



Short Communication

Food Safety in Commercial Food Establishments

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ABSTRACT

This review focuses on food safety in commercial food establishments that is now considered an important global issue. The various factors that contribute to food borne outbreaks are summarized and the standard operating procedures for safe food production are discussed. Time temperature control at receiving of raw ingredients, cooking, holding and chilling are considered as Critical control points. The article emphasizes on the fact that addressing these contributing factors and implementing the control measures could help ensure a sound Food Safety Management System.

Keywords: Food Safety, Commercial Food, Establishments.

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INTRODUCTION

Food safety has emerged as an important global issue with international trade and public health implications. In response to the increasing number of food borne illnesses, governments all over the world are intensifying their efforts to improve food safety. The World Health Assembly adopted a resolution (WHA 53.15) and the World Health Organization (WHO) was asked "to give greater emphasis on food safety with the goal of developing food safety systems for the reduction in health risk along the entire food chain, from primary producer to the consumers".(Sudharsan *et al.*, 2009).

Food safety remains a critical issue with outbreaks of foodborne illness resulting in substantial costs to individuals, the food industry and the economy (Kaferstein *et al.*, 1997). Food borne diseases due to microbial pathogens, biotoxins and chemical contaminants in food represent serious threats to the health of thousands of millions of people. Consumers everywhere view food borne disease outbreaks with ever-increasing concern. Serious outbreaks of food borne diseases have been documented on every continent in the past decades, illustrating both the public health and social significance of these diseases.

It is estimated that approximately 3 million children below the age of five die of diarrhoea every year. About 70% of these deaths are said to be of food-borne origin (Esrey, 1990). Recent years have seen a reversal in this trend but food poisoning remains a high priority for the public and government (Parliamentary Office of Science & Technology, 2003).

Causative Organisms

Foodborne illnesses are caused by bacteria, viruses, parasites or toxins and chemicals that contaminate our foods and beverages.

The main cause for food illness in Asia are microbial contamination, excess pesticides contaminated water, lack of knowledge and inconsistent standards in food production hygiene and the last but not the least the very important one is the attitude of the people towards food safety standards (Sudharsan *et al.*, 2009).

During 1998-2008, CDC reports that of the 7,998 outbreaks with a known etiology, 45% were caused by viruses, 45% were caused by bacteria, 5% were caused by chemical and toxic agents, and 1% was caused by parasites. Among the outbreaks with an implicated food or contaminated ingredient reported, 42% could be assigned to one of 17 predefined commodity categories: fish, crustaceans, mollusks, dairy, eggs, beef, game, pork, poultry, grains/beans, oils/sugars, fruits/nuts, fungi, leafy vegetables, root vegetables, sprouts, and vegetables from a vine or stalk. The pathogen-commodity pairs most commonly responsible for outbreaks were scombroid toxin/histamine and fish (317 outbreaks), ciguatoxin and fish (172 outbreaks), Salmonella and poultry (145 outbreaks), and norovirus and leafy vegetables (141 outbreaks) (Gould *et al.*, 2013).

The pathogen-commodity pairs most commonly responsible for outbreak-related illnesses were norovirus and leafy vegetables (4,011 illnesses), Clostridium perfringens and poultry (3,452 illnesses), Salmonella and vine-stalk vegetables (3,216 illnesses), and Clostridium perfringens and beef (2,963 illnesses). Compared with the first 2 years of the study (1998-1999), the percentage of outbreaks associated with leafy vegetables and dairy increased substantially during 2006-2008, while the percentage of outbreaks associated with eggs decreased (Gould *et al.*, 2013).

Food Safety Programs in Commercial Food Establishments

The technological advances in food sectors and also social changes introducing new food habits and travel has introduced new food safety problems into our food supply. More individuals and sectors are now relying on food commercial establishments for their regular meals.

Delicatessens, cafeterias, and restaurants were the most common places where contaminated food was reportedly eaten (Bean *et al.*, 1996). Eighty nine percent of the outbreaks occurred at food service establishments, such as restaurants and catered functions as compared to 11% in domestic settings. The major foods involved in the outbreaks included sandwiches, salads and miscellaneous hot items (Guzewich and Ross, 1999).

A commercial food processing establishment is a place where food is prepared or packaged for human consumption whether consumption occurs on or off the premises and is operated under license, permit or with the approval of an appropriate regulatory authority.

WHO defines "Foodborne illnesses as diseases usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food WHO report Fact sheet Rev Mar 07. A practical approach has shown there are ten main reasons identified with food borne illness in commercial food establishments.

To practice food safety in commercial food establishments it is important to use HACCP based programs to assess hazards and establish controls in order to diminish risks and prevent foodborne disease and injury of customers. Hazard analysis and critical control points are worldwide considered as an effective and rational means of assuring food safety and can be

applied throughout the food chain from primary production to final consumption (Domenech *et al.*, 2008).

TEN FACTORS THAT CONTRIBUTE TO FOOD BORNE OUTBREAKS AND THE FOOD SAFETY (HACCP) PROCESSES ADOPTED TO CONTROL OR MINIMISE RISKS

CCP (Critical Control Point) or SOP (Standard Operating Procedure) Adopted

1. Use of Contaminated Raw Food

Raw foods are sources of contamination, and a point of entry of contamination into processing areas and kitchens. The quality of raw materials used in the preparation of street foods is very important as their contamination can persist through preparation and or cooking (Rane, 2011).

In New York State during the period 1980-1993, among the outbreaks the most commonly reported contributing factor was contaminated ingredients (23%) (Guzewich, 1995). It has been estimated that pathogens found in animal products (*E. coli* O157:H7, *L. monocytogens*, *C. jejuni*, *C. perfringens* *Toxoplasma gondii*, *Salmonella spp.*, *S. aureus*) account for approximately 3.3-12.3 million cases of illness and 3,900 deaths in the United States each year (Buzby and Roberts, 1997).

Contaminated raw ingredients was the main contributing factor in food borne outbreaks. Ingredients included raw meat and fish (Roisin M. Rooney *et al.*, 2004).

SOP: Ensure food is obtained from approved sources that comply with all laws relating to food and food labeling, with certificates of accreditation for raw ingredients wherever possible.

Supplier approval programmes and Supplier Performance Program to be carried out periodically to ensure raw materials are as per specifications.

CCP 1: Temperature Controls for Receiving Potentially Hazardous Foods (QSAI guidelines, 2013)

Food provider must ensure that the surface temperature of food items at the time of receiving are within the following limits:

Table 1: Type of Food and Target Surface Temperature

| Type of Food | Target Surface Temperature | Rejection Temperature |
|-------------------|--|----------------------------|
| Refrigerated food | 5°C | >8°C |
| Frozen foods | Rock hard or solid with No signs prior thawing | Any signs of prior thawing |
| Hot Foods | 60°C or above | <60°C or above |

Food provider must ensure that the received food items are placed in storage within an appropriate time whereby the surface temperature does not exceed >8°C/46°F. “Labelling, Date Marking and Rotation of Foods (FIFO)” with proper storage to be followed Wash, sanitize with chlorine, 50-100 ppm for 1 to 5 min and then rinse all fruits and vegetable (QSAI guidelines, 2013).

2. Improper Thawing of Frozen Meat

The longer raw food is left at room temperature the more quickly bacteria will multiply and toxins may form, while the inside of the food may still be frozen, the outside may have thawed and is already in the "temperature danger zone"

SOP: Appropriate Thawing Methods (QSAI guidelines, 2013).

1. Thawing at Refrigeration temperature: In any event the surface temperature of the thawing food item must not exceed 8°C.

2. Thawing under running water: The frozen food items must be thawed under cold potable running water at a temperature that does not exceed 21°C.

If the frozen food item being thawed under running water is a ready to-eat food, the surface temperature of the product must not at any point exceed 8°C and the ready-to-eat foods must be sealed in leak proof packaging.

3. Thawing in an area maintained below 21°C: The surface temperature of the food item must not exceed 8°C and the food provider must verify the surface temperature of the food item every six (6) hours during thawing.

3. Food Prepared Too Far In Advance

The preparation of food long before its consumption, storage at ambient temperature, inadequate cooling and reheating, contaminated processed food, and undercooking are identified as the key factors that contribute to food poisoning outbreaks. WHO (1989).

SOP: Proper production schedule to be adhered to and monitored.

Food Processing Quality Standards and Interpretation Guidelines (QSAI, 2013) require that the food provider must use:

(a) Hot Production Foods items within 48 hours of production; and (b) Cold Production Food items within 24 hours of production.

4. Inadequate Cooking

Improper practices responsible for microbial food borne illnesses have been well documented (Bryan, 1988) and typically involve cross-contamination of raw and cooked foodstuffs, inadequate cooking and storage at inappropriate temperatures.

CCP 2 (QSAI guidelines, 2013).

Safe Cooking Temp Food provider must ensure that the core temperature of food items following Heat Treatment falls within the Safe Cooking Temp of 74°C / 165°F 15 seconds.

5. Cooling Food Too Slowly Prior To Refrigeration

When food is cooked and left out at room temperature, bacteria can multiply quickly to sufficient numbers and / or produce sufficient amount of toxin in food resulting in food borne illnesses on consumption.

CCP 3 (QSAI guidelines, 2013).

Food provider's rapid cooling procedure must require that all Heat Treated Foods are either: (a) Cooled from 60°C/140°F to 21°C/70°F within 2 hours and from 21°C/70°F to 5°C/41°F within an additional 4 hours; (OR) (b) Cooled from 60°C/140°F to 10°C/50°F within 4 hours.

6. Cross Contamination From Raw Food To Cooked

Cross-contamination occurs when:

1. Contaminated raw food is handled by someone and it contacts surfaces of utensils or equipment;
2. Hands surfaces contaminated by raw food make contact with an uncontaminated or cooked food;
3. Equipment and surfaces are not washed and sanitized between raw and cooked food handling;
4. Food handlers do not wash hands in between handling raw and cooked foods.

Pathogens such as *Yersinia*, *Proteus*, *Campylobacter*, and *Klebsiella* originating from raw animal products, can contaminate hands and then be transferred to foods, equipment, and other workers (Bryan, 1988).

Improper practices responsible for microbial foodborne illnesses have been well documented by (Egan *et al.*, 2007 and typically involve cross-contamination of raw and cooked food, inadequate cooking, and storage at inappropriate temperatures.

SOP : Effective training to minimize cross-contamination and to ensure safe food handling practices.

7. Inadequate Reheating

Cooked foods should be reheated so that the pathogenic bacteria are destroyed.

CCP 4: The FDA Food Code 2009 recommends that food shall be reheated so that all parts of the food reach a temperature of at least 74°C for 15 sec.

8. Inadequate Hot Holding or Cold Holding

After food is cooked, the vegetative pathogens have been reduced to a very low, safe level and when allowed to remain at improper temperatures it permit the outgrowth of spores and multiplication of pathogenic bacteria. This must be controlled, hence holding temperature is important.

Mishandling of food plays a significant role in the occurrence of foodborne illness. Improper food handling may be implicated in 97% of all foodborne illness associated with catering outlets (Howes *et al.*, 1996). The two most commonly reported practices that contributed to foodborne disease were improper holding temperatures of foods and poor personal hygiene of food workers, reported in 59% and 36% of outbreaks, respectively (Bean *et al.*, 1996).

CCP 5 (FDA Food code, 2009) Potentially hazardous foods shall be maintained as follows:

- (1) May be held at a temperature of 54° C or above (or)
- (2) At 5° C or less.

9. Infected Food Handlers

Enteric pathogens that are believed to be capable of being transmitted by food workers include, but are not limited to: E. coli, hepatitis A virus, Salmonella spp., Shigella spp., and Clostridium perfringens (Guzewich and Ross, 1999)

Food handlers may also be asymptomatic carriers of food poisoning organisms (Cruickshank, 1990).

SOP: Health, Hygiene and Training: Food provider must follow a food safety and **HACCP training:** The training program must require that all Food handling employees and management receive appropriate training and maintain training records .Medical screening of employees is a must (QSAI guidelines, 2013).

Food handler training is seen as one strategy whereby food safety can be increased, offering long-term benefits to the food industry (Smith, 1994).

Food safety education is a critical part of the overall strategy to reduce the incidence of food borne illness and complements regulatory and other activities. (Barro *et al.*, 2007)

There is general agreement that good overall level of knowledge of food safety among food handlers and the effective application of such knowledge in food handling practices are essential in ensuring the consistent production of safe food in restaurant operations (Bolton *et al.*, 2008)

10. Use of Left Overs

The FDA Food Code, 2009 requires that all leftover foods or foods that have a precooked or leftover food as an ingredient is reheated to 165 °F for 15 seconds within 2 hours.

SOP: Discarding guidelines to be strictly followed.

HACCP Verification: The purpose of verification activities is to confirm that the implemented HACCP plan is working according to expectations. Verification may be achieved by various tools and techniques, of which third party audits, internal audits, including record review and microbiological analysis are among the most important.

CONCLUSION

The above food safety measures coupled with good prerequisite programmes, food safety Policies and periodical HACCP verification ensures a sound Food Safety Management System.

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