



Food Safety Review

Revenge of the 'Killer Lettuce' and Other Foodborne Illness Outbreaks of 2019

FOOD PROTECTION CONNECTION

A look at the foodborne pathogens that triggered illness outbreaks last year

Foodborne illnesses are preventable, yet they continue to happen repeatedly, causing a burden to public health and driving skyrocketing healthcare costs. Food safety is multifaceted in the United States and spans the gamut of farm to fork. Each industry segment throughout the supply chain is a key player in the prevention of foodborne illness, from farm, harvest, processing, packing, distribution, transportation, storage, preparation, to consumption.

More than 250 foodborne diseases have been identified, however, the Centers for Disease Control and Prevention (CDC) focuses primarily on the known foodborne pathogens, which include 31 pathogens that are tracked by public health system surveillance of diseases and outbreaks. It is estimated that in the United States, 48 million people are sickened by

food annually—that's a staggering one in every six Americans. And of those sickened, 128,000 people are hospitalized with 3,000 deaths resulting from foodborne illnesses and diseases. Additionally, foodborne illness has an estimated financial burden on the U.S. of \$77.7 billion, which includes medical costs, loss of productivity, pain, suffering, and mortality.

According to the CDC the top five foodborne pathogens responsible for **illness** in the U.S. are:

1. Norovirus
2. *Salmonella* nontyphoidal
3. *Clostridium perfringens*
4. *Campylobacter* spp.
5. *Staphylococcus aureus*



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The top five foodborne pathogens resulting in **hospitalization** are:

1. *Salmonella* nontyphoidal
2. Norovirus
3. *Campylobacter* spp.
4. *Toxoplasma gondii*
5. *Shiga toxin-producing Escherichia coli* (STEC) O157

And, the top five foodborne pathogens resulting in **death** are:

1. *Salmonella* nontyphoidal
2. *Toxoplasma gondii*
3. *Listeria monocytogenes*
4. Norovirus
5. *Campylobacter* spp.

REVENGE OF THE “KILLER LETTUCE”

Almost a year to the day for three consecutive years, leafy greens have been tied to an *E. coli* outbreak. Rewind... Repeat...Rewind...Repeat... Are they connected? Yes, all three outbreaks were identified as being caused by the same strain of *E. coli* O157:H7.

Foodborne illness tracking remains largely reactive currently, relying on consumer complaints and illness reporting to identify issues. However, the goal is a proactive and collaborative approach across the food industry with prevention measures that will reduce foodborne illness in the United States. The CDC’s

Foodborne Disease Active Surveillance Network (FoodNet) documents major sources and trends in foodborne illness in an effort to determine if prevention measures are working across the U.S. and produces an annual report on their findings and incidence and trend predictions. Unfortunately, the time from the beginning of symptoms to the confirmation as part of an outbreak averages about two to three weeks, and can be longer, making epidemiological identification of outbreaks a difficult and lengthy process.



PulseNet is coordinated by the CDC and is the national network of local, state, and federal public health and food regulatory agency laboratories that can analyze and compare the DNA fingerprints of bacteria from patients to quickly detect a foodborne illness that otherwise might have gone undetected, and identify clusters of possible unrecognized outbreaks. PulseNet’s tools allow public

health labs around the country to work together in a coordinated network to monitor for potential outbreaks by analyzing and comparing data from laboratory samples. DNA fingerprinting is performed using a data analysis method called whole genome sequencing (WGS) that provides investigators detailed information about illness causing bacteria. Just as human fingerprints are unique, so are bacterial DNA fingerprints, thus allowing investigators to determine closely genetically related

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strains of various foodborne pathogens and aid in determination of a source of an outbreak.

However, WGS information is only one clue in solving a foodborne disease outbreak that plays a key role, but information must still be gathered outside the laboratory, such as people’s

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2019 Foodborne Illness Multistate Outbreaks Chronologically

MARCH

- 78,164 pounds of raw ground turkey recalled for *Salmonella* Schwartzengrund contamination (7 cases, 3 states, 1 hospitalization, no deaths)

APRIL

- Pre-cut melons infected with *Salmonella* Carrau (137 cases, 10 states, 38 hospitalizations, no deaths)
- Frozen ground tuna infected with *Salmonella* Newport (15 cases, 8 states, 2 hospitalizations, no deaths)

MAY

- Tahini linked to *Salmonella* Concord (6 cases, 3 states, 1 hospitalization, no deaths)
- Del Monte fresh produce trays linked to *Salmonella* Infantis (5 cases, 2 states, no hospitalizations, no deaths)

JUNE

- Ground beef from multiple sources contaminated with Shiga toxin-producing (STEC) *Escherichia coli* O103 (209 cases, 10 states, 29 hospitalizations, no deaths)
- Oysters from Mexico cause multiple gastrointestinal illnesses, including *Shigella* and *Vibrio* (16 cases, 5 states, 2 hospitalizations, no deaths)

- Whole, fresh papayas from Mexico infected with *Salmonella* Uganda (81 cases, 9 states, 27 hospitalizations, no deaths)

JULY

- Flour contaminated with STEC *E. coli* O26 (21 cases, 9 states, 3 hospitalizations, no deaths)
- Ground bison infected with *E. coli* O103 and *E. coli* O121 (33 cases, 8 states, 18 hospitalizations, no deaths)

AUGUST

- Imported yellowfin ahi tuna linked to Scombrotoxin fish poisoning (50 cases, 11 states, 1 hospitalization, no deaths)

SEPTEMBER

- Fresh basil from Mexico contaminated with *Cyclospora cayentensis* (241 cases, 11 states, 6 hospitalizations, no deaths)
- Various deli-sliced meats and cheeses contaminated with *Listeria monocytogenes* (10 cases, 5 states, 10 hospitalizations, 1 death)
- Fresh conventional blackberries from Fresh Thyme Farmers Market infected with Hepatitis A (18 cases, 6 states, 10 hospitalizations, no deaths)

OCTOBER

- Pig ear pet treats contaminated with multidrug-resistant *Salmonella* (154 cases, 34 states, 35 hospitalizations, no deaths)

NOVEMBER

- Romaine lettuce linked to STEC *E. coli* O157:H7 grown in the Salinas, California region (102 cases, 23 states, 58 hospitalizations with 10 cases of hemolytic uremic syndrome (HUS), no deaths)

DECEMBER

- 34,222 pounds of ground beef recalled for *Salmonella* Dublin (13 cases, 8 states, 9 hospitalizations, 1 death)
- Fresh Express Sunflower Crisp Chopped Salad Kits linked to STEC *E. coli* O157:H7, a continuation of November romaine outbreak from the Salinas growing region (8 cases, 3 states, 3 hospitalizations with 1 case HUS, no deaths)
- Cut fruit and melons contaminated with *Salmonella* (11 cases, 2 states, 7 hospitalizations, no deaths)
- Hard-boiled eggs contaminated with *L. monocytogenes* (7 cases, 5 states, 4 hospitalizations, 1 death)

ADDITIONAL RESOURCES

For more information on foodborne illness outbreaks, please visit:
<https://www.cdc.gov> | www.fda.gov | www.healthypeople.gov

geography and the foods eaten prior to getting sick. WGS information supports epidemiological investigations and helps public health investigators identify and solve more outbreaks before they become massive. Over the

last three years of utilizing WGS methodology, the CDC reports that three times more outbreaks were found and solved and over \$500 million was saved annually through detection and prevention of foodborne illness.

The key to successful foodborne illness prevention is ongoing collaboration and transparency along with new and novel technologies. By identifying ongoing foodborne outbreaks, health officials can stop an outbreak, and industry

and regulatory agencies can make changes to improve food and water safety, thus impacting public health through the prevention of future illness. **E**

SAN CE Questions | FOOD PROTECTION CONNECTION



This Level II article assumes that the reader has a foundation of basic concepts of the topic. The desired outcome is to enhance knowledge and facilitate application of knowledge to practice.

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1. What does STEC stand for?
 - A. *Shigella* toxin *E. coli*
 - B. Shiga toxin-producing *E. coli*
 - C. *Shigarella Escherichea coli*
2. What type of testing confirmed the same strain of *E. coli* in the 2017, 2018, and 2019 leafy greens outbreaks?
 - A. Whole genome sequencing
 - B. PulseNet
 - C. HUS testing
3. How many known foodborne pathogens are there?
 - A. 21
 - B. 41
 - C. 31
4. What is the number one foodborne illness resulting in deaths in the U.S.?
 - A. *Salmonella* nontyphoidal
 - B. *Toxoplasma gondii*
 - C. *Listeriosis monocytogenes*
5. What foodborne pathogen is responsible for the most illnesses in the U.S.?
 - A. *Salmonella* nontyphoidal
 - B. Norovirus
 - C. *Shiga toxin-producing E. coli* O157:H7
6. How many people are sickened by foodborne illness annually in the U.S.?
 - A. 48 million
 - B. 50 million
 - C. 128,000
7. What is the financial burden of foodborne illness in the U.S.?
 - A. \$67.7 million
 - B. \$500 million
 - C. \$77.7 million

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