



PERSPECTIVES

Food Forensics & Safety: It's Not Always a Gut Feeling

Our perspectives feature the viewpoints of our subject matter experts on current topics and emerging trends.

INTRODUCTION

You get out of bed in the middle of the night with an upset stomach and think to yourself “wow, I must have eaten something bad yesterday.” If you have done this, you are not alone. The Centers for Disease Control and Prevention (CDC) estimates that one of every six Americans experience some form of foodborne illness a year, which is roughly 48 million people. Foodborne illnesses account for 128,000 hospitalizations in the U.S. annually.

OVERVIEW

Currently, there are two hundred fifty (250) known disease-causing microorganisms or pathogens that are responsible for twenty (20) percent of the reported foodborne cases. The cause of the remaining eighty (80) percent of foodborne illness cases are unknown. Additionally, physical or chemical contamination such as pesticide or debris contamination has also been associated with illness. In the U.S., the top five pathogens that cause foodborne illnesses are norovirus (58%), Salmonella (10%), Clostridium perfringens (10%), Campylobacter (9%), and Staphylococcus aureus. Salmonella infections (salmonellosis cases) are responsible for the majority of hospitalizations and the most deaths of any of the known pathogens. There are also seasonal patterns to foodborne illnesses, norovirus infections are more likely to occur in the winter, while campylobacteriosis and salmonellosis occur more often in the summer months.

For this paper, we are going to focus our discussion on foodborne illness and food contamination in the restaurant, retail, and hospitality sectors. Trained experts, such as epidemiologists and toxicologists, determine how these incidents may have occurred, including the root cause, and provide recommendations on how to eliminate or resolve the problem. Additionally, trained experts understand the appropriate testing for the suspected food items and testing of the person(s) who is (are) ill. A trained epidemiologist is also able to help you understand if you have a single case of illness or if there are multiple cases. For example, an epidemiologist can create an epidemiological curve, a type of chart, to determine how long the illness occurred from ingestion of the suspect food item in multiple people. This curve can be used to rule out other illnesses such as non-foodborne viruses

that could have caused similar symptoms as a foodborne illness.

UNDERSTANDING FOODBORNE PATHOGENS

Foodborne pathogens can cause several different types of illnesses. Salmonella and noroviruses can cause illness by consumption of live pathogens that replicate and grow in the intestinal tracks, which is called a foodborne infection. An organism like Bacillus cereus, a pathogen found in rice and grains, can cause illness through foodborne intoxication via the production of toxins (the live bacteria does not have to be consumed). These microorganisms typically do not make the food look, taste, or smell bad, which can make it impossible to determine if the food is contaminated.

For a pathogen to grow and proliferate, certain conditions must be met. The first condition is that the pathogen, or its toxin, must be in the food. Many raw foods have naturally occurring background levels of pathogen contamination which is allowable under U.S. Food and Drug Administration (FDA) rules. These pathogens can thrive when the temperature and the nutrients are suitable for pathogenic growth. Foods that are high in protein such as eggs, meat, fish, and milk can provide appropriate nutrient levels for pathogens. Additionally, slightly acidic foods (pH levels 4.6-7.6) also support microbiological growth. Foodborne pathogens grow best in foods that have a temperature of 70-104° F. To prevent growth, hot foods must be kept hot and cold foods must be kept cold. Common food service foods that have a higher risk of foodborne illness are rice, cooked or raw animal products, cooked or raw vegetables, raw seed sprouts, raw shell eggs or water-cooled hard-boiled eggs, cut melons, and garlic and oil mixtures.

Once a pathogen has been allowed to proliferate in a food, foodborne illness can set in following consumption of the contaminated food. Most foodborne illnesses can occur within two to twenty-four (2-24) hours following consumption of the contaminated food, but symptoms have been reported as far out as thirty (30) days post-contaminated food consumption. The time of onset for foodborne illness symptoms can be pathogen dependent. The most common symptom is diarrhea, but symptoms can include vomiting, cramping, fever, and flu-like symptoms.

Trained personnel, such as epidemiologists and toxicologists, understand the nuances of biological sample collection, storage, transportation, and analysis of both food samples and biological samples. These personnel are also important in determining which analytical laboratories have the appropriate certifications, such as being an International Organization for Standardization (ISO) 17025 compliant laboratory for performing the required testing.

PREVENTION STRATEGIES

To avoid potential problems in food production and food service, it is very important to control or eliminate pathogens in food products. There are four major strategies for prevention: personnel, process, procedures, and documentation.

Personnel

Facility personnel are key partners in preventing foodborne illnesses. Practices such as hand washing and having no barehanded contact with prepared foods are key prevention measures. Additionally, employees are critical in having processes, strategy number two, and procedures, strategy number three, implemented.

Process & Procedures

Standard operating procedures (SOPs) and employee training and education are other strategies for preventing foodborne illnesses. The SOPs should address everything from where the product can be ordered from to how it is received, how it is stored, how long it is stored, how it is prepared, where it is prepared, by whom it is prepared, how it is transported, and how it is served. Comprehensive SOPs go a long way to not only prevent foodborne illnesses but also in defending claims. However, that is only if they are adhered to. These processes need to be evergreen documents that are regularly reviewed for changes in best practices. Additionally, these SOPs need to reflect the local, state, and federal regulations for food handling.

Employee training should be done continuously, especially in locations that might have seasonal workers or high turnover of personnel, and management teams

should continually verify SOPs are being followed. Comprehension quizzes that employees sign, or sign-in sheets, are a way to document both attendance and comprehension of the training material. There are also several training certifications in food handling such as those offered through ServSafe and Learn2Serve. These can be done online and provide employees with valuable education in developing safe food handling protocols. Additionally, check with the local municipality's health department to determine where training records must be kept and if some certificates must be displayed.

Documentation

Document your SOPs and date any revisions to these documents. As mentioned earlier, SOPs should be an evergreen document that is reviewed at least once a year. Document your training materials and the training of your employees, especially when you've had a revision to your SOPs. Even document things such as what cleaning products (list brand names) are used in what locations or situations. Document your emergency action plan that includes items such as who in your organization should respond when a claim of foodborne illness occurs and how that employee has been trained to respond including the questions that might be asked of the claimant. Document your facility's compliance with federal, state, and local regulations. Consider conducting a hazard analysis and critical control point analysis (HACCP) which can be your quality assurance and risk assessment steps. HACCPs include coming up with preventative measures; evaluating critical control points and preventing, eliminating, or reducing risk; evaluating and establishing critical limits such as cooking temperatures; monitoring CCP's with temperature measurements; corrective action; record-keeping systems; and verification.

CONCLUSION

Foodborne illnesses can be a grave issue for any facility. Understanding how pathogens are transmitted and what processes and procedures are needed to reduce transmission are the means for protecting facilities from a devastating loss. Implementing the four key prevention strategies will help defend a claim against a foodborne illness. Additionally, using trained personnel and the proper accredited laboratory, once issues arise, will also help with defense against a foodborne illness claim.

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