BASICS IN FOOD HYGIENE AND SAFETY
Nowadays, we are used to hear and read news headlines about outbreaks of foodborne disease. Examples of foodborne outbreaks that happened only in the last years include E. coli O157:H7 infections linked to ground beef and ready-to-eat chicken salad, Listeriosis linked to dairy products, Salmonella infections linked to cucumbers, Hepatitis A linked to frozen berries, etc. Among all types of foods, the most common food source of fatal infections is meat and poultry. In brief, food hazards can be found in all types of food, and they can be introduced at any stage of the food chain, from primary producers through to final consumption.

Codex Alimentarius defines food hygiene as “all conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain,” and food safety as “assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.”

Sometimes, even the large companies fail to comply with even the most basic food safety practices so their products result to being unsafe. In most cases these breaches may have serious impact in consumers’ health.

In order to identify hazards and control them before they threaten the safety of food and the health of customers, food businesses implement food safety management systems based on the principles of HACCP (Hazard Analysis and Critical Control Points). However, there are three basic principles which prevent introduction of food safety hazards in food.

### Personal Hygiene

In both, industrial and domestic food preparation, maintaining good personal hygiene while handling food is very important to prevent foodborne illness. Not necessarily only ill personnel can pose threat to food safety; everyone involved in preparation of food can be a source of contamination. Thus, food handlers should perceive the highest possible standards of personal hygiene to make sure that food does not become contaminated by food safety hazards.
The followings are some general good hygienic practices that everyone preparing food should consider.

1. Hands should be washed regularly and effectively with clean water and soap, especially before and after preparing food, before and after using kitchen utensils, after going to the toilet and after handling raw food, waste or chemicals.
2. Sneezing or coughing into hands or touching hair, nose or mouth while handling food should be avoided. In cases when these actions cannot be avoided hands should be washed.
3. Avoid unsanitary habits such as eating, drinking, chewing and smoking while working with food.
4. Personnel working in food handling areas should wear suitable, clean and, where necessary, protective clothing such as hair restraints, gloves, apron, etc.

**Time and Temperature Control**

Control of time and temperature plays a critical role in food safety, as well as in prevention of a foodborne illness. Time and temperature control is important for processes such as cooking, hot holding, reheating, cooling, freezing and thawing of foods.

Microorganisms, in particular bacteria are capable of growing over a wide range of temperatures and are usually classified according to the temperature at which they grow; such as psychrophiles, mesophiles and thermophiles. Most of pathogenic microorganisms are mesophilic and have an optimum temperature for growth of about 37°C (human body temperature). When conditions are favorable, some bacteria divide and double their cell number in every 20 minutes, thus one bacterial cell may increase to 16 million cells in 8 hours.

The way the food is cooked is as important as the way it is prepared and stored. The temperature range, in which pathogens can grow, between 4°C and 60°C, is commonly referred to as the ‘danger zone.’ The best practice is to consume food immediately after cooking, however if it is not possible, the amount of time food spends in the danger zone must be minimized, and must not spend more than 6 hours total between 60°C and 4°C. To prevent time-temperature abuse the following combinations can be used as a reference:

1. Keep hot food at 60°C or higher
2. Cool food from 60°C to 20°C in 2 hours or less
3. Cool food from 20°C to 4°C in 4 hours or less
4. Keep cold food at 5°C or lower
5. Keep frozen food frozen, at -18°C and lower
6. Thaw food in a refrigerator at 4°C or lower

**Cross-contamination Prevention**

Cross-contamination is the physical transfer of food safety hazards from a contaminated surface to one that is not contaminated. These hazards include all biological, physical or chemical agents in food that are likely to cause illness or injury after the contaminated food is consumed. Food can be contaminated directly or indirectly, from people, work surfaces or equipment, and other foods. Thus, preventing cross-contamination is one of the key factors in preventing foodborne illness.

There are three main routes through which cross-contamination can occur:

1. *‘People to food contamination’* is the most common way of food cross-contamination, and it occurs when people working with food do not carefully follow good hygiene practices. Untrained and unaware employees are the main source of cross contamination. For this reason, training employees on good personal hygiene practices and monitoring them on adequate hand washing, hand care, correct glove use, etc., can help spreading hazards and prevent the cross contamination of food.
2. "Food to food contamination" involves the transfer of microorganisms directly from other foods. It is especially dangerous if raw foods come into contact with cooked or ready-to-eat foods. Hence, storing foods properly by keeping all foods covered and separating ready-to-eat foods from unwashed or raw foods is the best way to prevent this type of contamination.

3. "Equipment to food contamination" occurs when working surfaces and equipment are not properly washed and sanitized between each use. Thus, washing and sanitizing all food contact surfaces, including cutting boards, dishes, counter tops and other utensils, etc., will help preventing this type of contamination.

Personnel hygiene, time and temperature control, and cross-contamination prevention, are only three important issues that help food businesses prevent risks and keep food safe. However, an effective food safety management system incorporates standard operating procedures for personal hygiene, time/temperature control and cross contamination prevention throughout the flow of the food.

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