the food may also be affected.

Sliminess - Food becomes slimy as the bacterial population grows. Moulds may also form slimy whiskers.

Discolouration- Foods can become discoloured by microbial growth. Some moulds have coloured spores that give the food a distinctive colour, for example, black pin mould on bread, or blue and green mould on citrus fruit and cheese.

Souring - Foods go sour when certain bacteria produce acids. A common example is when milk sours from the production of lactic acid.

Gas - Bacteria and yeasts often produce gaseous by-products that can affect food. You may have noticed meat becoming spongy, or packages and cans swelling or having a popping or fizzing sound on opening.

Naturally Occurring Toxins in Plants and Animals

Although the incidence of food poisoning from this group is rare, it is important to point out that they exist and must be avoided.

Some examples of poisonous plants and animals include:

- Solanine in green potatoes
- Poisonous mushrooms
- Rhubarb leaves, jimson weed, water hemlock
- Fish and shellfish toxins

The toxins found in fish and shellfish are especially dangerous if ingested. The toxins can be either produced in the fish, or the toxin can be ingested by the fish, from the water supply. Examples are scombrototoxin and tetra don toxin respectively.

Chapter Two

Scombrototoxin is a toxin formed in certain scombroid fish when bacteria convert their natural histidine to histamine. Histamine is a chemical related to allergic reactions in humans. This toxin develops when fish are improperly chilled or stored. Scrombotoxin can develop in fish in as little as 3-4 hours. Signs of the toxin include a honey-comb appearance, and a metallic or peppery taste. A reaction to scombrototoxins starts 10 minutes to 2 hours after ingestion. The symptoms include burning or numbness of the mouth, hives, rashes, flushing, heart pounding, nausea, sweating, headaches and vomiting.

Cooking does not destroy Scombrototoxin. Therefore, the only way to protect against the possible hazard is to prevent the toxins from forming by handling fish safely from harvesting to serving.

Tetradon Toxin is the deadly toxin found in the internal organs of Japanese Fugu or Puffer Fish. There is no antidote. Expert chefs must remove the toxin entrails before serving.

What are Food Allergies and Allergens?

Severe allergic reactions (e.g. anaphylactic shock) occur when the body's immune system strongly reacts to a particular allergenic protein or irritant. These reactions may be caused by food, insect stings or medications.

There are nine substances most frequently associated with food allergies and allergic-type reactions. These substances are often referred to as the nine priority food allergens and include:

- peanuts,
- tree nuts,
- sesame seeds,
- soy,
- milk,
- eggs,
- fish including crustaceans and shellfish,
- wheat and other cereal grains containing gluten,
- Sulphites.
- mustards

An allergic reaction to food may be very serious or life threatening. Symptoms may include throat itchiness and swelling, vomiting, nausea and difficulty breathing.

A Food Handler's Responsibility

While it is not a food handler's responsibility to serve only non-allergenic foods, it is very important to be as helpful and honest as can be when a customer asks about ingredients in the food. Customers who ask about ingredients may be asking because of their allergies to certain things. Therefore, if you or anyone else is not sure or does not know about the ingredients, make certain to tell the customer you are not sure! Keep high risk foods separate, use separate utensils in order to avoid cross contamination – Being honest and helpful may save a life.

Call 911 immediately if someone is having a severe allergic reaction!

Chapter 2. Review Questions

1. Symptoms of food borne illness range from mild to severe and may affect anyone. Which people are most at risk? (Check all that apply)
 - Elderly people
 - Pregnant women
 - Young children
 - People with weakened immune systems due to illness or medical treatments.
2. True or false: If food looks and smells good, it is probably safe to eat?
3. Name three places in the kitchen where harmful microorganisms may exist?
4. Salmonella is a food poisoning organism commonly found in which foods? (*Name 2 foods*)
5. E.coli 0157:H7 is a dangerous foodborne and waterborne organism responsible for numerous outbreaks in Ontario. Name the food this organism is most often linked to.
6. True or false: Scraping mould off food before eating may be harmful because of invisible toxins?
7. True or false: Honesty is the best policy when it comes to food allergies. If a customer asks for the ingredients of a food and you are not certain, say you don't know!
8. True or false: Call 911 if someone is showing symptoms of an allergic reaction such as difficulty breathing?

Chapter 3. Growth of Microorganisms

In this chapter you will learn about:

- **Ideal conditions for the growth of harmful microorganisms**
- **Potentially hazardous foods that may cause foodborne illness if not handled properly.**
- **How temperatures affect the growth of microorganisms**
- **Danger zone temperatures**

What do micro-organisms need for growth?

All living organisms, including humans, thrive under the right conditions. For example, people need food, air, water, and the right temperatures in order maintain life. It is useful to remember that micro-organisms are living things as well and, as such, need food, air, water and proper temperatures to stay alive, to grow and to multiply.

Under ideal conditions, pathogens grow very quickly. They grow by doubling every 20 minutes! At this rate, extremely dangerous levels of pathogens may be reached in several hours. If ingested, foods with high numbers of pathogens cause foodborne illness.

It is important that food handlers know what pathogenic or, disease causing micro-organisms need in order to grow. By knowing what pathogens need, food handlers can make sure they do not get it. In fact, the science of safe food handling is based on making sure favorable conditions that allow bacteria to grow are prevented or, that they are destroyed before they are ingested. The following chapter describes the conditions pathogens need in order grow and multiply.

An easy way to remember exactly what micros need is the acronym, F A T T O M. Here each letter stands for something needed to support the growth of bacteria. Each one will be discussed in detail below.

- **F – FOOD**
- **A – ACIDITY**
- **T – TEMPERATURE**

- **T – TIME**
- **O – OXYGEN**
- **M – MOISTURE**

Food: Potentially Hazardous Foods

Foodborne pathogens grow well in foods that are high in protein and moisture. These foods are referred to as **potentially hazardous foods**. They include:

- milk or milk products
- shell eggs
- meats, poultry, fish shellfish, edible crustacean (such as shrimp, lobster, crab)
- tofu or other soy-protein foods
- synthetic ingredients such as textured soy protein in hamburger supplements

In addition, foodborne illness organisms may grow in a variety of other foods and they must also be considered potentially hazardous. These foods include:

- garlic-and-oil mixtures
- plant foods that have been heat treated (such as) beans, raw seeds and sprouts,
- sliced melons
- baked or boiled potatoes
- cooked rice

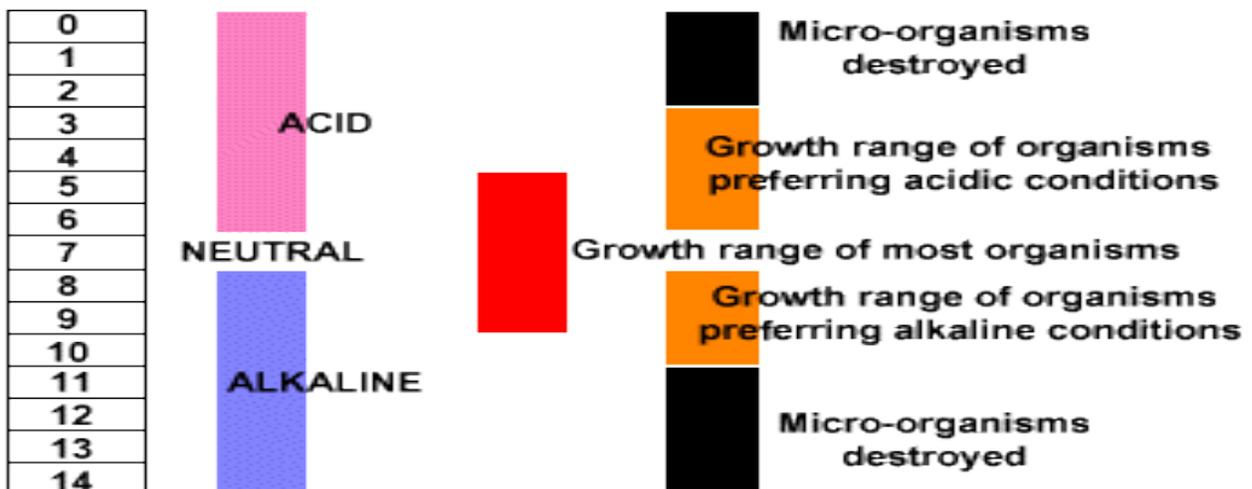
It is important to handle all potentially hazardous foods with care to prevent foodborne illness. Knowing how these foods must be treated every step of the way from the time they are delivered, through preparation and service is the basis of safe food handling practices.

(Safe food handling is discussed further in chapter 4.)

Acidity Level (pH)

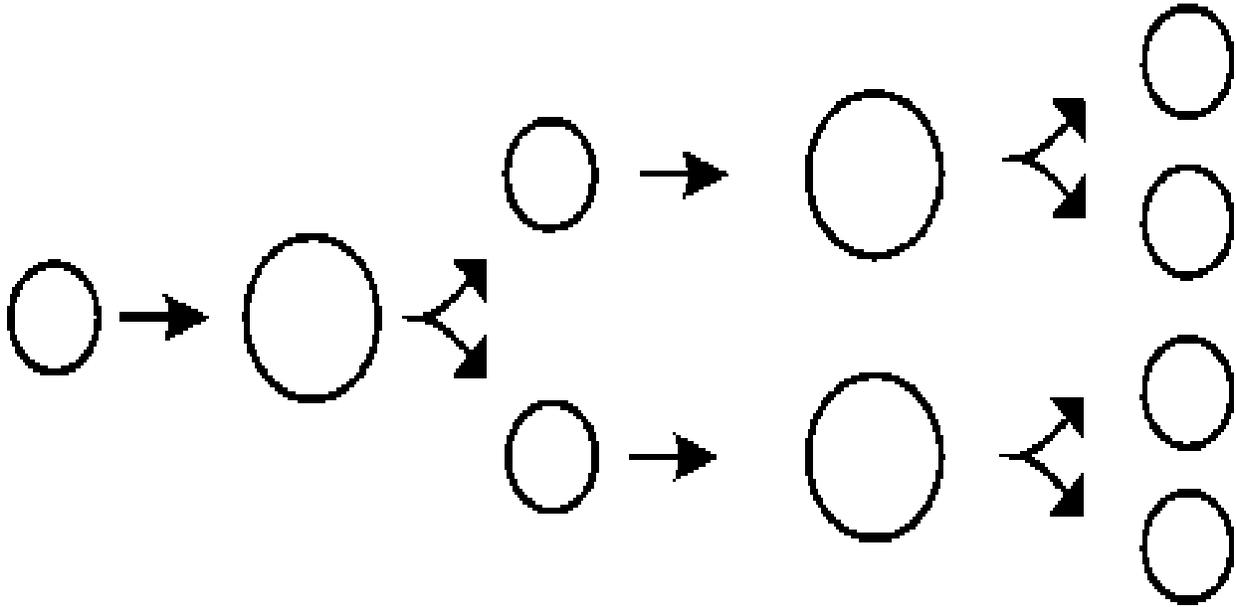
The degree of acidity or alkalinity in food is expressed in terms of pH. The pH is measured on a scale from 0 (acidic) to 14 (alkaline). Most organisms will grow best in a low acid or neutral pH.

Most potentially hazardous foods have a pH level ranging from 4.6 – 7.0 and are therefore in the ideal range for pathogens to grow as depicted in the chart below.



Time

Under ideal conditions, bacteria multiply by doubling every 20 minutes. For example, every 20 minutes, 10,000 bacteria become 20,000 and then 40,000 and then 80,000 and so on. This is called exponential growth. If left unchecked, pathogens can reach dangerous levels very quickly.



The Danger Zone

Pathogens grow best in temperatures between 4°C to 60°C or 40°F to 140°F

This is known as the *temperature danger zone*.

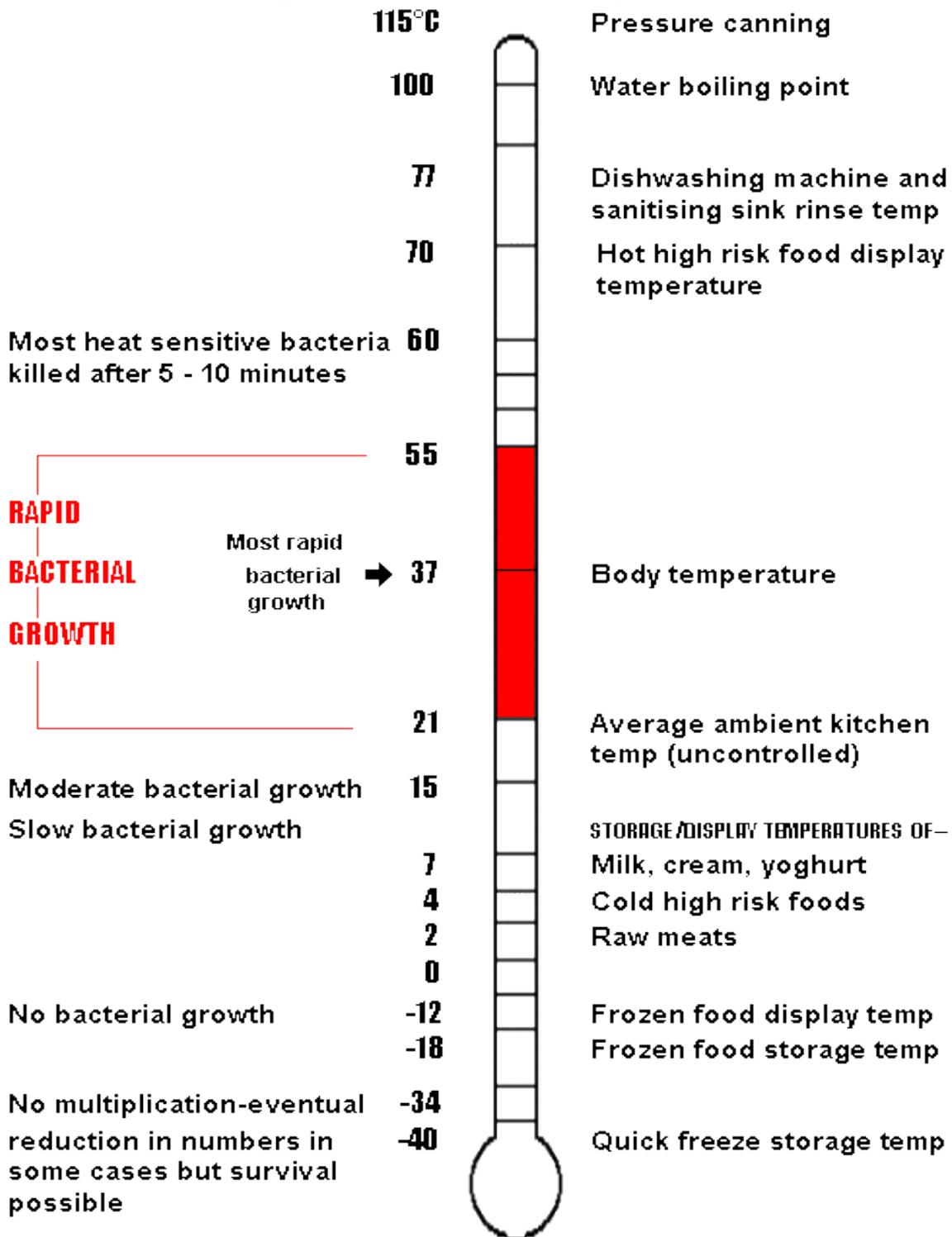
The danger zone temperatures include room temperature so, it is extremely important to limit the amount of time food is allowed to stay at room temperature. Leaving food out at room temperature for more than two hours is considered very dangerous and can easily lead to foodborne illness.

Temperatures below 4°C or 40°F will slow down the growth of bacteria. Refrigerators and walk-in coolers should be set to temperatures 4°C or 40°F or below.

Temperatures higher than 60°C or 140°F will begin to destroy bacteria. Steam tables should be set to temperatures 60°C or 140°F or higher.

Keeping foods out of the danger zone is one of the most important ways to prevent the growth of pathogens!

Temperature: The Danger Zone



The impact of temperatures on microbial growth is plotted on the thermometer above.

Hot and Cold Holding Temperatures

Type of Unit	Temperature	Effect
Refrigerators: Cold display cases, salad bars, walk in units	4°C or 40°F or lower	The growth of microorganisms slows down.
Freezers	-18 °C or 0°F	Microorganisms do not grow but will survive. Parasites and their eggs will be destroyed after 21 days .
Steam Tables : Chafing dishes, bain marie	60°C or 140°F or higher	Microorganisms begin to die

Hot and cold holding temperatures are intended to prevent microbes from growing.

Oxygen

Pathogens fall into two categories:

1. Those that need oxygen to grow: **aerobic**
2. Those that grow without oxygen: **anaerobic**

The majorities of pathogens are aerobic and need oxygen to grow. They are of constant concern in daily food preparation.

Anaerobic pathogens that grow without oxygen are of great concern in canned and jarred foods. For example, botulism, caused by the anaerobic *Clostridium botulinum* organism causes neurological symptoms and is often fatal if not treated immediately.

Moisture: Available Water

Pathogens need the moisture in food to survive. Because most of the foods we eat contain moisture, most of the foods we eat are susceptible to the growth of common foodborne illness organisms.

Traditional food preservation methods reduce moisture in food by drying, smoking, and salting. Eliminating the moisture in food inhibits the growth of most bacteria.

Chapter 3. Review Questions

1. FAT TOM is an acronym that stands for the different elements needed for microorganisms to grow. Fill in the correct element next to each letter:

F

A

T

T

O

M

2. List the names of three potentially hazardous foods.

3. True or false: Foodborne organisms are very dangerous because they grow very quickly and double every 20 minutes?

4. What is the name given to the range of temperatures microorganisms grow in best?

5. True or false: Refrigeration units must be set to 10°C or (50°F) in order to stop the growth of microorganisms?

6. True or false: Steam tables must be set to 60°C (140°F) or higher. This temperature will kill microorganisms?

Chapter 4. Safe Food Handling

In this chapter you will learn about:

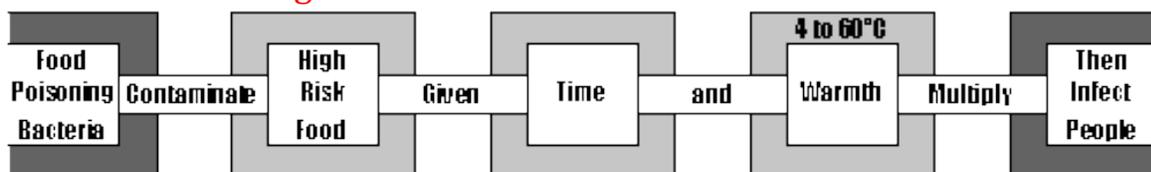
- The food poisoning chain of infection;
- How to prevent foodborne illness by using safe food handling techniques;
- How to avoid cross contamination in the kitchen;
- How hand washing prevents cross contamination;
- The importance of maintaining temperatures regarding:
 - Internal temperatures
 - Danger zone temperatures
 - Hot and cold holding temperatures
- How to calibrate a food thermometer

How does safe handling prevent food poisoning?

In most cases of food poisoning a chain of events takes place. To prevent illness, this chain must be broken. The illustration below shows the chain of events that take place in a typical food poisoning. If the chain is broken at any point, food poisoning is prevented. If the chain is not broken then the result is food poisoning.

Safe food handling techniques are designed to break the chain at any or all points so that illness is prevented.

The Food Poisoning Chain



The chain of food poisoning may be broken at any point above in order to prevent foodborne illness. For example, illness will not occur if:

- High risk foods are not contaminated;
- Microorganisms are not given enough time to multiply to dangerous levels;
- The proper temperatures for growth are not provided;
- People do not ingest the contaminated food.

Three major ways of breaking the food poisoning chain:

1. Protecting food from contamination
2. Preventing bacteria from multiplying
3. Destroying bacteria in food.

Protecting food from contamination:

Cross contamination occurs when harmful micro-organisms, chemicals or objects come in contact with safe or ready to eat food. Micros travel by hitchhiking on utensils, equipment and hands and can easily contaminate otherwise safe foods.

Common causes of cross contamination:

- Meat juices dripping onto ready to eat foods in walk in coolers
- Contaminated hands touching food
- Using the same equipment for raw and cooked food e.g. cutting boards, tongs and spoons
- Improper use and storage of chemicals.

Prevent cross contamination:

Refrigerate ready to eat foods separate, or on the on the top shelves, all foods should be covered, labeled & dated.

Raw meat must be stored on the lower shelves according to their final cooking temperatures; poultry is always stored on the lowest shelf.

- Use separate cutting boards for raw and cooked food
- Use different utensils to handle raw and cooked foods
- Taste food using a clean spoon for every taste or use the 2 spoon method. Here, one spoon or ladle is used to dip into the pot and the food is poured into a saucer or bowl. Then a second spoon is used to taste from the saucer.
- Store chemicals and pesticides in a separate area away from food.
- Provide salad bars with sneeze guards, cover or wrap foods on counters
- Do not top up salad bars or steam tables with fresh foods before discarding the old food.
- Frequent hand washing
- Clean and sanitize immediately after preparing raw meats or fish

Handwashing

Handwashing is the best and most effective way of preventing cross contamination in the kitchen. **Handwashing** is also the best way to stop the spread of disease such as colds and the flu. As a result, hands must be washed before starting work, before handling any food, whenever they are visibly dirty or after finishing one job and before beginning another job.

Chapter Four

Wash hands after:

- handling hazardous or raw food
- sneezing or coughing
- touching something contaminated
- smoking
- using the washroom



Always wash your hands before handling food.



Graphic created by Toronto Public Health

Scrub hands with soap for 15 seconds as in step 3.

Rather than counting for 15 seconds, it's easier to recite a nursery rhyme such as "*Jack and Jill*" while scrubbing hands.

Try reciting this rhyme while you wash your hands:

*"Jack and Jill went up the hill to fetch a pail of water.
Jack fell down and broke his crown and Jill came tumbling after".*

Handwashing Sinks

The importance of handwashing is emphasized by the law which requires food preparation areas to have a separate handwash sink. The handwash sink may not be used for any other purpose other than handwashing. It must have hot and cold running water and must always be kept supplied with soap in a dispenser and paper towels.

Note: Using the handwash sink for food preparation or dishwashing may result in fines.

Preventing microbes from multiplying:

Temperature Control

When proper cooking, holding or cooling temperatures are not maintained, this is known as temperature abuse. Temperature abuse has caused more food poisonings than any other single factor. The most common is improper cooling procedures!

Temperature abuse may be caused by walk in coolers that are too warm, steam tables that are too cold, salad bars that are not cold enough, as well as inadequate cooking, reheating and cooling temperatures.

The Danger Zone Temperatures

The range of temperatures between 4°C to 60°C or 40°F to 140°F is called the “Temperature Danger Zone”

Micros multiply very quickly in the danger zone. It is therefore, very important to keep food out of the danger zone as much as possible.

Keep hot foods hot and cold foods cold!

Hot foods must be maintained at **60°C or 140°F or higher**

Cold food must be maintained at **4°C or 40°F or lower.**

Check your temperatures every 2 hours when holding hot or cold foods

Move hazardous food through the danger zone as quickly as possible.

During preparation do not allow hazardous food to stay in the danger zone for more than 2 hours.

If food has been in the temperature danger zone for 2 hours or more, then it has to be discarded.

Destroying Microbes: Cooking Food Thoroughly

Cooking and reheating to the proper internal temperature ensures that harmful micros are destroyed before that food is eaten. Please refer to the table of recommended internal temperatures for hazardous foods on page 29

Hamburgers

Ground beef patties are particularly dangerous because pathogens are spread throughout by the mixing action of the meat grinder. To avoid “Hamburger Disease” caused by E.coli 0157H, patties must be cooked to an internal temperature of 71C/160F or until the juices run clear.

Internal Temperature Guide For Cooked Foods

Hazardous Food		Internal Cooked Temperature (hold for 15 seconds)	Internal Reheated Temperature (hold for 15 seconds)
Poultry Whole		82°C or 180°F	74°C or 165°F
Poultry Parts	<ul style="list-style-type: none"> • Poultry parts • Ground poultry or, • Ground meats containing poultry 	74°C or 165°F	74°C or 165°F
Food Mixtures	Containing poultry, eggs, meat, fish or any other hazardous food.	74°C or 165°F	74°C or 165°F
Pork	Pork products Ground pork	71°C or 160°F	71°C or 160°F
Ground beef/veal/pork	Hamburger	71°C or 160°F	71°C or 160°F
Fish		70°C or 158°F	70°C or 158°F

Chapter Four

Thermometers

A thermometer is a food handler's most important tool in the kitchen and must be used to ensure thorough cooking and safe hot and cold holding as well.

Thermometers are available in a variety of designs and prices and so will fit any budget.



Thermometers must be cleaned and sanitized after each use to prevent cross contamination; at the beginning of the day, wash the stem with soapy water, rinse under warm water, and sanitize. The stem can be sanitized by immersing in a properly prepared chemical sanitizing solution or by wiping off the stem with an alcohol swab.

Thermometers also must be calibrated (adjusted) to make sure the readings are accurate.

To do this simply, place your thermometer in a glass containing equal parts of crushed ice and water. Place thermometer in the glass and wait until the needle is steady. It should read 0°C or 32°F if necessary, adjust the nut on the back using small pliers until it reads 0°C or 32°F

In addition to probe thermometers, a display thermometer is legally required in all refrigeration units.



Check the temperatures of cold holding refrigerators and walk-ins regularly every day

How do we check the temperatures of foods?

To check the temperature of foods always use a clean sanitized thermometer, clean and sanitize after each use. This is done by washing stem with soap and water, immersing in a chemical sanitizing solution or by wiping the stem with an alcohol swab.

Check the temperature of Hot and Cold holding foods every 2 hours. The temperature has to hold steady for 15 seconds

Hot foods must be held at 60C or 140F or higher, cold foods must be held at 4C or 40F

For soups, stews, gravy or sauces first stir and then insert the probe in 2 or 3 places, avoid touching the bottom or side of the pan.

Foods must be reheated within 2 hours to a temperature of 74C or 165F and then held at a temperature of above 60C (140F). **At 60c (140F) there is no further growth of bacteria)**
Check Temperatures every 2 hours to ensure that you are keeping food safe.

Potentially hazardous foods that has been in the temperature danger zone for 2 hours or more must be discarded.

When checking the temperature of meats, the sensor or probe must be placed into the thickest part of the meat, avoid touching the bone.

Cooling Food

Preparing large quantities of food in advance and then refrigerating it until needed is a common practice in the food industry. The problem with this practice is that the quantity of hot food in large 5 or 10 gallon pots takes a dangerously long time to cool down. As it cools, food moves through the danger zone range of temperatures very slowly giving micros the time they need to multiply to harmful levels. To minimize the time spent in the danger zone, food must be *cooled quickly*.

It is important to cool foods from 60C to 20°C or from 140°F or 70°F within 2 hours, then refrigerate to 4c or 40°F within the next 4 hours.

There are two safe and simple methods of quick cooling: the shallow pan method and the ice bath method. Once cool then label and date.

Improper cooling procedures are one of the major factors causing Food Borne Illness.

Shallow Pan Method

Transfer foods from deep pots into large shallow pans to a depth of 5cm or 2 inches deep. Refrigerate the pans for quick cooling – within 2 hours or less

Ice Bath Method

Fill a sink up with ice and place the pot in the middle. Stir the contents of the pot until the food is cooled. Refrigerate within 2 hours or less

Reheating Food

Inadequate reheating of food is one of the most common causes of food borne illnesses. When ready for use, foods prepared in advance must be thoroughly reheated to destroy any micros that may be there. Foods should be reheated to at least the original cooking temperature or higher as quickly as possible at least within 2 hours. *(Please see the Internal Temperature Guide page 29).*

Never reheat foods in steam table or hot holding equipment, food has to be reheated on a stove top, oven or microwave and should be reheated only once.

Defrosting Food

Frozen food defrosts unevenly. Food begins to defrost on the outside first and continues inward toward the center which defrosts last. This may lead to potential problems for several reasons. First, if food is still frozen in the center at the time of cooking, it may result in inadequate cooking. If food is thawed at room temperature, as the outside thaws, harmful micros may begin to grow and multiply. Frozen foods can be defrosted safely in several ways:

- In the refrigerator,
- Under running cold water in the sink,
- In the microwave, for small portions – complete the cooking process immediately after.
- Many foods can be cooked from frozen, on the grill, fryer or in the oven

Can raw meats or fish be re-frozen after thawing?

If raw meat or fish or other potentially hazardous foods has been completely defrosted, it must not be refrozen unless it is cooked first.

If defrosted raw meats or fish is cooked first, then it is safe to refreeze.

Chapter 4: Review Questions

1. How can the food poisoning chain be broken?
 - a. Avoiding cross contamination
 - b. Cooking foods to proper internal temperatures
 - c. Keeping hot food hot and cold food cold
 - d. Frequent and proper handwashing
 - e. All of the above
2. Raw meat juices dripping onto lettuce and tomato salad during storage in the fridge is an example of _____?
3. True or false: Hands must be washed after sneezing or coughing in order to prevent spreading these germs onto food?
4. True or false: To avoid “hamburger disease”, ground beef patties must be cooked to an internal temperature of 71°C or 160°F or until the juices run clear?
5. True or false: Temperature abuse is the most common form of food borne illness?
6. True or false: It is safe to allow a five gallon pot of beef stew to cool in the refrigerator?
7. Which method of cooling food *is not safe*?
 - a. Shallow pan
 - b. Ice bath
 - c. Reduce volume
 - d. Room temperature
8. What is the most accurate method for checking the internal temperature of food?

Chapter 5: Personal Hygiene

In this chapter you will learn how to prevent dangerous micro-organisms from getting into food and the importance of:

- **Clean clothes**
- **Personal habits to avoid when preparing food**
- **Hand washing**
- **When to phone in sick**
- **The use of gloves**
- **What servers need to know about handling plates, glasses and cutlery**

Why is good personal hygiene important for food handlers?

Good personal hygiene is essential in order to prepare safe and wholesome food. Harmful microorganisms hitchhike easily from one place to another. Keeping in mind that harmful microorganisms are everywhere including, on the clothing we wear, over the entire body and especially on our hands, being and staying clean is extremely important. This chapter details how food handlers should practice good personal hygiene.

Hair Restraints

Nothing upsets restaurant patron's more than finding hair in their food. To avoid upsetting patrons and to avoid food handler hair falling into food, some sort of hair restraint must be worn to confine hair. Options for hair restraints include hair nets, baseball caps, chef's hats or kerchiefs. Wearing hair restraints also prevents hands from touching hair, for example, to get it out of eyes. It is also important to note that most food premises regulations in Canada require food handlers to wear hair restraints while working. Bacteria could be on your hair and can easily be transferred into food.

Clothing and Aprons

Food handlers must wear clean outer clothing or a uniform while at work. Avoid working in street clothes. It is much more sanitary to bring your work clothes with you to work and change when you get there, than it is to wear your work clothes on the street on the way to work. Also, a clean apron should be worn on top of the uniform. Aprons should be changed when they become soiled with food and dirt and especially with raw meat juices.

Smoking

In addition to obvious health concerns, smoking also poses food safety risks. First, while smoking, a person is repeatedly touching their mouth and therefore risks contaminating food with microorganisms from their mouth. As well, ashes and cigarette butts may accidentally fall into food. For these reasons, smoking is strictly forbidden in the kitchen. Food handlers must go outside to smoke and then wash their hands before returning to work.

When to Phone In Sick

It can be tough deciding whether to phone in sick. No one wants to miss work knowing that co-workers depend on you to do your share. And for many people, taking time off to be sick means not getting paid. However, the poor health of only one food handler can end up making many people very sick!

Under no circumstances should a food handler prepare food if they are suffering from **fever, sore throat, vomiting, diarrhea, or fever, or sneezing or coughing**. You can be spreading pathogens even though you wash your hands

If you are sick report your illness to management, particularly symptoms such as diarrhea, or confirmed foodborne illness, food handlers must seek medical attention promptly. A doctors note may be required before returning to work.

Under some circumstances, a food handler may continue to work if they are reassigned to non-food related duties.

Hand Washing

Hand washing is the single most important activity to prevent the spread of disease. As discussed in the previous chapter, food handlers must wash hands often and carefully.

Always wash hands before handling food.

Gloves

The use of rubber or latex gloves can be a very important tool in preventing the spread of food borne illness. However, in practice the use of gloves is the most commonly misunderstood and misused tool in the kitchen. There is a feeling that by wearing gloves, food handlers cannot contaminate the food, utensils or people they touch will the gloves are worn. Unfortunately, this is not true.

Gloves do not prevent cross contamination and are not immune to micro-organisms if they are not used correctly. To understand how to use gloves safely, it is important to understand how gloves work.

Wearing gloves is like wearing an extra layer of skin. When you put on a glove, the bacteria on your hand stays inside the glove. However, similar to the skin on your hand, the gloves you wear will become contaminated by everything they touch as well. It is a mistake to think that because of gloves, you don't have to wash your hands and not change the gloves with every new activity.

The correct use of gloves involves two important actions.

First, wash your hands every time you put on a new glove.
Second, change gloves every time you change an activity.

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This means, wash hands and put on fresh gloves after using the washroom, taking out the garbage, cleaning, changing the type of food being prepared, etc. This can become very expensive and therefore in most cases the use of gloves is not recommended. There are several barriers we can use to avoid bare hand contact such as wax paper sheets, tongs, spoons forks, napkins

Gloves are best used to completely cover a hand wound or infection a food handler may have. Using a glove in this case, prevents any micro-organisms from getting into food from the food handler's wound. None the less, the glove must be changed frequently and hands washed according to the activities of the food handler.

Information for Servers: Handling Plates, Glasses and Cutlery

The effort that has gone into keeping food safe to eat should not be taken for granted when it is finally time to serve customers. Servers may contaminate food by the way they bring plates, glasses or cutlery to the table. In short, never touch any part of a plate, a cup, a fork or a spoon that will go into someone's mouth.

Remember:

- Forks and spoons may only be handled by the stem.
- Cups may only be handled by the handle. That's what handles are for.
- Glasses may only be handled by the bottom or by holding the glass as close to the bottom as possible. Do not put your fingers over the rim of the glass.
- Plates may only be handled by holding it from underneath. Do not put your thumb on top of the plate as you're carrying it to the customer.

Chapter 5. Review Questions

1. Hair restraints must be worn by food handlers when preparing food in order to:
 - a. Prevent hair from falling into food during preparation
 - b. Prevent food handlers from touching their hair
 - c. Both a and b
2. True or false: Hand washing is the single most important action in the prevention of foodborne illness?
3. True or false: Food handlers with symptoms such as diarrhea should not handle food until their symptoms clear up completely?
4. True or false: Food handlers must wash their hands after every task in the kitchen unless they are wearing gloves?
5. True or false: Servers may not touch any part of a glass that will go into a person's mouth?

Chapter 6. Housekeeping and Sanitation

In this chapter you will learn:

- The difference between cleaning and sanitizing
- What should be sanitized
- How to prepare a sanitizing solution
- How to clean and sanitize large equipment
- The proper methods for washing and sanitizing: dishes and utensils 3 compartment sink
- Pots and pans in a two compartment sink
- Using a mechanical dishwasher
- Tips for controlling pests

Why is Good Sanitation Important in a Food Premises?

Maintaining a high level of sanitation in a food premise helps prevent microorganisms from getting into food. In fact, the laws in Ontario require all food preparation areas and all food contact equipment be constructed of a washable material and also, that they be maintained in a clean and sanitary manner. In short, this means that walls, floors, ceilings, and all equipment in the food preparation area is washable and is always kept in good repair. The following chapter details how to maintain a food premise in a clean and safe manner.

In food premises, surfaces and equipment must not only be cleaned, they must be sanitized. So the first step to good sanitation is to understand the difference between cleaning and sanitizing.

Cleaning refers to the removal of dirt you **can see**. Clean using soap and water and depending on the surface, scrub using brushes, rags, sponges or mops. Cleaning may remove some microorganisms from surfaces but not enough of them to make it safe for further use. That is why items need to be sanitized after cleaning.

Sanitizing refers to the removal of microorganisms from cleaned surfaces that you **cannot see**. **Sanitizing** involves the use of chemicals or extreme heat to destroy most microorganisms that were not removed by cleaning.

Any utensil, work surface or piece of equipment that comes in contact with food must be sanitized after cleaning. They include:

- Cutting boards are to be cleaned and sanitized after every use when preparing meats or fish,
- Cutting boards used for continual use minimum every 4 hours
- Counter tops
- Mixers, Slicers
- Pots and pans
- Knives and other utensils
- Dishes , cutlery, glasses and cups
- Tables sanitized and table coverings changed after each use.

Approved Chemical Sanitizers

Here are three approved chemical sanitizers for use in food premises. They include:

1. Quaternary ammonium compound (Quats)
2. Iodine
3. Chlorine (bleach)

In addition, hot water at a temperature of 77°C or 170°F may also be used as a sanitizer in the 3 sink dishwashing method.

Vinegar is not an approved sanitizer for food premises

Mention must be made of vinegar because of common misconceptions. Please note **vinegar is not an approved sanitizer for food premises**. It is important to remember that vinegar does not have the fast killing power needed to destroy pathogens in a food premises. For fast and effective sanitizing, one of the above sanitizers must be used.

Preparing Sanitizing Solutions Using Chlorine

Mix 2ml ($\frac{1}{2}$ teaspoon) chlorine for every litre of water. This will result in a sanitizing solution that is 100 ppm (parts per million). Wash, rinse then soak in solution for 45 seconds to 1 minutes and then air dry – do not rinse

A 100 ppm solution is used to sanitize dishes and utensils.

Mix 4ml (1tsp.) chlorine for every litre of water resulting in a sanitizing solution of 200ppm. The solution may be used out of a bucket or in a spray bottle. **A 200ppm solution is used to sanitize table tops, counters and food preparation work surfaces. (Use a sanitizer test strip)**

Chlorine solutions lose their strength with time especially if it is kept in a bucket or spray bottle. A new solution should be prepared about every three or four hours.

If using quats; follow manufacturing guidelines to obtain a solution of 200 ppm.

If using iodine; follow manufacturer's guidelines to obtain a solution of 25 ppm.

Test stripes are available for all the above chemicals. **Using test stripes is required by law because they ensure the accuracy of the sanitizing solution mixtures.**

Cleaning and Sanitizing Large Equipment and Counter Tops

Large pieces of equipment such as mixers may be cleaned and sanitized as follows:

Wash unit with soapy water and rinse with fresh water. Using a spray bottle, apply a chlorine solution of 200 ppm and allow unit to air dry. Steam or hot water may also be used to sanitize. If so, hot water should be at a temperature of 82°C or 180°C

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Cleaning and Sanitizing Utensils and Dishes in a three Compartment Sink



Scape, rinse/soak

Sink #1 is used for washing with soap and water

Sink #2 is used for rinsing at a temperature of 43°C (110°F)

Sink #3 is used for sanitizing soak for 45 seconds to 1 minute

100ppm chlorine solution at 24°C (75°F)

Quats 200 ppm or Iodine 25ppm 24°C (75°F)

Or Hot water at 77°C (170°F) for 2 minutes

Check sanitizer with a test strip

Cleaning and Sanitizing In a two Compartment Sink



Sink#1 is used for washing and rinsing at 24°C (75°F)

Sink#2 is used for sanitizing: solution at 24°C (75°F) for 45 seconds to 1 minute

100ppm Chlorine

200ppm Quats, for 45 seconds to 1 minute

Or Hot water at 77°C (170°F) for 2 minutes

Check sanitizer with a test strip

Allow to air dry or dry with a paper towel

Cloths or towels used for washing dishes to be clean and in good repair and used for no other purposes Allow dishes, pots, pans and utensils to air dry on a clean, corrosion resistant, sloped drainage rack



A sanitizing solution using either quats or chlorine can be used in a spray bottle in order to sanitize table tops, counters and food preparation work surfaces. Spray and leave on for at least 2 minutes, wipe or air dry. Chlorine needs to be changed daily, *best practice, at least every 4 hours*

Mechanical dishwashers come in a wide variety of shapes and sizes they all work on the same basic principles wash, rinse, sanitize.

High temperature dishwashers sanitize using hot water; Low temperature dishwashers use chemicals to sanitize, thermometers are required for both to ensure the water temperatures are correct, for low temperature dishwashers' chemical test strips are required in order to check the concentration of the sanitizer.

Dishes must be manually sorted and scraped before placing into the machine, do not overload the machine. ***Follow manufacturer's instructions regarding maintenance of your dishwasher.***

High Temperature Dishwashers:

High temperature dishwashers use hot water to sanitize; water temperature is very important otherwise items will not be sanitized. Check and record the wash and rinse temperatures daily.

Wash 60°C to 71°C / 140°F to 160°F : clean water and detergent, rinse, **sanitize at a water temperature of not less than 82°C / 180°F for not less than 10 seconds.**

Low Temperature Dishwashers:

Low temperature dishwashers use chemicals to sanitize; three things must be monitored daily.

- **Concentration of the sanitizer:** too little sanitizer will result in an inadequate reduction of harmful microorganisms. Too much can be toxic. Check and record the concentration daily using a chemical test strip. Chemical sanitizers and concentrations are Quaternary ammonium 200ppm, Chlorine - 100ppm and Iodine 25ppm.

- **Temperature of the water:**

Wash water temperature of not lower than **60c /140F – and not higher than 71c /140F.**

Sanitizing - water temperature of **not lower than 24C /75F.** Check and record the water temperatures daily.

- **Contact time:** the cleaned item must be in contact with the sanitizer for the recommended length of time of **45 seconds**, in order to allow the sanitizer to kill harmful microorganisms

Housekeeping

Food preparation can be a messy business. Preparing, cooking and serving large quantities of food on a daily basis require good organization, hard work and constant cleaning.

Operators that cut corners by skipping daily clean up chores will quickly find themselves in trouble with their customers and with health inspectors.

A good way to stay on top of cleaning chores is to create a cleaning schedule. A schedule identifies all the required cleaning and how often it should be cleaned during the day or during the week.

The operator or manager then assigns the various duties to the staff.

In general, floors, equipment and washrooms must be cleaned daily. Walls and ceilings must be kept in good repair and kept clean. Cleaning underneath equipment and in hard to reach areas should be cleaned as often as necessary to keep grime from building up. Vents and exhaust hoods must also kept clean and free of grease buildup.

Pest Control

Pests such as flies, roaches, mice and rats are naturally attracted to the food and shelter a food premises provides. **Once these pests enter and get established, it is a difficult chore to get rid of them. It is therefore best to keep pests out.** Here are some tips on pest control:

Keep your premises clean! The smallest amount of food debris or grime provides food for pests. Make sure to clean underneath equipment and in corners. Good housekeeping is essential to preventing pest infestations. Eliminate nesting areas by keeping areas free of unused equipment or boxes.

Eliminate water supply by keeping taps in good repair and by making sure water is not pooling anywhere on the floor. Caulk and fill holes around pipes and drain openings in the walls and floors. Check deliveries for any signs of pests. Cockroaches and rodents can hitchhike from place to place in food containers.

Check storage and food prep areas daily- look for signs of cockroaches, ants, flies, look for droppings, dead insects, your pest control company can give you pest strips that you can place in the storage areas to help monitor. Look for chew marks on packaging

Hiring a reputable and licensed pest control company is recommended and can be a good investment, particularly if their service prevents or eliminates infestations.

Garbage and waste: to be removed from the premise at least twice weekly, or as often as necessary to maintain the premise in a sanitary condition. Garbage is to be stored in a closed bin. Garbage containers in food prep areas must be emptied, cleaned and sanitized daily.

Do not store garbage in the dry storage area.

Chapter 6 Review Questions

1. True or false: Sanitizing kills microorganisms that cannot be seen with the naked eye?
2. True or false: Cleaning removes visible dirt and some microorganisms?
3. True or false: Vinegar may be used as substitute for chlorine when mixing a sanitizing solution?
4. True or false: When using a 2 or 3 compartment, the last sink is always used to sanitize?
5. True or false: Approved sanitizers include, chlorine, quats, iodine or hot water at 77°C or or 170°F ?
6. True or false: Dishes and utensils should be dried with a clean cloth?
7. True or false: All food contact surfaces such as cutting boards, knives, and thermometers must be cleaned and then sanitized?
8. True or false: Mechanical dishwashers must have a sanitizing cycle that sanitizes using hot water at 82°C or 180°F or sanitizes with the use of approved chemicals?

Chapter 7. Ensuring Food Safety: HACCP

In this chapter you will learn:

- What HACCP stands for
- What are the basic principles of the HACCP system
- What is a critical control point (CCP)
- What are the 7 steps to developing a HACCP system

What is HACCP?

Hazard Analysis Critical Control Point, is the name of a system used to ensure the safe preparation of food. HACCP is a system that controls the safety of the product as it being prepared, rather than trying to detect problems by testing the product after it is finished.

HACCP was developed by the Pillsbury Corporation for the NASA space program who wanted to guarantee the safety of food for astronauts while in space.

Fortunately, the HACCP system is not as complicated as its name may sound. It simply incorporates all the principles of safe food handling into a system that monitors food from receiving to serving. The goals of a HACCP program are to:

- Identify high risk factors
- Identify corrective actions required to reduce or eliminate risks
- Monitor the safe preparation of foods
- Record steps taken

Hazard Analysis

- A review of recipes to determine any hazards associated with each step in the preparation of those foods.

Critical Control Point (CCP)

- A point during the processing of food at which control can be applied and a food safety hazard can be prevented, eliminated or reduced to acceptable levels. Examples include, cooking, cooling, hot and cold holding.

The Benefits of HACCP - HACCP provides businesses with a cost effective system for the control of food safety, from delivery, storage, cooking, holding and serving.

The benefits of HACCP are:

- *Avoids potential food borne illness*
- *Increases food safety standards*
- *Ensures that you in compliant with the law*
- *Increases confidence with patrons and staff*
- *Allows you to monitor and control any hazards*

Keeping records on file is important in the event of a reported foodborne illness or recall.

7 Steps to HACCP

- 1. Review recipes and assess level of risk**
- 2. Identify Critical Control Points**
- 3. Establish Preventive Measures with Critical Limits for each CCP**
- 4. Establish Procedures to Monitor the CCPs**
- 5. Take Corrective Action**
- 6. Verify the system is working**
- 7. Keep Records**

- 1. Review recipes and assess level of risk** there are 3 levels of risk in HACCP: low, medium and high. Low risk foods include cereals, breads and dry goods. Medium and high risk foods include poultry and poultry products, beef, veal, pork, seafood, mixed salads, rice dishes, dairy and cream products.

The first step is to look at each recipe or menu item and any of the potentially hazardous food items. Next, set up a flow chart by breaking down the recipe as follows:

- Receiving
- Storage
- Preparation
- Cooking
- Portioning
- Serving
- Use of leftovers

Chapter Seven

2. Identify Critical Control Points (CCPs)

CCPs are points in food production from its raw state through processing and consumption at which the potential hazard can be controlled or eliminated. It refers to procedures that either prevents micro-organisms from growing or, that kill micro-organisms. Examples are cooking temperatures, cooling procedures, equipment sanitation, personal hygiene procedures, holding times and temperatures.

3. Establish Preventive Measures with Critical Limits for each CCP

Write down the CCPs including, correct time and temperatures, cooling procedures etc., identified in step 2, that must be met to prevent foodborne illness.

4. Establish Procedures to Monitor the CCPs

Such procedures might include determining how and by whom cooking time and temperature should be monitored. Other examples of monitoring procedures include:

- Taking food temperatures - cold and hot holding every 2 hours
- Washing hands
- Reheating foods to safe temperatures

5. Take Corrective Actions - Establish a corrective action to be taken when monitoring shows that a critical limit has not been met. For example, reheating or disposing of food if the minimum cooking temperature is not met.

6. Verify or monitor the steps established to see that the system is working well, be sure to do this if you have added a new menu item

7. Keep Records This includes keeping records (Daily Temperature Logs) of hazards and their control methods, the monitoring of safety requirements and action taken to correct potential problems.

Purchasing, Receiving and storage of foods

Purchase foods from Reliable suppliers, keep invoices on file – your health inspector may want to look at your invoices.

Reliable approved suppliers will get their food from approved sources, they also understand the importance of practice safe food handling also having an approved reliable supplier helps with tractability.

When receiving food it is important to check all deliveries to ensure food is fresh, wholesome and safe.

Prepare shelves before delivery, rotate your stock we call this FIFO – this is the first in first out system to ensure freshness of foods. Check the temperatures of foods. Check expiry or best before dates.

Chapter Seven

Put away temperature sensitive foods first.

Do not accept any food if packaging is dirty, damaged or past the expiry date.

Do not overload shelves in the coolers or refrigerated units this will reduce the circulation of air. Store all foods in walk in coolers and freezers 6inches or 15cm off the floor

Meats are to stored according to their final cooking temperature – poultry on the lower shelves

Frozen foods: must be received frozen – if the package is damaged or there are large ice crystals it may indicate the food had been thawed and them refrozen – *Reject it*

Dry Goods: Check for damage, tears or open bags, look for moisture stains on bags of dry goods such as flour, rice, sugar, ect., if you see signs of water damage or insect infestation then *Reject it*

Canned goods: check for bulging, rusty or severely dented cans if can is leaking or label is missing or if it is dented especially around the seal – *Reject it*

Fresh fruits and vegetables: look for bruising or brown spots and mould.

Fresh meat and fish - fish should be packed on ice and received at a temperature of 4°C or 40°F or colder there should be no fishy odor, all fresh meat must be received at 4°C or 40F or colder

Store all food and supplies a minimum 6 inches or 15 cm off the floor so that you can wash the floor reducing the risk of dirty water or chemicals contaminating food and supplies. *This can also help with pest control.*

Keep dry food storage areas clean and well ventilated, look for signs of insects and pests.

Chapter 7 Review Questions

1. True or false: HACCP is a system that monitors the overall safety of a food product from delivery, during all the stages of preparation and finally to serving?
2. True or false: Critical control points (CCPs) refers to procedures that either prevent micro-organisms from growing or, that kill micro-organisms?
3. True or false: An example of a CCP is to cook food to the appropriate internal temperature?
4. True or false: The HACCP system requires a review of recipes to determine the level of risk associated with that item?
5. True or false: Examples of high risk foods include cereal, dry goods and breads?

Glossary of Terms

Appendix 1 Glossary of Terms

Allergen: Any substance that causes an allergic reaction

Anaphylaxis: A severe allergic reaction that could be fatal if not treated quickly

Acidic food: Foods that contains higher amounts of acid such as, tomatoes, lemons, vinegar

Bacteria: A type of microorganism. A living organism that is invisible to the naked and found everywhere in the environment. Some bacteria are harmful and may cause foodborne illness.

These single-celled microbes reproduce by splitting in two - often very rapidly. In the right conditions of warmth, acidity and moisture they can produce millions of cells in a few hours. Some bacteria form spores which are resistant to drying and heating. They can survive cooking and will start to grow again under ideal conditions (F A T T O M)

Spore forming bacteria in food can produce a toxin. When consumed can cause vomiting, nausea and diarrhea. Toxins in food can survive cooking,

Bacterial intoxication: Food that has been contaminated by toxin producing bacteria.

Best Before Date: date that indicates when food should be consumed or should be frozen

Biological contamination: Harmful microorganisms found in food

Chlorine: A chemical used for disinfecting or sanitizing

Contamination: Introduction of unwanted microorganisms, disease agents or objects in food

Critical Control Point (CCP): Term used in the HACCP system indicating the stage in food preparation at which microorganisms are either prevented from growing or destroyed.

Cross contamination: Unknowingly transferring pathogens from raw foods to ready to eat foods, common sources include improper storage, poor personal hygiene, unsanitized equipment and utensils, pests and insects

Cutlery: Knives forks and spoons – eating utensils

Danger Zone: The range of temperatures from 4°C - 60°C or 40°F - 140F that pathogens grow best

Foodborne illness: Commonly known as food poisoning. An acute illness caused by ingesting food contaminated with foodborne pathogens.

Food premises: A legal term referring to any place where food is manufactured processed or prepared for sale to the public.

Glossary of Terms

FIFO: Acronym that stands for First In First Out. Refers to the rotation of food where those foods in storage longest should be the first to be used.

Food grade containers: Safe for food storage and will not transfer toxic substances into food

HACCP – Hazard Analysis Critical Control Point: The name of a quality assurance system used to identify, monitor and correct hazards or risks in food preparation.

Microorganisms (microbes, germs): Invisible living single cells - bacteria, viruses and parasites

Pathogens: Harmful microorganisms that cause diseases in humans

pH: The measure of acidity and alkalinity. Most bacteria require low acidity in order to thrive

Sanitizing: A chemical or heat treatment designed to kill 999 out of 1000 microorganisms on surfaces.

Sneeze guard: A plastic or protective shield that protects food in salad bars and self-serve units from human contamination.

Spores: Protective outer surface formed by some microorganisms when conditions for growth are not favorable. Spores can survive dehydration and continue to grow when conditions improve.

Toxins: Poison produced by toxin producing bacteria

Utensils: Spoons, ladles, tongs, spatulas any tool used for cooking, serving and preparing foods

Food safety web sites

www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900562_e.htm HPPA food premises regulations

<http://www.health.gov.on.ca/en/pro/programs/publichealth/enviro/> MOHLTC

www.cfia.com Canadian Food Inspection Agency

www.toronto.ca City of Toronto Disclosure website

www.foodsafetynetwork.com Guelph Food Safety Network

www.canadianfoodsafetytraining.com Food handler training

Answers to the review questions.

Correct Answers

The following are the correct answers to the review questions found at the end of each chapter.

Chapter 1 – Public Health Laws in Ontario

1. True
2. True
3. All apply

Chapter 2 – Contaminants and Foodborne Illness

1. All apply
2. False, you can't tell by looking at food if it is safe to eat. Food poisoning germs are invisible, tasteless and odorless.
3. Possible answers include:
 - Raw meats and poultry
 - Utensils
 - Hands
 - Nose, mouth
 - Counter tops
 - Floors
4. Poultry, eggs
5. Ground beef (hamburger)
6. True
7. True
8. True

Chapter 3 – Growth of Microorganisms

1. FATTOM stands for :
 - Food
 - Acidity
 - Time
 - Temperature
 - Oxygen
 - Moisture
2. Poultry, Beef, Eggs, Fish, Cream and other dairy, Tofu (bean curd), Cooked rice, Cooked beans, Garlic in oil.
3. True
4. Danger Zone temperatures
5. False , 4°C or 40°F or less
6. True

Glossary of Terms

Chapter 4 – Safe Food Handling

1. E
2. Cross contamination
3. True
4. True
5. True
6. False , large pots of hot food must be cooled quickly using one of the safe methods for cooling, before being stored in the refrigerator
7. D
8. Using a thermometer

Chapter 5 – Personal Hygiene

1. C
2. True
3. True
4. False, gloves must be changed after every task and hands washed before new gloves are put on.
5. True

Chapter 6 – Housekeeping and Sanitation

1. True
2. True
3. False, vinegar is not a suitable sanitizer.
4. True
5. True
6. False, dishes and utensils should be air dried.
7. True
8. True

Chapter 7 – Ensuring Food Safety: HACCP

1. True
2. True
3. True
4. True
5. False, examples of high risk foods include poultry, meat, fish, eggs, tofu, and dairy products.