<table>
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<th>This is Part II of the lectures entitled “Prevention of Foodborne Illness: A Global Perspective”. Part II has sections C &amp; D.</th>
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<td>Section C is entitled: Hazard Analysis Critical Control Points System (HACCP). A good reference for this material is listed on slide #59 in this lecture.</td>
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| Slide 3 | There are many opportunities for food to become contaminated as it is produced and prepared. Many foodborne microbes are present in healthy animals (usually in their intestines) raised for food. Meat and poultry carcasses can become contaminated during slaughter by contact with small amounts of intestinal contents. Similarly, fresh fruits and vegetables can be contaminated if they are washed or irrigated with water that is contaminated with animal manure or human sewage. Some types of Salmonella can infect a hen’s ovary so that the internal contents of a normal looking egg can be contaminated with Salmonella even before the shell is formed. Oysters and other filter feeding shellfish can concentrate Vibrio bacteria that are naturally present in sea water, or other microbes that are present in human sewage dumped into the sea. Later in food processing, other foodborne microbes can be introduced from infected humans who handle the food, or by cross contamination from some other raw agricultural product. For example, Shigella bacteria, hepatitis A virus and Norwalk virus can be introduced by the unwashed hands of food handlers who are themselves infected. In the kitchen, microbes can be transferred from one food to another food by using the same knife, cutting board or other utensil to prepare both without washing the surface or utensil in between. A food that is fully cooked can become recontaminated if it touches other raw foods or drippings from raw foods that contain pathogens. The way that food is handled after it is contaminated can also make a difference in whether or not an outbreak occurs. High salt, high sugar or high acid levels keep bacteria from growing, which is why salted meats, jam, and pickled vegetables are traditional preserved foods. Microbes are killed by heat. If food is heated to an internal temperature above 160°F, or 78°C, for even a few seconds this sufficient to kill parasites, viruses or bacteria, except for the Clostridium bacteria, which produce a heat-resistant form called a spore. Clostridium spores are killed only at temperatures above boiling. This is why canned foods must be cooked to a high temperature under pressure as part of the canning process. The toxins produced by bacteria vary in their sensitivity to heat. The
Interventions at various stages in the food processing/preparation chain to ensure a safer product.

Objective: to identify hazard points that may lead to FBI, implement strategies to minimize the identified hazards, & monitor practices for compliance.

7 key principles.

1. Assess the hazard
   - Essential to effective HACCP plan
   - Food on site must be reviewed to determine which are potentially hazardous
   - Employee activities must be supervised for dangerous practices
   - Design of facility should be examined for potential flaws

2. Identify Critical Control Points (CCPs)
   - CCPs identified to control the potential hazards
   - CCPs depend on hazard
     - Cooking (e.g., to destroy Salmonella)
     - Refrigeration (to prevent microbial growth)
     - pH fluctuation (inactivate toxins)

3. Establish Standard Procedures & Set Critical Limits
   - Standard procedures:
     - Handwashing
     - Sanitizing machinery
     - Food preparation
   - Critical limits:
     - Time
     - Temperature
     - pH
     - Water activity

Although there are several measures in place to prevent foodborne disease, pathogens such as E. coli and Salmonella still continue to pose a serious health threat. In response to this threat, the federal government has mandated the implementation of hazard analysis critical control points (HACCP) strategies in the seafood, poultry and meat industries. In contrast to the traditional end product testing methods, HACCP intervenes at various stages in the food processing/preparation chain to ensure a safer product. The objective of a HACCP plan is to identify hazard points within a certain industry that may lead to foodborne illness, implement strategies to minimize the identified hazards, and monitor these practices to ensure that all implemented plans are adhered to and are effective. There are 7 key principles to the HACCP program and each will be described in the subsequent slides.

The first principle in HACCP is to assess the hazard. Adequately assessing the hazards in a food process is essential to an effective HACCP plan. The person(s) conducting the hazard assessment must review the food on site to determine which are potentially hazardous; employee activities should be supervised for dangerous practices; and the design of the facility should be examined for potential flaws.

Once the hazards have been assessed, critical control points (CCPs) are identified to control the potential hazards. This is the second principle. For example, if raw chicken is being handled, Salmonella would be an identified hazard and the cooking process would be the critical control point, because it is there that Salmonella can be eliminated. Depending on the hazard, other critical control points could be refrigeration to prevent microbial growth or fluctuation of the pH to inactivate a toxin.

The third principle is to establish standard procedures and set critical limits. Procedures such as washing hands, sanitizing machinery, and food preparation should be established and well-defined to ensure the production of a safe product. Critical limits, such as time, temperature, pH, and water activity are parameters that assure the production of a safe product. Operating outside of the critical limits could lead to foodborne illness. In the case of raw chicken, the critical limits during the cooking would be heating to an internal temperature of 73.9°C for 15 seconds or more. By not meeting these critical limits, Salmonella organisms can remain viable in numbers high enough to cause infection or possibly contaminate another food item.
### Slide 8

#### 4. Monitor Procedures

- This is necessary in order to:
  - Track operation of the facility
  - Indicate when critical values have not been followed
  - Provide documentation in the event of an inspection or other situation which may require verification

**Example:** cooking chicken

The 4<sup>th</sup> key principle in HACCP is to monitor procedures. The periodic monitoring of procedures is necessary to track the operation of the facility, indicate when critical values have not been followed, and provide documentation in the event of an inspection or other situation which may require verification. For instance, while cooking chicken, it is important to conduct periodic checks on the oven temperature. If an inspection reveals that the oven is operating at 74° C, the time, date, and temperature are recorded, and the supervisor might request that the temperature be raised slightly. By monitoring the CCPs, improperly cooking the chicken can be avoided, preventing a possible Salmonella outbreak.

### Slide 9

#### 5. Corrective Actions

- Necessary when CCP has operated outside of critical limits
- May require **discarding** a product
- May require bringing CCP back **within critical limits**
- Any deviation must be documented, & corrective action approved by proper regulatory bodies before implementing HACCP

Corrective actions must be taken when a CCP has operated outside of the critical limits. In some cases it may be necessary to discard a product, while other situations may simply require bringing the CCP back within the critical limits. In either case, the deviation from the critical limit should be documented and any corrective action should be approved by the proper regulatory bodies before implementing HACCP. This is principle #5.

### Slide 10

#### 6. Record Keeping

- Written copy of HACCP must be kept on site
- During government inspections, documentation of CCPs, critical limits, & deviations produced

If a facility is required to have a HACCP plan, a written copy of the plan must be kept on site. This is the 6<sup>th</sup> principle. In the event government inspectors visit a facility, documentation regarding CCPs, critical limits, and deviations from those limits should be available.

### Slide 11

#### 7. Verification that HACCP System is Working Correctly

- **Purpose:** check how effective plan is in ↓ hazards & identify new hazards
- Verification includes current documentation for patterns in errors or corrective actions, false reporting, ineffective CCPs, or other flaws
- Does HACCP plan result in ↓ #s of previously identified pathogens?

The final principle requires verification that the HACCP system is working correctly. The purpose of verification is to check how effective the plan is in reducing the identified hazards, and possibly reveal any hazards that might not have been previously identified. Verification may include reviewing current documentation for patterns in errors or corrective actions, which may reveal false reporting, ineffective CCPs, or flaws in the HACCP plan. Detection methods such as those previously discussed confirm the presence or absence of identified microbes and should reveal if the HACCP plan has resulted in decreased numbers of those pathogens.
Concerns of using bioterrorism through a food or water-related contamination, have emerged since 9/11 and the anthrax attacks of 2001. Three of the 6 Category A Agents of bioterrorism, as designated by the Centers for Disease Control & Prevention, can potentially be spread by purposeful contamination of food or water. These are anthrax, botulism and tularemia. Ricin is part of the waste mash produced when castor oil is made. One of its routes of exposure is by ingestion. Its consequences can range from mild symptoms to death. In December of 2010, it was reported that the Department of Homeland Security uncovered a credible threat of attacks using ricin, or other poisons, in salad bars and buffets as a bioweapon. We will discuss Category A Agents in great detail in a later unit in this course. If interested in more information on ricin, the link to this report is available at: http://www.fas.org/sgp/crs/terror/RS21383.pdf on this slide.

The FDA Food Safety Modernization Act (FSMA) was signed into law by President Obama on January 4, 2011. It aims to ensure the U.S. food supply is safe by shifting the focus of federal regulators from responding to contamination, to preventing it. The law also provides FDA with new enforcement authorities designed to achieve higher rates of compliance with prevention- and risk-based food safety standards and to better respond to and contain problems when they do occur. In addition, the law also gives FDA important new tools to hold imported foods to the same standards as domestic foods and directs FDA to build an integrated national food safety system in partnership with state and local authorities.

The FDA’s key new authorities as a result of FSMA are: 1) prevention, 2) inspection and compliance, 3) response, 4) imports, and 5) enhanced partnerships. Within each new mandate are certain authorities. Under prevention the following are included: mandatory preventive controls for food facilities, mandatory produce safety standards, and the authority to prevent intentional contamination of food. The FSMA provides FDA with new tools for inspection and compliance, such as mandated inspection frequency, access to records, and testing of specific foods by accredited laboratories. New authorities for response are mandatory recall, expanded administration, suspension of registration, enhanced product tracing abilities, and additional recordkeeping for high-risk foods. Under imports, the FDA will strive to make imports safe for U.S. consumers through importer accountability, third party certification, certification of high-risk foods, a voluntary qualified importer program, and the authority to deny entry of food from a foreign facility. In order to establish enhanced partnerships, food safety agencies need to work together by use of state and local capacity building, foreign capacity building and reliance on inspections by other agencies. Be sure to read Required Reading #2 to obtain more detail about each authority under the new mandates, with a particular focus on prevention.
This is Section D: Strategies for Preventing Foodborne illnesses. In this section we will discuss formal (from the World Health Organization) and common sense strategies to use to prevent or reduce the possibility of acquiring a foodborne illness at home, when away, and when eating out.

Several years ago, the W.H.O. published their “10 Golden Rules for Safe Food Preparation”. We will now go through each of these rules, giving as many examples and using as many illustrations as possible. These rules are designed to reduce these four groups of errors in food preparation and handling (mentioned on the previous slide). The W.H.O. offers advice so that the risk of foodborne pathogens contaminating, surviving or multiplying, can be reduced. As these are available in numerous languages, the users are encourage to adopt these rules in their respective cultural settings.

The first rule is to choose foods processed for safety. While many foods, such as fruits and vegetables, are best in their natural state, others simply are not safe unless they have been processed. For example, always buy pasteurized as opposed to raw milk, and if you have the choice, select fresh or frozen poultry treated with ionizing radiation. When shopping, keep in mind that food processing was invented to improve safety as well as to prolong shelf life. Certain foods, such as lettuce, need thorough washing.

The second rule is to cook food thoroughly. Many raw foods, most notably poultry, meats, eggs and unpasteurized milk, may be contaminated with disease-causing organisms. Thorough cooking will kill the pathogens, but remember that the temperature of all parts of the food must reach at least 70° C. If cooked chicken is still raw near the bone, put it back in the oven until it is done-all the way through. Frozen meat, fish, and poultry, must be thoroughly thawed before cooking.
Everyone who cooks should have a food thermometer. It is the only reliable way to determine if your food has reached a high enough temperature to destroy harmful microorganisms. There are many different sizes and shapes of food thermometers, and they are quite inexpensive. If you do not have one and cook, please get one soon. This poster from the USDA shows safe cooking temperatures for ham, beef, lamb and poultry.

As hamburgers are one of those “pooled products” previously mentioned to be a higher risk food, there are several strategies that can be employed to reduce foodborne illness from consuming them. First, they must be thoroughly cooked regardless of the method (e.g., frying, baking, and grilling). Before eating, cut through the burger to check that it is brown throughout—there should be no pink color noted. A common problem that occurs with bar-b-ques is that raw burgers will be taken outside to the grill on a plate. At that time, some juices may remain on the plate. After cooking, if the burgers are placed on the same plate, they can become contaminated with the juice, as the burger will not be further cooked. A strategy for reducing this problem is to use separate plates for raw and cooked burgers, or place tin foil under the raw burgers to catch any raw juice, and then remove it before placing cooked burgers on it. Finally, simply wash the plate with hot soapy water while the burgers are cooking.

Even though it is tempting, stuffing can be a high-risk food if not prepared properly. A food thermometer should always be used with turkeys, and the internal temperature takes much longer to reach adequate levels than the outer parts of the turkey. The safest thing to do is cook the stuffing separately. Once the turkey’s internal temperature is adequate, then the stuffing can be placed inside the turkey. A few safety tips regarding cooking stuffing are listed here: If you choose to stuff your turkey, the ingredients can be prepared ahead of time; however, keep wet and dry ingredients separate. Chill all of the wet ingredients (butter/margarine, cooked celery and onions, broth, etc.). Mix wet and dry ingredients just before filling the turkey cavities. Fill the cavities loosely. Cook the turkey immediately. Use a food thermometer to make sure the center of the stuffing reaches a safe minimum internal temperature of 165 °F. Guidelines for cooking turkeys and stuffing are available at the U.S. Department of Agriculture, Food Safety and Inspection Service at: [http://www.fsis.usda.gov/Fact_Sheets/Lets_Talk_Turkey/index.asp](http://www.fsis.usda.gov/Fact_Sheets/Lets_Talk_Turkey/index.asp)
Eating cooking foods immediately is the 3rd rule. When cooked foods cool to room temperature, microbes begin to proliferate. The longer the wait, the greater the risk. To be on the safe side, eat cooked foods just as soon as they come off the heat.

Buffets can present several problems, including inadequate holding times, inadequate heating times, and potential for contamination by hands or vectors. These problems can be reduced by not leaving foods out for prolonged periods without either heating tools or ice, depending upon what is being served.

The 4th rule is to store cooked foods carefully. If you must prepare foods in advance or want to keep leftovers, be sure to store them under either hot (near or above 60 °C) or cool (near or below 10 °C) conditions. This rule is of vital importance if you plan to store foods for more than four or five hours. **Foods for infants should preferably not be stored at all.** A common error, responsible for countless cases of foodborne disease, is putting too large a quantity of warm food in the refrigerator. In an overburdened refrigerator, cooked foods cannot cool to the core as quickly as they must. When the center of food remains warm (above 10 °C) for too long, microbes thrive, quickly proliferating to disease causing levels.

Here is one example of a food temperature guide. Note the different temperatures indicated for beef, pork, and poultry.

This temperature guide list temperatures in both degrees Fahrenheit and Celsius (Centigrade) for your reference. An essential fact you should remember for food safety is that the danger zone, in terms of temperature, during which bacteria can multiply rapidly in food, is 40-140° F (or 4-60° C). To prevent this, foods need to be cooked to hot enough temperatures and cooled to cold enough temperatures so that they are not in this temperature zone. This seems straightforward enough, but temperature abuse is a very common case of foodborne outbreaks.
### Slide 28

**Food Preparation Area**

On this slide are two photographs of what it might look like in a hospital food preparation area.

### Slide 29

**Common Error Re: Storage**

- Putting ↑ quantity of warm food in refrigerator
- Cooked foods then can’t cool to core quickly
- If food center remains >10°C too long, microbes thrive

A common error that occurs during the storage of food can result in foodborne illness. That is placing large quantities of warm food in the refrigerator at one time. This overloads the system and does not allow all of the food to rapidly cool to proper temperatures, and can result in the multiplication of microbes in the food.

### Slide 30

**Refrigerator Storage Guides**

These diagrams provide several tips for storing food in the refrigerator to prevent contamination. Raw meats should be covered and not allowed to drip onto food that will not be cooked later. Vegetables and fruit should be kept in sealed bags in a drawer. If there is not a drawer, then these items should be placed above raw meats.

### Slide 31

**5. Reheat Cooked Foods Thoroughly**

- Proper storage slows down microbial growth but does not kill the organisms
- Reheat leftovers so all parts reach 165°F

The fifth W.H.O. food safety rules is to reheat cooked foods thoroughly. This is the best protection against microbes that may have developed during storage (proper storage slows down microbial growth but does not kill the organisms). Once again, thorough reheating means that all parts of the food must reach at least 165°F.

### Slide 32

**Case Example: Botulism**

- Several cases in one family
- Not first meal
- Reheating

There was a case in California when I was working there, involving several family members. The situation was this. First, one day, an entire family had turkey curry. Then it was left out and reheated the next day. Several family members ate this dish. Botulism poisoning occurred in several family members. When public health workers investigated, they found that only those family members who ate the leftover curry were infected. It turns out that when the leftover curry was sampled, botulinum spores were found in the very center of the batch. The curry had not been reheated adequately to ensure that safe temperatures were achieved throughout the entire pot of curry. In order to prevent foodborne botulism, foods needs to be heated to proper temperatures.
Safely cooked foods can become contaminated through even the slightest contact with raw food. This cross-contamination can be direct, as when raw poultry meat comes into contact with cooked foods. It can also be more subtle. For example, if a raw chicken is cut and then the same cutting board and knife used to carve the cooked bird. Doing so can reintroduce the disease-causing organisms. Thus, the 6th rule is to avoid contact between raw & cooked foods.

The knife and cutting board, if used, should be cleaned between handling raw chicken and foods that will not be cooked later. Better yet, have separate cutting boards for raw and cooked foods.

The recommendation about washing hands after cutting chicken or other raw meat is important because *Salmonella* and other bacteria can be spread to raw foods, surfaces, utensils, and other objects, resulting in potential foodborne illness incidents.

Wash hands thoroughly before preparing food and after every interruption - especially if activities such as changing the baby or personal toileting are done. After preparing raw foods such as fish, meat, or poultry, wash again before handling other foods. Be sure to bandage or cover any cuts on hands before preparing food. Remember, too, those household pets - dogs, cats, birds, and especially turtles - often harbor dangerous pathogens that can pass from your hands into food.
### Slide 38

**Example of poster used to remind food service workers to wash hands**

Many restaurants have signs like this in the restrooms to remind employees to wash their hands after using the restroom.

### Slide 39

**8. Keep All Kitchen Surfaces Meticulously Clean**

- Clean counter used for raw foods before you put cooked foods or foods not to be heated later
- Clean cloths & utensils frequently
- Don’t smear organisms on counters

Since foods are so easily contaminated, any surface used for food preparation must be kept absolutely clean, which is the 8th rule. Cloths that come into contact with dishes and utensils should be changed frequently and boiled before re-use. Separate cloths for cleaning the floors also require frequent washing.

### Slide 40

**Kitchens In Use**

These pictures show several different views of kitchens in use.

### Slide 41

**Keep Grinders & Utensils Clean**

It is important to remember that utensils and appliances (e.g., grinders, blenders and graters) also need to be cleaned in between different food items, especially raw and cooked foods, so that they do not become contaminated. This is a detail that can be easily overlooked. The item on the left is a meat grinder and a cheese grater, therefore it is used for both raw items and items that will NOT be cooked further. It is imperative that it is cleaned after using on raw meats.

### Slide 42

**9. Protect Food from Insects, Rodents, Other Animals**

- Keep food in storage containers
- Don’t leave food uncovered
- Pick up dog, cat food dishes overnight

The ninth W.H.O. rule is to protect food from insects, rodents and other animals. Animals frequently carry pathogenic microorganisms, which cause foodborne disease. Store foods in closed containers. Food should not be left uncovered and it is a good idea to pick up pets’ dishes overnight so that they do not invite rodents, insects or other animals. There have been cases of raccoons coming into houses through pet doors to eat dog and/or cat food.
### Slide 43

**Avian Influenza Update…**
- Wash hands thoroughly with soap & water after handling frozen or thawed raw eggs
- Cook egg yolks so not runny
- Do not eat raw eggs
- IN areas where avian flu cases have occurred

To date, there have been no cases of avian influenza in humans related to eating chicken. Chicken that has been cooked to an internal temperature of 180°F should NOT transmit avian influenza. If traveling to areas where avian flu cases have occurred, 3 strategies are recommended re: eggs: 1) wash hands thoroughly with soap & water after handling frozen or thawed raw eggs, 2) cook eggs so that the yolks are cooked, not runny and 3) do not eat raw eggs.

### Slide 44

**About Summer Eating**
- Keep foods chilled
- Keep foods covered

This picture raises several questions for outdoor cooking: how long was food kept outside before cooking, was food cooked to a safe enough temperature, and how long was the cooked food kept at unsafe temperatures? Keep foods covered and chilled when doing outdoor entertaining and remember that homemade ice cream is made from eggs. See the next slide for more information about eggs.

### Slide 45

**About Eggs…**
- Don’t use raw eggs in hospital
- Don’t recommend at all
- This includes homemade ice cream, egg nog

Raw eggs are really not a good idea at all, as they can be a pooled product (so have a higher risk of contamination), can be sources of *Salmonella*, and absolutely should not be used in hospitals. Foods and beverages that are made from raw eggs include homemade ice cream, Caesar salad dressing, and egg nog.

### Slide 46

**10. Use Safe Water**
- If any doubts, boil before adding to food
- Boil before freezing for ice cubes
- Take special care with preparing infant’s meals

The 10th and final W.H.O. rule for food safety is to use safe water. There are several strategies to ensure the use of safe water. Boiling before adding to food or drink should be done if there is any doubt about the source of the water. This includes before filling ice cube trays. It is essential that safe water be used when preparing infants’ meals, as they do not have mature intestinal systems to protect them from foodborne illness.

### Slide 47

**Bottled Water**
- Know source & treatment
- Standards for bottled water (FDA) based on standards for tap water from EPA
- Read labels on bottled water

Americans spend billions of dollars every year on bottled water. People choose bottled water for a variety of reasons including aesthetics (for example, taste), health concerns, or as a substitute for other beverages. If you have questions about bottled water, make sure you are informed about where your bottled water comes from and how it has been treated. The standards for bottled water are set by the United States Food and Drug Administration (FDA). The FDA bases its standards on the EPA standards for tap water. (For basic information on bottled water, see EPA’s brochure on Bottled Water Basics. The link for this is on the top of this slide.) Read the label on your bottled water. While there is currently no standardized label for bottled water, this label may tell you about the way the bottled water is treated. Check the label for a toll-free number or Web page address of the company that bottled the water. This may be a source of further information.
A very common mistake that travelers make is to not think about the fact that ice is made from water that is not necessarily safe. So adding it to drinks can be a high-risk activity for acquiring a foodborne illness. If you are not sure that the source of the ice is safe, don’t consume it when you travel to areas known for contaminated water.

If foods have been possibly rinsed with water and are not going to be cooked further, you can acquire a foodborne illness if the water was contaminated. This is true for lettuce, spinach and fruit. A good general rule if traveling to areas with questionable water, is to not eat lettuce products and only eat fruit that can be peeled. That way, by peeling the fruit, if the outside was contaminated and is removed, so should the hazard be removed.

You can protect yourself first by choosing which restaurant to patronize. Restaurants are inspected by the local health department to make sure they are clean and have adequate kitchen facilities. Find out how restaurants did on their most recent inspections, and use that score to help guide your choice. In many jurisdictions, the latest inspection score is posted in the restaurant. Some restaurants have specifically trained their staff in principles of food safety. This is also good to know in deciding which restaurant to patronize. You can also protect yourself from foodborne disease when ordering specific foods, just as you would at home. When ordering a hamburger, ask for it to be cooked to a temperature of 160°F and send it back if it is still pink in the middle. Before you order something that is made with many eggs pooled together, such as scrambled eggs, omelets or French toast, ask the waiter whether it was made with pasteurized eggs, and choose something else if it was not.

Some additional strategies for preventing foodborne illness, by reducing hazards associated with the contamination of food, not listed in the W.H.O. recommendations, are listed and described on this and the next slide.

1. Disinfect dishcloths frequently (each day) by placing is disinfectant soap, or heating in a cup of water in a microwave, before cleaning counters. It is also acceptable to place the dishcloth in the dishwasher. Counters and sinks should be cleaned with hot soapy water between placement of high-risk foods on the same surface. Dishcloths or sponges should be rinsed out and placed to dry, not left sitting in pools of water, between uses.

2. Microwave Cooking: Use the thermometer meat probe to ensure proper cooking temperature. Be sure to let the food stand as instructed since further cooking will take place during this time. Rotate or stir to assure even cooking throughout.

3. Cutting boards: Avoid preparing food on wooden cutting surfaces where deep grooves permit high numbers of bacteria to grow. Use plastic or ceramic cutting surfaces that can be easily
sanitized between uses or between the preparation of high-risk foods.

### Slide 52

**Prevention of FBI: 2**

- Refrigerator/freezer: Maintain recommended temperatures, store foods safely & clean regularly
- Time & temperature: serve or discard foods within 4 hrs. after removal from temperature control
- Foods: Don’t mix poultry, meat & fish on counter or in storage

4. Refrigerator/freezer: The freezer should be kept at 0° F and refrigerator at 38-40° F; checking the temperature periodically with a reliable metal thermometer. Store raw meats on bottom and enclose in plastic wrap or baggies. Large amounts of hot food should be divided into shallow pans for faster cooling, then covered and placed in refrigerator. Clean refrigerator on a regular basis. Freeze meat, poultry, and fish products if you are not going to use them quickly.

5. Time & temperature: Serve or discard foods within 4 hours from time when it is removed from temperature control.

6. Foods: Never mix different meats, poultry, or fish on counter or in storage. Package meat and poultry in plastic storage bags to prevent cross-contamination. Do not allow the high-risk foods to remain at room temperature for more than a couple of hours; refrigerate or cook immediately. Do not partially cook foods. Cook poultry to 180° F, meat and ground meat to 160°F, and reheat leftovers to 165°F.

### Slide 53

**What Should the General Public Know About Diarrheal Illness?**

- Consult a healthcare provider if:
  - ↑ fever (oral temperature > 101.5° F)
  - blood in the stool
  - ↑ vomiting preventing retaining liquids
  - signs of dehydration (↓ urination, dry mouth & throat, feeling dizzy when standing up)
  - diarrheal illness lasting >3 days

A healthcare provider should be contacted if the diarrhea is accompanied by any of the following conditions:

1. ↑ fever (oral temperature > 101.5° F)
2. blood in the stool
3. ↑ vomiting preventing retaining liquids
4. signs of dehydration (↓ urination, dry mouth & throat, feeling dizzy when standing up)
5. diarrheal illness lasting >3 days

### Slide 54

**What is Wrong Here?**

I apologize in advance for the blurry pictures. In the pictures on this slide, see if you can apply what you have learned from this lecture in answering “What is wrong here?”.

In the picture on the left, food handlers are not wearing gloves or hair nets. In addition, the meat, some of which appears to be cooked, is being placed in very deep pans. This does not allow the meat to be cooled thoroughly and foodborne pathogens can multiply in the meat. In the picture on the right, there are several issues. First, the shelves are filthy. Second, the meat is not covered. Third, the two containers next to the meat are not covered. These situations can lead to food contamination.

### Slide 55

**What is Wrong Here?**

In this photograph, bacteria from the raw chicken juice is contaminating the cut tomato & cucumber.
### Slide 56
**Now the W.H.O. has 5 Keys...**
- See Required Reading #3
- Review 10 vs. 5 tips
- Compare & contrast. Which do you prefer & why?

The W.H.O. has consolidated their 10 rules into 5 keys. The 5 keys comprise Required Reading #3 for this set of lecture materials. Compare & contrast the W.H.O.’s previous 10 Golden Rules with their revised “5 keys to safer food”. *This is a possible essay question on the final exam.*

### Slide 57
**Good Slogan to Live By**
Boil it, Cook it, Peel it or FORGET IT!!

The W.H.O. has a slogan, “Boil it, Cook it, Peel it or Forget it.” The boiling refers to water, cooking to safe temperatures, and peeling it, for fruit. This is a good slogan to follow to prevent acquiring a foodborne illness when traveling.

### Slide 58
**“Fight Bac” Campaign**

There is a campaign entitled “Fight Bac” sponsored by the Partnership for Food Safety Education. This is one of the educational posters from this campaign. The 4 strategies are 1) cleaning (hands and food preparation surfaces), 2) separating cooked and raw food, 3) chilling (making sure to refrigerate cooked foods promptly), and 4) cooking foods to proper temperatures. There is a very informative website for this campaign located at: [http://www.fightbac.org](http://www.fightbac.org) if you are interested in more information on this topic.

### Slide 59
**References**
- Diseases transmitted through the food supply. Federal Register, 69(191), 10/4/04
- CDC’s website, Topics A-Z.
- Foodborne Illness, Chapter 8, from *Living with the Earth* text
- Hazard Analysis & Critical Control Point Principles & Application Guidelines Available at:
- WHO’s 10 Golden Rules for Food Safety
- FDA Food Safety & Modernization Act

This slide lists the main references used in putting this lecture together.

### Slide 60
**Bon Appetite!**

We will end this session by saying “Bon Appétit!! By following food safety strategies, hopefully you will enjoy safe and healthy foods, be it at home, when eating out, and when traveling.

This completes Section D and Part II of the lecture materials entitled “Prevention of Foodborne Illness: A Global Perspective.”