

Integrating Hazard Analysis and Critical Control Point (HACCP) and sanitation for verifiable food safety

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ABSTRACT

Reliable, verifiable food safety requires the application of technologically correct methods in a systematic way. This requires making a distinction between sanitation and Hazard Analysis and Critical Control Point (HACCP) and integrating these two systems into one food safety system. Although sanitation and HACCP share the same goal of producing safe food products, the focus of sanitation is on the environment surrounding the food to prevent contamination, whereas the focus of HACCP is on controlling hazards intrinsic to food materials. Together they provide the organizational base for applying the correct methods and procedures to ensure and verify that food served is safe for foodservice clients. These approaches also provide records that demonstrate that food safety measures have been planned and completed as planned. One way to demonstrate a responsible approach to food safety is to understand the differences between sanitation and HACCP and to build approaches to food safety that use both of these systems. The resulting integrated system has a better chance of controlling all the hazards than either system by itself. *J Am Diet Assoc.* 1997;97:889-891.

Reliable and verifiable food safety programs are becoming more important to foodservice. Evidence indicates that the foodservice industry has been responsible for most of the confirmed foodborne illness outbreaks that have occurred in Western countries (1-4). Because the foodservice is closest to the consumer, blame and suspicion for food safety failures will come to it first, even though the cause of the problem may be earlier in the food manufacturing chain. New hazards such as *Escherichia coli* 0157:H57 and new methods such as use of adenosine triphosphate soil detection (4) put new requirements on those who are responsible for food safety. Such new developments boost regulatory interest in verifying that those who serve food understand and prevent hazards. Consequences of a food safety failure can be especially severe for institutional foodservice (4). It is not enough for foodservice management to *know* that good food safety practices are used. There must be *evidence*—records—that correct sanitation and food-handling procedures are followed.

Demonstrating *due diligence* in food safety cannot be done on an ad hoc basis. Doing what is customary to clean and sanitize a surface or to cook and hold a menu item does not reflect a considered approach to food safety problems. Food safety must be deliberate. A menu item served is the consequence of a chain of events that starts long before the foodservice first sees the constituent food materials. Hazards may become part of the food materials at many places along the way. To prevent such hazards means understanding the menu-item manufacturing system, identifying the hazards, and controlling the hazards during manufacture. What is required is a *system* to intentionally prevent these hazards from occurring and to verify this hazard control with record keeping.

From the perspective of foodservice, potential hazards can be divided into two classes: those that are introduced to the food materials in the foodservice (eg, pathogens from an unsanitized utensil) and those that come with the food materials (eg, pathogens on ground beef). Methods to control the first kind of hazard require proper hygiene and proper cleaning and sanitizing of the foodservice equipment and environment. Methods to control the second kind of hazard (if it is biological) require proper holding and proper cooking—essentially proper management of time and temperature of the food materials. Sanitation deals with the first type of hazard (5). Hazard Analysis and Critical Control Point (HACCP) is a system that deals with the second type of hazard (6,7). Integrated, these two approaches can provide reliable and *verifiable* food safety in foodservice.

SANITATION

The objective of sanitation is to prevent contamination of food materials. Contamination occurs when biological, chemical, or physical agents present in the foodservice environment are imparted to food materials during any handling or holding

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- Identify hazards.
- Determine critical control points (CCPs).
- Establish the critical limits that must be met at each CCP.
- Establish procedures to monitor each CCP.
- Establish corrective actions to be taken when there is a deviation.
- Establish effective record keeping.
- Establish procedures for verification that the HACCP system is working correctly.

The seven principles of Hazard Analysis and Critical Control Point (HACCP) (11).

operation. The approach to prevent contamination is first to clean objects and surfaces that may come in contact with food materials and then to sanitize these objects and surfaces.

The purpose of cleaning is to remove soil and food debris from food contact surfaces. Such surfaces include utensils, assembly tables, cutting boards, cooking surfaces, and so on. Typically, cleaning involves two steps: washing with a detergent solution and rinsing with water.

Sanitizing follows cleaning and is intended to reduce the number of microorganisms to a safe level. The food contact surfaces that have been cleaned are either immersed in hot water (171°F for 30 seconds [8]) or treated with a chemical sanitizing compound. For sanitizing to be effective, cleaning must be effective. Soil or food debris left on surfaces may insulate microorganisms from the effect of hot water or sanitizing chemicals.

A special set of food contact surfaces are the hands of employees. The hygiene part of a sanitation program specifies procedures and methods to prevent contamination of food materials by food handlers. Taken together these approaches form a system intended to prevent contamination. This system is applied to the entire food preparation and service operation, including the food manufacturing equipment, people, and facilities (9). Such a system may include record keeping regarding the methods used and when they were used and reports of any unforeseen occurrences during cleaning and sanitizing. The goal of a sanitation program is always to prevent contamination.

HACCP

The objective of HACCP is to prevent *specified hazards* from occurring in *specified menu items*. A HACCP team consisting of employees familiar with food production and the requirements of food safety is appointed. Typically, a target menu item (or group of similar items) is selected by the HACCP team and hazards that may occur in this menu item are determined. In foodservice the means of control usually include managing the time and temperature history of the food materials during refrigeration, cooking, and holding. The objective of HACCP is systematic control of specified hazards (10).

A HACCP system is built by a facility-specific HACCP team and is based on the seven principles of HACCP (the Figure shows these principles). The resulting HACCP plan is a protocol for the manufacture and service of a safe menu item. The HACCP system for the target menu item results when the HACCP plan is implemented.

Getting benefits from a HACCP system in foodservice requires thorough knowledge of the menu-item manufacturing system (reflected in a detailed flow-of-materials diagram) and of foodborne hazards associated with the menu item. Hundreds of recipes are used by a foodservice, but only a few are good candidates for HACCP. Typically, HACCP systems are

phased in, one menu item at a time. This gives the HACCP team a chance to assess the impact of the HACCP implementation and time to learn from previous experience. Notice that record keeping is part of the system. Record keeping not only focuses the attention of the employees on their roles in achieving food safety but also provides a means to document and verify that correct procedures have been followed. HACCP is effective when it integrates food safety into everyone's job. Because it is developed and planned locally—by the people in the specific foodservice facility—it can accommodate local conditions and constraints.

A common misgiving about HACCP is that it will cause excessive extra work. Because the plan is developed locally, this need not be the case. The big change brought about by HACCP is that food safety actions applied to food materials are planned and recorded. How much extra work this depends on the HACCP planners. The goal of HACCP is always the control of specified hazards in selected menu items.

HACCP AND SANITATION

Foodservice sanitation and a HACCP program have the same goal: to ensure food safety. But neither system *by itself* will provide verifiable assurance that the goal is achieved. Some hazards requiring control cannot be "sanitized away" and other hazards requiring control cannot be "cooked away." These two approaches to food safety are different in objectives, in methods, in training required, in basis for development, and in focus of attention. Although they share a common goal, they are two separate systems that have to be built and planned separately.

In a sanitation program, all employees in foodservice operations must have adequate orientation and training about food sanitation. Each person has to know operation policies and the principles of food protection. In contrast, all employees in foodservice operations do not need to be trained in and oriented to a HACCP system. For example, each employee does not have to know how to build and maintain a HACCP plan. Although managers and supervisors need to understand HACCP, a typical role of line employees is record keeping, monitoring at critical control points, and giving the initial response to a deviation.

A foodservice sanitation program is based on uniform, nationally accepted public health principles and standards. HACCP, by contrast, requires people in a foodservice to develop hazard control policies—a HACCP plan is developed locally. Details of a sanitation program are determined by government regulation; procedures for cleaning and sanitizing equipment and facilities are part of regulatory documents. This contrasts strongly with HACCP where procedures for ensuring food safety are specified by the HACCP team.

Sanitation applies methods that are intended to control many hazards without regard to their identity or classification. Biological, chemical, and physical hazards can be eliminated by cleaning and then sanitizing the environment and equipment in a foodservice. Because these methods are not applied to food materials, the chemicals used can be harsh or even toxic, and temperatures can be very high. HACCP targets specific hazards and applies methods to food materials to control hazards. These methods must be consonant with the eventual consumption of the food. The aim and focus of a HACCP system is on the food materials and products of a foodservice. The aim and focus of a sanitation system is on the equipment, facilities, and people in a foodservice. A summary of the differences between HACCP and sanitation can be found in the Table.

A sanitation program by itself is not adequate to ensure food safety. No matter how sophisticated and elaborate the sanitation program is, very few would advocate the consumption of

Table

Differences between a sanitation program and a Hazard Analysis and Critical Control Point (HACCP) system

Variable	Sanitation program	HACCP system
Target Method	No specific hazard Clean then sanitize, usually with 171°F water for 30 sec or chemicals	Specified hazards Specified by the local HACCP team
Training Based on	All employees in foodservice must have adequate training Uniform, nationally accepted public health principles, standards, and regulations	All line workers in foodservice do not need to be trained in HACCP A HACCP plan designed by the HACCP team using the seven HACCP principles
Focus Goal	Physical facilities, utensils, people, and equipment Prevent contamination	One menu item at a time Control hazards that are intrinsic to food materials

raw meat or poultry. You cannot simply sanitize a chicken and expect people to eat it. A HACCP system targets a hazard (say, *Salmonella*) and controls it by proper cooking. But a HACCP system by itself is not adequate. Inadequate sanitation can cause contamination of food materials after they pass a critical control point. A HACCP system will be powerless to correct such a problem. Inadequate sanitation can also cause problems cooking is not intended to correct. The outgrowth of pathogens on surfaces can cause the presence of heat-stable toxins.

To consistently and confidently serve safe food requires both a sanitation program and a HACCP system. Having these two systems is more work, but the resulting program verifies that food safety procedures have been implemented according to plan. Sanitation and HACCP records provide evidence of how facilities and food materials have been treated, and the HACCP plan itself shows that foodservice management is serious about its food safety obligation.

HACCP AND SANITATION WORKING TOGETHER

Better (more reliable) food safety can be achieved if HACCP and sanitation systems are running simultaneously. Even though proper cooking (a HACCP requirement) can overcome errors in sanitation (ie, contamination of food materials before cooking), preventing contamination with a well-run sanitation program means there is even less chance that a foodborne hazard will reach the consumer. After the cook step, proper sanitation prevents contamination at later steps. Such contamination is dangerous because there is no HACCP critical control point to prevent it. Properly designed, the two systems complement each other. Keeping in mind the objectives and potentials of each system makes it possible to integrate their activities to achieve more reliable food safety.

Some examples may be useful. A sanitation program plays an important role in achieving a safe lettuce salad because a salad is a menu item that does not usually have a kill step (such as cooking). So a salad is vulnerable to contamination from unsanitized work surfaces and utensils or from a food handler. But a HACCP system can also contribute to making a lettuce salad safe. A HACCP system ensures that salad ingredients are kept below a specified temperature before being consumed. More control is provided at receiving, where raw ingredients are examined, to make sure that only materials in good condition are accepted. For this menu item, therefore, the sanitation system prevents contamination while the HACCP system does not let hazards intrinsic to the food into the product.

For a menu item that has a kill step, such as cooking, managing critical control points is important. Without proper sanitation, however, food can be contaminated after the kill step. An example is a menu item like scrambled eggs. While being held before cooking, the main ingredients are kept at 41°F; subsequently, they are cooked to an internal temperature of 145°F for at least 15 seconds. Reheating should bring

the product to 165°F for at least 15 seconds (9, p 51). All of these requirements can be built into a HACCP system. They can all be rendered useless, however, if subsequent handling or holding contaminates the product. Sanitation and hygiene are required to ensure this product is safe.

APPLICATIONS

Management of foodservice operations has been an integral part of dietetics since the beginning of the profession. Inherent in this role is the basic responsibility for preparing and serving safe food to customers. The 1989 role delineation study of The American Dietetic Association reported that 45% of entry-level dietitians and 65% of entry-level dietetic technicians were involved in the maintenance of safe food and sanitation to some degree (12). To fulfill this role expectation successfully, dietetics practitioners must make a commitment to lifelong learning on issues, concepts, and techniques relative to food safety. This begins with a thorough understanding of foodborne illness, its causes and prevention. Second, dietetics practitioners must be able to design, implement, and monitor an integrated food safety system of HACCP and sanitation. The system must include training, motivating, and supervising food handlers to ensure that food safety objectives are met.

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