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Food Contamination Monitoring and Foodborne Disease Surveillance at the National Level

(*Prepared by the United States of America)*

Background

Effective surveillance systems at the national level are critical to identifying problems at an early stage, mobilizing the resources necessary to address the problem, and communicating the problem in a timely manner. The World Health Organization (WHO) estimates that in 2000 alone 2.1 million people died from diarrheal diseases. A great proportion of these cases can be attributed to contamination of food and drinking water. In industrialized countries, the percentage of people suffering from foodborne diseases each year has been reported to be 25 percent or more. In the United States, for example, foodborne diseases are estimated to afflict 76 million Americans every year. (www.foodsafety.gov, CDC). Food contamination creates an enormous social and economic burden on communities and their health systems both in medical costs and lost productivity.

Discussion

In the United States, continual monitoring of the food supply is carried out by food inspectors, microbiologists, epidemiologists, and other food scientists working for city and county health departments, state public health agencies, and various federal departments and agencies. The Food and Drug Administration within the U.S. Department of Health and Human Services (HHS/FDA) has the lead regulatory responsibility within the Department for ensuring the safety of food products. The Food Safety and Inspection Service (FSIS) within the United States Department of Agriculture (USDA) is responsible for domestic and imported meat and poultry and related products, such as meat- or poultry-containing stews, pizzas and frozen foods, and processed egg products (generally liquid, frozen and dried pasteurized egg products).

The Centers for Disease Control and Prevention within HHS (HHS/CDC) has an important complementary and non-regulatory public health role. As the lead Federal agency for conducting disease surveillance, HHS/CDC monitors the occurrence of illness in the United States attributable to the entire food supply. By gathering disease surveillance data from all states for several specific infections, such as botulism, salmonellosis, and *E. coli* O157:H7 infections, as well as for outbreaks of foodborne illness, HHS/CDC maintains a watch for unusual outbreaks of illness, for changing trends in the public health burden of these infections, and for changes in the way they affect specific age-groups or populations. This effort is greatly enhanced by the network of public health laboratories in the States and large cities, which serotype the clinical isolates of *Salmonella* and *Shigella*, and report the results to HHS/CDC. Serotyping *Salmonella* has provided great value to surveillance since the 1960s, allowing the early detection of outbreaks caused by a single serotype, greatly assisting in their investigation, and in defining the success of measures to control them;

Salmonella serotyping is a fundamental starting point for public health surveillance of foodborne infections. More recently, the same important principle of subtyping has been applied more broadly to a number of foodborne pathogens by PulseNet, the national network for molecular subtyping of foodborne bacterial pathogens. Launched by HHS/CDC in 1996 in a few state health departments, PulseNet reached full national participation in 2001, and now includes HHS/FDA and FSIS laboratories as well. Comparison of molecular "fingerprints" of pathogens isolated from ill persons or from foods with the national databases maintained at HHS/CDC can rapidly identify clusters of related cases that may represent an outbreak. PulseNet has revealed a new class of foodborne outbreak, the "highly dispersed outbreak", that previously often went undetected. Investigation of these outbreaks can identify the need for new control points in the food safety system.

The HHS/CDC also maintains the Foodborne Diseases Active Surveillance Network (FoodNet), the principal foodborne disease component of HHS/CDC's Emerging Infections Program (EIP). FoodNet is a collaborative activity of HHS/CDC, HHS/FDA, FSIS, and ten EIP sites, (California, Colorado, Connecticut, Georgia, New York, Maryland, Minnesota, Oregon, Tennessee, and New Mexico). Through this active surveillance system, these sites seek out information on foodborne illnesses identified by clinical laboratories, collect information from patients about their illnesses, and conduct investigations to determine which foods are linked to specific pathogens. This surveillance system provides important information about changes over time in the burden of foodborne diseases. These data help public health and food safety agencies evaluate the effectiveness of current food safety initiatives and develop future food safety activities. HHS/FDA and FSIS provide monetary support and technical expertise to the program.

Drinking water in the United States is protected through the Environmental Protection Agency's (EPA) establishment of drinking water standards. EPA also establishes tolerances for maximum permissible residue levels for pesticides in all types of food and feed whether imported or domestically produced. HHS/FDA and FSIS enforce the pesticide residue standards set by EPA for products under their respective jurisdictions.

An additional step in enhancing response capability is to improve laboratory capacity. A critical component of controlling threats from deliberate food-borne contamination is the ability to rapidly test large numbers of samples of potentially contaminated foods for a broad array of biological, chemical, and radiological agents. To increase laboratory surge capacity, HHS/FDA has worked in close collaboration with HHS/CDC and USDA/FSIS to augment the Laboratory Response Network by establishing the Food Emergency Response Network (FERN) to include a substantial number of laboratories capable of analyzing foods for agents of concern. HHS/FDA seeks to expand capacity through agreements with other Federal and state laboratories. Approximately 30 laboratories representing 23 states have submitted laboratory qualification checklists for membership in FERN. The President's 2005-budget proposal requests additional funding to enhance FERN. Once completed, FERN will encompass a nationwide network of Federal and state laboratories capable of testing the safety of thousands of food samples, thereby enhancing the Nation's ability to swiftly respond to a terrorist attack.

HHS/FDA also maintains an Electronic Laboratory Exchange Network (eLEXNET). eLEXNET is an integrated, web-based data exchange system for food testing information that allows multiple agencies engaged in food safety activities to compare, communicate, and coordinate findings of laboratory analyses. eLEXNET is funded by HHS/FDA and supported by FSIS and the Department of Defense. It enables health officials to assess risks and analyze trends, and it provides the necessary infrastructure for an early-warning system that identifies potentially hazardous foods. At present, there are 108 laboratories representing 49 states that are part of the eLEXNET system with 62 laboratories actively submitting data. We are continuing to increase the number of participating laboratories.

Conclusion

Food contamination monitoring and foodborne disease surveillance at the national level requires a multi-faceted approach that takes into account all of the potential food vehicles involved. Further, it requires a well-coordinated strategy that includes all of the organizations with responsibility for food safety and security. For additional information, please refer to the following web sites: www.fda.gov, www.cdc.gov/pulsenet, www.cdc.gov/foodnet, www.cdc.gov/foodborneoutbreaks, www.fsis.usda.gov, and www.epa.gov.