Centers for Disease Control and Prevention
National Center for Environmental Health
Vessel Sanitation Program

Health Practices on Cruise Ships: Training for Employees
Transcript

Hazard Analysis Critical Control Point

The Centers for Disease Control and Prevention's Vessel Sanitation Program is proud to bring to you the following session: HACCP. While this presentation is primarily intended for cruise vessels under the jurisdiction of the Vessel Sanitation Program, it may also be used by anyone who is interested in this topic. This session should not be used as a replacement for existing interactive training, but should be used as an adjunct to a comprehensive training program.

HACCP. Learning objectives. At the end of this presentation, you will be able to list the seven HACCP principles and describe how they apply to food safety, list the challenges of implementing a HACCP plan on a cruise vessel, list the ways in which HACCP can be implemented, and list the areas on the vessel where HACCP can be used.

HACCP: what is it? HACCP stands for Hazard Analysis Critical Control Point. HACCP was developed in conjunction with NASA and the Pillsbury company, and this system of providing safe food has been incorporated worldwide.

HACCP principles include principle one: hazard analysis; principle two: critical control points; principle three: critical limits; principle four: monitor; principle five: corrective action, principle six: records; principle seven: verify or verification. Each one of these principles will be discussed in detail during this presentation.

Background. Before developing a HACCP plan, it is important to consider various aspects of the vessel, including facility, equipment, and people. One HACCP plan will not work for an entire cruise company or cruise line. Within a cruise line, there can be different vessels, some old, some knew, some small, some large, and the size and the age of the vessel will dictate the type of facility and equipment on that vessel. Additionally, before developing a HACCP plan, a consideration must be made of the people on the vessel, both the employees preparing the food and the intended population for that food. As an example, on a cruise vessel, we have people who would be considered in a high-risk group. Hamburgers prepared for a restaurant may be prepared undercooked as requested. Considering a child activity center where we have a vulnerable population, the same would not apply. Hamburgers prepared for children in a child activity center should all be prepared well done. So again, considering the population to be served is very important when developing a HACCP plan.

Getting started. Assembling a HACCP team. We will discuss later in this presentation how HACCP can be used on various parts of the vessel, and when developing a HACCP plan, the HACCP team is going to be dictated by the area of the vessel that the plan is going to be used for. For this presentation, we will primarily discuss HACCP as it relates to the food areas of the vessel. The team members should include, at a minimum, a representative from shoreside, individuals who are involved in vender selection, a representative from the provisioning department on the vessel, the person in charge of the food area on the vessel, and anyone else who might be appropriate, but definitely individuals who are involved in the preparation of food. The HACCP plan should describe the food formulation and recipes and again should consider the population served. HACCP plans would ideally have flow diagrams which are easy to follow, and the HACCP plan, after it's been develop, should be used in the vessel with a verification process. Does the HACCP plan adequately describe the processes that are actually occurring in the food areas?

Hazard Analysis: Principle Number One. Analyzing the hazard of food is very important. Many individuals consider the food as the problem. For example, raw chicken. Raw chicken does not make people ill. It is the pathogenic bacteria on the raw chicken that makes you ill. Therefore, it's very important to look at each food that's coming on to the vessel when you're developing a HACCP plan and to analyze a hazard, whether it's a microbiological hazard, a chemical hazard, or a physical hazard. We will predominantly be discussing microbiological hazards, and specifically in microbiological hazards, we have bacterial, parasitic, and viral hazards. We will be discussing bacterial hazards for this demonstration. In considering the hazard associated with the food, we must assess the risk of occurrence: high, medium, or low. We will use bacteria and raw chicken as an example. The risk of this hazard occurring in raw chicken is considered to be high. So therefore we will follow the flow of chicken considering the hazard of bacteria. Additionally, during the hazard analysis step, we must consider the flow of the food through a recipe. Hazards may be associated with a preparation step. For example, hazards can occur during preparation if cross-contamination is a problem.

Critical control point, principle number two. A critical control point is a point, step, or procedure where the hazard that's associated with the food can be prevented, eliminated, or reduced to acceptable levels. Some critical control points can include cooking. For example, raw poultry is associated with bacteria. The bacteria can be eliminated, reduced, or prevented by cooking raw poultry to 165 degrees Fahrenheit for 15 seconds. As another example, reheating can be a critical control point. If we take a stew-- for example, a beef stew-- if we reheat that beef stew to 165 degrees for 15 seconds, we can eliminate any bacteria that might have grown during the cooling and the cold holding steps. Holding can also be considered a critical control point. Cold holding, hot holding, or using time control during holding can prevent bacterial growth. It is important to consider, whether using cooking, cooling, holding, or reheating, time is a factor in any one of these critical control points.

Critical limits, principle number three. We've identified the hazard associated with raw poultry as being bacteria. We have identified some critical control points-- for example, cooking. Now we must identify critical limits. Critical limits can be found in the Vessel Sanitation Program operations manual. These critical limits were obtained from the 1999 FDA model food code. If we are considering raw poultry again, the critical limit that we must achieve for pathogen destruction is a temperature of 165 degrees Fahrenheit for a time of 15 seconds minimum. There are other food industries that might use pH, moisture, preservatives, or water activity to control bacterial growth. As an example, beef can be taken and dehydrated, which results in beef jerky. Beef jerky has a water activity below .85 and is no longer considered to be a potentially hazardous food. In this example, the critical limit is .85 water activity level.

Monitoring, principle number four. Monitoring is observing sequences and operations and taking measurements during the flow of food. It is also tracking the system's operation and determining when control is lost when a deviation occurs. Additionally, a written record should be provided of monitoring.

Corrective action, principle number five. Things happened. Things do not always go as planned, and predetermined courses of action should be in place prior to these things happening. The cause of deviation should be fixed and records should be maintained for an affective batch. As an example, temperature control is used on a hot buffet line in the galley. A temperature is taken of beef chili, which is found to be at 128 degrees Fahrenheit. Not only does the cause of the deviation need to be corrected; a determination needs to be made on the disposition of the food. Is the food going to be reheated to 165 for 15 seconds and placed back on the line? Is the food going to be discarded because it's a leftover and has already been reheated? Or perhaps the food wasn't cooked properly to begin with. A lot of questions would need to be asked to not only decide what is to be done with the food, but also to find out why was the food at 120 degrees Fahrenheit to begin with. This may also involve fixing the hot line where the food was placed. It could be equipment failure that caused the temperature deficiency.

Records, principle number six. Records include the HACCP plan, flow diagrams, operational records, and these should all be simple and meaningful. Operational records includes things as simple as ensuring that equipment is washed, rinsed, and sanitized, taking temperatures of warewashing units and manual compartments, a three-compartment sink-- basically the things that are done day to day on a normal basis.

Verify, principle number seven. Critical limits are acceptable. Critical limits can be verified by viewing the Vessel Sanitation Program's operational guidelines. Critical limits for pathogen destruction can be found there. Want to verify that the HACCP plan is functioning effectively, and this means that what is going on in the galley corresponds with what the plan describes. HACCP plans need to be revalidated. This can occur

through independent audits, and this can be as simple as having an executive chef from one ship visit another and take a new approach or new look to ensure that things are going on effectively. Or a HACCP plan can be verified through government oversight, and this would be by the Vessel Sanitation Program reviewing the HACCP plan.

We will go through the HACCP principles one more time. Principle number one, hazard analysis. Principle number two, critical control point. Principle number three, critical limit. Principle number four, monitor. Principle number five, corrective action. Principle number six, records. Principle number seven, verification.

HACCP implementation. There are numerous challenges to implementing HACCP plans on cruise vessels, and these can include a variety and changing menus. Menus on cruise vessels change for various reasons, either because of itinerary changes, either because passenger ethnicity or nationalities change, or food sources are not available at the time they are needed and the menu has to change subsequent to that inavailability. Additionally, challenges to HACCP implementation can include turnover rate. Each time employees turn over, this requires additional training. And HACCP plan implementation can also be difficult due to economic and human resources, lack thereof.

There are three ways that HACCP can be implemented. The strategies include the classical approach, categorical approach, and process approach. A discussion will be brief for the classical and categorical approach.

HACCP implementation. HACCP can be implemented using the classical approach. In this approach, each potentially hazardous food is taken through the seven HACCP principles: hazard analysis, critical control points, critical limits, on and on. This can be very cumbersome and time consuming and for cruise vessels can be very difficult, because by the time this HACCP plan has been developed, an itinerary change can occur, requiring the HACCP plan to begin all over again.

HACCP implementation. HACCP implementation using the categorical approach, while simpler and easier to follow than the classical approach, is also time consuming and cumbersome. Each food is placed into a category, and then the seven HACCP principles are followed through for each category.

HACCP implementation using the process approach is the easiest approach to use on a cruise vessel, and this is the approach we will discuss from here on. Using the process approach, each food is reviewed, and it's decided how many times the food goes through the danger zone. If the food goes through the danger zone, which is 41 degrees Fahrenheit to 140 degrees Fahrenheit, less than one time, that is considered to be process one. If the food goes through the danger zone one time, that is considered to be process two. If the food goes through the danger zone two or more times, that is to be considered process three. An example of a food that falls into the process one would be tuna salad.

Tuna salad is not a food that is cooked or heated, therefore it does not go through the danger zone. An example of a process two food would be hamburgers or hot dogs or steaks cooked to order. These foods go through the danger zone, but they only go through the danger zone once. They can be cooked and served. Foods that are cooked and hot-held additionally are considered process two foods. So for example, scrambled eggs in the morning that are cooked and hot-held only go through the danger zone one time and are considered process two foods. Examples of process three foods, foods that are cooked and cooled and served cold, can be many of the items in the pastry area of the vessel including cheese cakes, creme brulee, and various other items. They can also be foods that are cooked, cooled, and reheated for service, such as gravies, stocks, soups, and stews.

HACCP implementation using the process approach. All foods follow specific common steps, and we will consider that all foods go through receiving, storing, preparation. It is after this that we must determine whether the food is a process one, process two, or process three. Again, to review, process one, the foods are received, stored, prepared, cold-held, and served. They may also be received, stored, prepared, and served. Again, the food does not go through the danger zone. Process two foods can be received, stored, prepared, cooked, and served, for cooked-to-order foods, or they can be received, stored, prepared, cooked, and hot-held and served. This, again, is a process two food. For process three foods, the foods are received, stored, prepared, cooked, cooled, and served cold, or received, stored, prepared, cooked, cooled, reheated and served or reheated and hot-held prior to service. Again, this is a process three.

HACCP challenge. At this point in time, we will take a brief pause from the lecture portion of the presentation to go into an activity section. During this activity, recipes should be distributed to attendees. Please ensure that recipes are included that involved each process approach: a process one recipe, a process two recipe, and a process three recipe. For this exercise, we will be using HACCP principles, the first six, to design a HACCP plan for each food item selected. Each food item should be analyzed for hazards. Critical control points should be identified from the flow of the food. For each critical control point identified, critical limits must be set. Monitoring methods must be planned. And standard operating procedure should be mapped in a HACCP plan. The culmination of this activity should be a flow diagram that has been designed following the flow of the food, identifying critical control points, and setting critical limits. Please pause the presentation now while recipes are distributed.

Welcome back. We will now conclude the lecture portion of the HACCP presentation.

On this slide, we can see a flow diagram for potable water. HACCP can be used in the potable water system by simply considering the seven HACCP principles. When bunkering or producing water, we must analyze what hazards might typically be associated with potable water. Again, predominantly, we would be concerned with

microbiological hazards: bacteria, parasites, and viruses. The requirements for chlorination in the Vessel Sanitation Program operational guidelines predominantly deals with bacterial contamination of water. If we were going through the HACCP principles, we would identify bacteria as the hazard, and then we would need to decide what flow of the water would get rid of that hazard, or what would the critical control point be? This would be halogenation. When water is either bunkered or produced on the vessel, this water must be halogenated or chlorinated. The critical limit for this critical control point would be two parts per million or two milligrams per liter during the bunkering or production step. From this point on in the flow of the water through the vessel, the water would be stored in potable water tanks. While we do not do anything in this step in the flow to eliminate or prevent hazards, this is an important point where we need to consider standard operating procedures-- maintenance of tanks, cleaning of tanks, disinfection of tanks, per the requirements of the Vessel Sanitation's guidelines.

At this point, we will now distribute the water throughout the vessel. And here again we will find a critical control point. Prior to water being distributed throughout the vessel, a test needs to be made to determine the chlorine...or the free-chlorine residual that is present in the water. If the free-chlorine residual is below a certain level, additional chlorine must be added prior to distribution. This again, this halogenation step or chlorination, is considered a critical control point-- a point, step, or procedure where the hazard, bacteria, can be eliminated, prevented, or reduced to acceptable levels. Because we have a critical control point, we must also have a critical limit. For this critical control point, the critical limit is 0.2 to 5.0 parts per million or milligrams per liter. This water is then distributed throughout the vessel. Again, considering HACCP, there are certain monitoring procedures that must be performed. For production or bunkering, manual monitoring can occur as is discussed in the potable water session. At the far point, there is monitoring and record keeping as well. The far point analyzer chart recorder can both be considered the monitoring method and the recording method, because a chart recorder is part of this piece of equipment.

Additionally, HACCP can be used in the recreational water systems on the vessel. Again, we would analyze the hazard which would typically be microbiological-- parasites, viruses, and bacteria-- and we would decide, "What do we do to this recreational water, "which can be found in swimming pools or whirlpools, "to eliminate the hazard, reduce it to acceptable levels, or prevent it?" We would either halogenate that water, which includes bromine or chlorine. Additionally, we might filter the water, which does minimal to reduce pathogens, but does take care of some larger organisms.

HACCP can be also used in the housekeeping section of the vessel. Predominantly during housekeeping, we are concerned about Norovirus. Norovirus can be eliminated or prevented or reduced to acceptable levels by using disinfection procedures. This would make disinfection the critical control point. Now that we have identified disinfection as the critical control point, we must also determine critical limits. The critical limits for this

critical control point would be based on the manufacturer's recommendations for the disinfectant chosen. There are other areas of the vessel where HACCP can be used.

This concludes the HACCP session. Resources and reference. For further information on HACCP or food safety, please visit www.cdc.gov For further information on the Vessel Sanitation Program, please visit www.cdc.gov/nceh/vsp. For further information on the Food and Drug Administration, please visit www.fda.gov or visit www.cfsan.fda.gov. For information on the United States Department of Agriculture, please visit www.usda.gov or www.fsis.usda.gov.