

FOOD SAFETY

ENSURING A STRONG SURVEILLANCE SYSTEM

UNMET NEEDS

Public health laboratories play a crucial role in foodborne disease surveillance and the detection of foodborne outbreaks. Advances in testing methodologies and a highly-trained public health laboratory workforce coupled with key networks such as PulseNet and the Food Emergency Response Network (FERN) have resulted in the detection of a large number of nationwide outbreaks and subsequent food recalls. However, gaps still remain and these vital food safety networks are being threatened with deep cuts.

- PulseNet is the only national laboratory-based surveillance system in the United States that uses DNA fingerprinting technology to detect clusters of foodborne pathogens. Without this network, many large national outbreaks will never be detected. Continued funding for training, infrastructure, and supplies are essential for PulseNet's maintenance and survival, as are resources to develop new molecular methods.
- FERN has been threatened in recent years with severe funding cuts and elimination. This network provides critical surge capacity for nationwide food emergencies, ranging from natural disasters such as the Deepwater Horizon oil spill in the Gulf of Mexico in 2010 to inadvertent contamination of the food supply including the recent Listeriosis outbreak linked to cantaloupe.
- New technology must continually be developed to identify and respond to emerging threats such as the recent outbreak of *E. coli* O104 in Europe that sickened ~4,000 people and killed 50. Resources are needed to develop these technologies and implement them.
- Culture independent diagnostics (CIDT). With the increasing availability of CIDT for foodborne pathogens, it is essential to look at new ways to conduct surveillance, collect important information, and detect outbreaks of



these pathogens which have historically relied on culture as the gold standard.

BACKGROUND

Recent nationwide outbreaks of Listeriosis in cantaloupe and Salmonella in turkey provide just a few of the more well-known examples of a much larger problem. In 2011, the Centers for Disease Control and Prevention (CDC) estimated that foodborne disease causes approximately 48 million illnesses (1 in 6 Americans) annually, accounting for 128,000 hospitalizations and 3,000 deaths in the US.

WHAT ROLE DO PUBLIC HEALTH LABORATORIES PLAY?

Surveillance is the ongoing collection and analysis of data in order to monitor illness. Through PulseNet, public health laboratories routinely perform DNA fingerprinting on common foodborne bacteria and transmit those data electronically, allowing public health laboratories to identify related bacterial strains across state borders in a timely manner. These mechanisms act as an early warning system for foodborne disease outbreaks. PulseNet continues to expand in scope and utility by engaging new federal partners, targeting emerging food pathogens such as non-O157 shiga toxin-producing *E. coli*, and expanding to

include patterns from animal and produce commodities. In 2011, PulseNet identified over 280 clusters of foodborne pathogens:

- Over 220 PulseNet clusters were followed by epidemiologists at CDC. Of those, 179 involved engaging epidemiologists at the state and local levels to conduct intensive epidemiological follow up;
- PulseNet was critical in identifying the scope of the recent *Listeria monocytogenes* outbreak associated with cantaloupe from Colorado;
- USDA-Microbiological Data Program (MDP) participation in PulseNet has increased the early detection and surveillance of foodborne pathogens in produce.

OUTBREAK TESTING

When a foodborne outbreak occurs, public health laboratories test human specimens and food samples to determine the chemical or biological contaminant and identify links between human illness and food sources. These links promote food safety initiatives that help prevent future illness.

Instrumentation, supplies, training, and proficiency testing provided through the FERN network prepared the Colorado public health laboratory to rapidly respond to the 2011 *Listeria* outbreak linked to contaminated cantaloupe. The Colorado results were important in identifying the culprit and in ruling out other cantaloupe that was safe to eat. Molecular subtyping of patient and food isolates through PulseNet, combined with strong epidemiologic investigations at the state and local level, completed the outbreak picture.

Without the resources of the FERN network, this and other foodborne outbreaks would go undetected, and food producers would not have the opportunity to improve their practices to prevent future illnesses.

CONSEQUENCES OF CULTURE-INDEPENDENT DIAGNOSTIC TESTS TO FOODBORNE ILLNESS OUTBREAK RESPONSE

The essential ingredient in the PulseNet system is the availability of a culture of the disease-causing bacteria. Without this ingredient, discovery of the source of foodborne illness and its linkage to an outbreak of human illness becomes nearly impossible. Most bacterial cultures that are characterized in public health laboratories and entered into the PulseNet database have their origins in the clinical laboratory setting. A rising number of clinical providers are choosing to perform culture-independent diagnostic tests (CIDT) that have been approved for clinical use.

- CIDTs are attractive in that they provide rapid, individual, and often less expensive results.
- Loss of bacterial culture for characterization in public health laboratories will:
 - Slow down and/or increase the cost of foodborne outbreaks detection.
 - Reduce antibiotic resistance monitoring, thereby negatively affecting patient treatment.
 - Diminish public health's ability to attribute food commodities to certain pathogens, e.g., *E. coli* to ground beef
 - Eliminate the ability of PulseNet to detect outbreaks.

To remedy this potentially dangerous situation, all partners with a commitment to national food safety must contribute to solutions that will ensure that our highly effective national surveillance system remains intact. ■

CONTACT

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