

Issue # 1

Foodborne Disease Outbreak Investigations

Framing the Issue

According to the Centers for Disease Control and Prevention (CDC), more than 250 different foodborne diseases have been described. Most of these diseases are actually infections, while others are caused by poisonings. A variety of bacteria, viruses, and parasites can be acquired through food such as *Campylobacter*, *Salmonella*, *Escherichia coli*, norovirus, *Cryptosporidium*, and *Giardia*. Poisonings can be caused by harmful toxins or chemicals that have contaminated the food or by foods that naturally contain toxins (for example, poisonous mushrooms). The clinical symptoms of foodborne disease vary depending upon the cause so no one syndrome can be described to encompass all foodborne illness. However, the most common clinical symptoms include nausea, vomiting, abdominal cramps, and diarrhea.

"As recent outbreaks have shown, too many people in the United States are getting sick each year from foodborne illnesses."

"We know the faster we can detect an outbreak, the faster we can take actions that will help protect people."

*Dr. Julie Gerberding,
CDC director
CDC Press Release
April 12, 2007*

Approximately 400-500 foodborne outbreaks are reported to be investigated by local and state health departments in the United States each year. This number may be artificially low due to the fact that many foodborne illnesses go undiagnosed. Many ill persons will not seek medical attention and even when they do, many do not submit a stool sample for testing. To complicate matters further, some foodborne diseases are not detected even when a stool sample is submitted because many pathogens may not be included in or identified by routine screening tests. The CDC estimates that 76 million individual cases of foodborne disease occur each year in the United States alone. Of these, an estimated 325,000 cases result in hospitalization and an estimated 5,000 deaths occur each year.

In April 2009, the CDC released a 10-state report stating that a plateau had been reached in foodborne illness prevention. The report, which was a collaborative study done by CDC's Foodborne Disease Active Surveillance Network (FoodNet), found there had been very little change in the incidence of foodborne illnesses over the past 3 years and that food safety practices must now improve.

"Food safety advocacy groups found the report disturbing. "This is confirming what a lot of folks have been worried about, which is some of the progress that had been made a few years ago on foodborne illness is now being reversed and we're seeing increased rates again." said Patty Lovera, assistant director of Food and Water Watch. "I think it's not the most encouraging news to see some of the incidents go back up on some of these pathogens."

CNN, Health, April 9, 2009

Foodborne Disease Outbreaks and Investigations*

*Adapted from CDC and MDH Foodborne Illness Websites

The Minnesota Department of Health *“has developed a model for investigating foodborne illness using a centralized group of epidemiologists and interviewers coordinated with local environmental health departments. This approach allows us to rapidly respond to reports of outbreaks, standardize outbreak investigations, maintain a statewide database of foodborne disease, and distribute information quickly and consistently.”*

<http://www.health.state.mn.us/divs/idepc/dtopics/foodborne/outbreak/index.html>

A **confirmed** foodborne disease outbreak occurs when two or more persons experience a similar illness after consuming the same food or meal, and epidemiologic evaluation (not necessarily including laboratory confirmation) implicates the meal or food as the source of illness. A **probable** foodborne disease outbreak is defined as an incident in which two or more persons experience a similar illness after consuming the same food or meal, and a specific food or meal is suspected, but person-to-person transmission or other exposures cannot be ruled out as a cause of the illness.

According to the Minnesota Department of Health (MDH), **confirmed** outbreaks may be classified in the following ways:

- **Laboratory-Confirmed Agent:** Outbreaks in which laboratory evidence of a specific etiologic agent is obtained.
- **Epidemiologically Defined Agent:** Outbreaks in which the clinical and epidemiologic evidence defines a likely agent, but laboratory confirmation is not obtained.
- **Outbreak of Undetermined Etiology:** Outbreaks in which laboratory confirmation is not obtained and clinical and epidemiologic evidence cannot define a likely agent.

Incidents of foodborne disease outbreaks are often local in nature and do not always make the news (local or national). Recently, outbreaks have increasingly become more widespread, affecting persons in many different places. This is likely due to the distribution and food handling processes now available. In Minnesota, outbreaks are detected in a variety of ways at the MDH. Some outbreaks are detected through routine surveillance activities that include interviewing all persons who are diagnosed with a reportable disease (many of which are foodborne diseases). It may be found that these outbreaks stretch across state lines and sometimes even national borders.

An investigation into a possible foodborne outbreak is initiated when multiple cases report a common exposure, such as eating a common food item, eating at a common restaurant, or having contact with an identical water source, daycare, or school. Foodborne outbreaks represent the possibility of a problem within the food safety system. Public health personnel investigate foodborne outbreaks in order to control them and also to learn how similar outbreaks can be prevented in the future. At the MDH reports of suspected foodborne illness are received from the general public (through local health departments or through the MDH foodborne illness hotline), from healthcare providers (who may suspect foodborne illness outbreaks if they see an unexpected number of patients with gastrointestinal illness), and from restaurants, daycare providers, schools, and healthcare facilities (i.e., hospitals, long-term care facilities).

At the MDH, outbreak investigations involve coordination between epidemiologists and environmental health specialists (health inspectors). Environmental health inspectors focus on evaluating the food safety practices at the restaurant or facility where the outbreak likely occurred and interviewing employees. Epidemiologists coordinate patron interviews, arrange diagnostic sample collection and testing (which may include “DNA fingerprinting” of organisms), and perform data analysis to help determine if there is

a specific food item that made people sick. This model of foodborne disease outbreak investigation, with a core group of epidemiologists and an extensive network of environmental health specialists, (in coordination with local, state, and federal health agencies) provides Minnesotans with an efficient foodborne disease surveillance system. During an investigation, it is important to interview patrons who were ill, as well as those who weren't. Information obtained from patrons during an investigation may include:

- Demographic information
- Illness history, including when illness started and symptoms
- Exposure history, including details about food and beverages consumed
- In addition, stool samples may be requested from ill patrons in order to identify the pathogen that is causing the outbreak.
- Investigation of the food service establishment usually includes: illness histories from all food workers and staff; an assessment of food preparation and storage practices; and implementing any necessary corrective measures within the establishment, modifying unsafe food preparation practices.

Outbreak of *Escherichia coli* O157:H7 Infections Associated with Shredded Iceberg Lettuce at Taco John's Restaurants, December 2006

"There was a significant increase in the proportion of food-borne illness outbreaks in the United States linked to leafy green vegetables from 1973 to 2006, but the rise can't be completely explained by increased consumption of leafy greens, researchers say."

HealthDay News, March 17, 2008

In December 2006 the MDH was notified about three *Escherichia coli* O157:H7 (*E. coli* O157) isolates from patients at one Minnesota (MN) hospital and eight presumptive *E. coli* O157 isolates at another MN hospital. Five of these initial patients were found through interviews to have eaten at a Taco John's in Albert Lea, MN during the week prior to their illness onset. During this same month the MDH became aware of a concurrent outbreak of *E. coli* O157 infections in Iowa that were also associated with a Taco John's restaurant (in Cedar Falls, Iowa). Ultimately, a case control study in MN identified 32 confirmed and probable cases associated with this outbreak. The interviews conducted for this case control study found only one food item, shredded iceberg lettuce, to be significantly associated with illness (odds ratio of 41.3). A separate analysis was performed in Iowa that also found shredded lettuce to be significantly associated with illness.

"Against Taco John's, we're representing 15 people. We've got three lawsuits filed, two in Iowa and one in Minnesota. Apparently, there's an unnamed grower in California that they have found a genetic match to the outbreak. So I don't know exactly where that's going to go."

Foodborne Illness Attorney Bill Marler in an interview with QSR magazine, February 2007

King Nut peanut butter confirmed in 43-state *Salmonella* outbreak, January 2009

"The Peanut Corporation of America said it was voluntarily recalling all peanut butter produced in its Blakely plant "out of an abundance of caution." "We deeply regret that this has happened," company president Stewart Parnell said."

CNN, Health, January 14, 2009

On January 12th, 2009, the MDH issued a news release stating that the strain of *Salmonella* found in a jar of King Nut peanut butter recovered from a long term care facility was the same as the one that caused 400 cases of *Salmonella* infection in 43 states and 30 illnesses in Minnesota. Epidemiological evidence from the MDH and the Minnesota Department of Agriculture Rapid Response Team investigations implicated King Nut creamy peanut butter as a likely source of infection. Ultimately, this outbreak involved the strain *Salmonella enterica serotype typhimurium*, which caused 116 persons to be hospitalized and might have contributed to 8 deaths across the nation. The CDC's epidemiologic and laboratory findings indicated that peanut butter and peanut paste produced at one plant were the source of the outbreak.

This outbreak highlighted the complexities of "ingredient-driven" outbreaks and the importance of rapid outbreak detection and investigation.

Risk Communication Challenges

"Communication about physical hazards, in any form or for any purpose, is necessarily and intricately linked to perceptions of risk about those hazards."

Joye Gordon, Risk Analysis, 2003

Gordon's article "Risk Communication and Foodborne Illness: Message Sponsorship and Attempts to Stimulate Perceptions of Risk" put forth the argument that foodborne illness prevention messages should stimulate risk perceptions and promote self-efficacy to increase the likelihood that people adopt safe food-handling behaviors. This may be more important today given that foodborne disease outbreaks appear to be on the rise and risky food handling procedures are still common. For example, a March 26th Reuters article highlighted a study by Dr. Carol Byrd-Bredbenner and colleagues which found that many college students continue to engage in eating behaviors that could make them sick. The study suggests that current food safety education and risk communication efforts may not be providing the information and/or motivation necessary to compel individuals to change their consumption levels of risky foods.

The Public Health Response to the Issue: Discussion Questions

The issue

- What are the essential elements of this issue?
- What public health problem does this issue raise?
- What are the psychosocial aspects of public health for this issue?
- What are the competing risks to be considered?
- What is the role of the public in this issue?

The team

- Why does this issue call for a trans-disciplinary public health team?
- What knowledge, skills and experience do you bring to addressing this problem?
- What frames your perspective on this issue?
- What knowledge, skills and experience do you need to address this problem and where can you find that?
- What other perspectives might be useful in addressing this problem?
- What skills, knowledge, and experience do you think are at the table now?

Reading Assignment

- In preparation for small group discussion, each student should review at least one additional resource that addresses this issue. The group should decide who will review each resource, so that there is not overlap. The resources may come from the list below or from an independent search. Bring a copy of your resource if possible. You may want to include at least one source describing a recent 2008/2009 foodborne disease outbreak – there have been many.

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