SafeBites

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There will be a Q&A session at the end of this webinar. If you have questions for our presenters, please type them in the chat box.

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SafeBites

MEET OUR FOOD SAFETY EXPERTS

DR. KEVIN ROBERTS
PhD

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PhD, RD

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MEET OUR PRESENTER

FoodHandler

- Brenda Halbrook, MS, RD, CFS, FAND is a Registered Dietitian with nearly 30 years of experience in food safety, most of which is at the Federal level.
- Ms. Halbrook is the Founder and first Director (retired) of the USDA Food and Nutrition Service, Office of Food Safety.
- She also was the Director of the Executive Secretariat for the National Advisory Committee on Microbiological Criteria for Foods.
- Her knowledge of food safety spans microbiology, regulatory, food defense, and school foodservice issues.

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SafeBites *presents*

CSI: FOODBORNE ILLNESS OUTBREAK

presented by **Brenda Halbrook, MS, RD, CFS, FAND**

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WELCOME

- Hi everyone!
- Thanks for joining us today.
- Foodborne illness outbreaks affect consumers and foodservice establishments, alike.
- We will take a closer look at how they unfold and are resolved.

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PURPOSE

- How are foodborne illness outbreaks identified? We will discuss how outbreaks are detected and resolved, and the many steps along the way in finding the source of the illness and ending the outbreak.
- We will cover analytical tools, such as whole genome sequencing (DNA fingerprinting), used to determine the food involved and reach of the outbreak.
- Reporting mechanisms at the local, state, and federal agencies also will be covered.

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OBJECTIVES

At the end of the webinar, participants will be able to:

1. Recognize steps involved in investigating suspected outbreaks.
2. Identify reporting responsibilities.
3. Describe procedures used in identifying outbreaks of foodborne illness.

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AN OUTBREAK HITS THE NEWS...

- How does an outbreak affect consumers and the foodservice industry?
- What happens during the investigation?
- What technologies are used in the investigation?
- How do you know when it is over?

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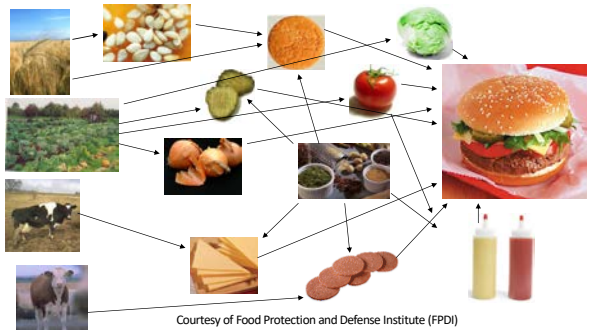
THE GLOBAL SUPPLY CHAIN



Courtesy of Food Protection and Defense Institute (FPDI)

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SALMONELLA IN ONIONS 2020

- Red, yellow, and sweet onions were the subject of an outbreak and recall in 2020.
- Distributed to wholesalers, restaurants, and retail stores in all 50 states, the District of Columbia and Canada.
- As of August 18, 2020, a total of 869 people infected with the outbreak strain had been reported from 47 states.

Source: CDC

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RATES OF FOODBORNE ILLNESS

CDC estimates 48 million people get sick, 128,000 are hospitalized, and 3,000 die from foodborne diseases each year in the United States.

Source: CDC

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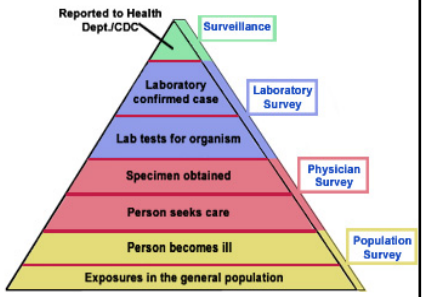
WHERE DO THE CDC NUMBERS COME FROM?
BURDEN OF ILLNESS PYRAMID

- Some members of the general population are exposed to an organism;
- Some of these exposed people become ill;
- Some of these ill people seek medical care;
- A stool, or blood, specimen is obtained from some of these people and submitted to a clinical laboratory;
- A laboratory tests some of these specimens for a given pathogen;
- The laboratory identifies the causative organism in some of these tested specimens and thereby confirms the case;
- The laboratory-confirmed case is reported to a local or state health department.

https://www.cdc.gov/foodnet/surveillance.html



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WHEN A FOODBORNE ILLNESS OCCURS...

- How is the outbreak detected?
- Who has the detective job of figuring it out?
- What is the role of the local health department?
- State health department?
- Federal Government health agencies?

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DEFINING TERMS

- **Pathogen** = any disease-producing agent, especially bacteria, a virus, a parasite, or toxins produced by bacteria.
- **Foodborne illness** = a condition caused by the consumption of a food or beverage contaminated by a pathogen.
- **Foodborne illness outbreak** = an incident in which **two or more persons** experience a similar illness resulting from the ingestion of a common food, or beverage.

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DEFINING TERMS

- **Epidemiology** = Epidemiology is a discipline within public health. It investigates all of the factors that determine the presence or absence of diseases and how the number of people affected by a disease changes over time.
- **Epi curve** = a graph in which the number of new cases of a disease is plotted against an interval of time to describe a specific epidemic or outbreak.
- **Sporadic** = occurring at irregular intervals; having no pattern or order in time.

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WHAT ARE TYPICAL FOODBORNE ILLNESS SYMPTOMS?

- Upset stomach
- Stomach cramps
- Nausea
- Vomiting
- Diarrhea
- Fever

Usually symptoms resolve in a matter of a few hours, or a few days. Any extended symptoms and the person should see a physician, or go to the health department for assessment.

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EVERY FOODBORNE ILLNESS STARTS AS A LOCAL EVENT

- Local and State Health Departments begin the investigative journey.
- They do an epidemiologic investigation.
- They look for similar illnesses among the population in their area.
- They check laboratories for analyses of foodborne pathogens.
- They run stool, or blood, samples from sick individuals.
- They ask whether any suspected food remains and take it to the lab for analysis.
- The State shares this information with the Centers for Disease Control and Prevention (CDC).

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EPI INVESTIGATIONS
INFORMATION NEEDED

- Date Occurred: _____ Restaurant Name: _____
- Time Day/Meal: _____
- Customer's Name: _____
- Address: _____
- Telephone number: _____
- Physician Contact Information: _____
- Health Dept. contact Name & Date: _____

- Suspected Food Item(s) & Manufacturer's Product Information:
- Summary of Incident:
- Symptoms and duration:
- Bag, label, date, and indicate current storage location of food
- Was medical treatment sought? If so describe
- Results of Investigation:
- Corrective Action:

- Restaurant Manager Signature: _____ Date: _____

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LIABILITY

- Liability can result from a foodborne illness if it is traced to your operation, or facility.
- Chipotle fined $25 million for causing five outbreaks over a three-year period from 2015 to 2018.
- Employees in their restaurants in LA, Boston, VA and OH failed to follow food safety protocols.
- Not only did they suffer millions of dollars in fines, but their reputation also was tarnished.
- Many establishments cannot afford these losses and simply go out of business.

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WHO DOES WHAT IN AN OUTBREAK?

Non-federal Agencies

- Regulators in State and local jurisdictions
- Epidemiologists and other public health personnel
- States report to Federal agencies – CDC
- Reporting to CDC is voluntary

Federal agencies:

- Regulatory:
  - USDA Food Safety and Inspection Service (FSIS)
  - Food and Drug Administration (FDA)
- Non-regulatory:
  - Centers for Disease Control and Prevention (CDC)

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NON-FEDERAL AGENCIES

- State Health Departments (DOH)
  - Association of State and Territorial Health Officials (ASTHO)
- State Departments of Agriculture (SDA)
- Local health departments

Every outbreak is a local event – first!

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FEDERAL AGENCIES

Department

Department

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A RECENT FINE

- On September 17th, a federal court in Texas sentenced ice cream manufacturer Blue Bell Creameries to pay $17.25 million in criminal penalties for an outbreak of listeriosis caused by their contaminated product.
- It is the largest-ever criminal penalty following a conviction in a food safety case.
- Listeriosis is a dangerous pathogen for the elderly, pregnant women and newborns, and people with compromised immune systems.
- In this outbreak, a total of 10 people were reported ill with listeriosis from 4 states: Arizona (1), Kansas (5), Oklahoma (1), and Texas (3). All ill people were hospitalized. Three deaths were reported from Kansas (3).
- Inspections at the plant found sanitation issues, including problems with the hot water supply, and food contact surfaces, non-food contact surfaces, and drains that tested positive for *Listeria*, as well as unsatisfactory factory conditions. All indicate problems with the sanitation program.
- Blue Bell temporarily has taken significant steps to enhance sanitation processes and enact a program to test products for *Listeria* prior to shipment.

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RESPONSIBILITIES

CDC Part of the Department of Health & Human Services	FDA Part of the Department of Health & Human Services	FSIS Part of the US Department of Agriculture	States, Locals and Tribal Agencies
Maintains and monitors surveillance and outbreak detection systems in collaboration with public health partners. Coordinates communications among States and may lead epidemiological studies. Once a contaminated food source is identified, public health action can be taken by regulatory agencies, such as FSIS and FDA to control the outbreak.	The FDA has many areas of regulatory authority. When it comes to food, it is responsible for protecting the public health by ensuring the safety of our nation's food supply for foods not regulated by the USDA. Has mandatory recall authority.	Ensures that the nation's commercial supply of meat, poultry and egg products, and catfish is safe, wholesome, and correctly labeled and packaged. Enters into outbreak resolution when a regulated food is suspected, or implicated. Has mandatory recall authority.	Primary responsibilities are to regulate the retail and foodservice industries. Agencies in these jurisdictions also provide epidemiologic evidence and conduct environmental health and public health laboratory functions. Local and Tribal agencies report to the State Department of Health. The State Department of Health reports to CDC. Collaborate with Federal agencies when necessary to resolve outbreaks.

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A QUICK HISTORY LESSON

- 1993: Jack in the box
  - 700 ill, 4 deaths
  - $50 million in settlements
  - Children suffered and died from complications of *E. coli* O157:H7. Many had life-long health consequences.
- 1996: PulseNet established by CDC
  - Uses Pulse Field Gel Electrophoresis (PFGE) analytical tool to discover any link between a pathogen found in food and a specimen collected from sick person.
  - Was the best tool for investigations for about 20 years, until Whole Genome Sequencing was developed.
- 2013 Whole Genome Sequencing (WGS) applied to *Listeria monocytogenes* in 2013. Uses the whole genome to create a 'fingerprint' of the pathogen.
- Today, databases with WGS fingerprints are almost exclusively used to find matches between a food sample and a clinical sample. It is 100 times faster than PFGE.
- PulseNet is used to store these data, but there are other databases, as well.

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TOOLS OF INVESTIGATION

- The primary tools for foodborne illness investigations are:
  - Epidemiology
  - Laboratory
  - Traceback

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CDC'S ROLE

- Outbreak reporting to CDC by the State, local, territorial, or tribal health departments is voluntary.
- With the data collected, CDC detects the outbreak, defines its size and extent, and identifies the source.
- They work in concert with FDA and FSIS, in addition to the many public health partners across the states to stop the contaminated food from being distributed.
- CDC links the illnesses to a food vehicle and confirms the connection through analyses and strives to prevent more people from getting sick.
  - Summaries of foodborne illness investigations can be found at the CDC publication of the Morbidity and Mortality Weekly Report
  - https://www.cdc.gov/mmwr/publications/index.html

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STEPS IN AN OUTBREAK INVESTIGATION

- Incoming data indicate an outbreak is occurring.
- State and local health officers look for additional cases of illness and take samples from the ill person and leftover food, if available.
- Interviews are done to learn what was eaten, how long before symptoms occurred, and where the person ate.
- Samples are taken from the ill person and analyzed to find the exact pathogen.
- Food and environmental samples are used to confirm the relationship with the sick person.
- Federal agencies, FSIS and FDA, are enlisted to trace the contaminated food back to the source and take regulatory action to stop further distribution of the food.
- Contamination can occur anywhere in food production, processing, transportation, handling, and preparation.

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OUTBREAKS ARE SLOW TO UNRAVEL

- Lag time for lab analyses
- Lag time for "shoe leather epidemiology"
- Under-reporting of illness: takes longer for picture to form
- State and local health departments have diminishing resources

Every outbreak is local (at first)

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MULTI-INGREDIENT OUTBREAKS

- Foods with other ingredients – salsa
  - Tomatoes were implicated, but Mexican chilies were to blame
  - Ruined the tomato business that year, except Roma and cherry tomatoes
- By the time they figure it out, the **perishable** food is gone
  - No food samples remain to analyze = no match with human illness
- Ill patients may not be in the location of the contaminated food when symptoms appear

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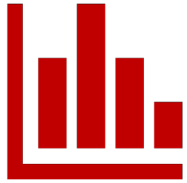
THE INVESTIGATION BUILDS DATA

- As all of the groups previously mentioned gather data that is analyzed and synthesized by the CDC, a picture of an outbreak emerges in the form of an 'epi curve.'
- These curves identify approximately when an outbreak started, how cases increase over time, and eventually how cases drop off.



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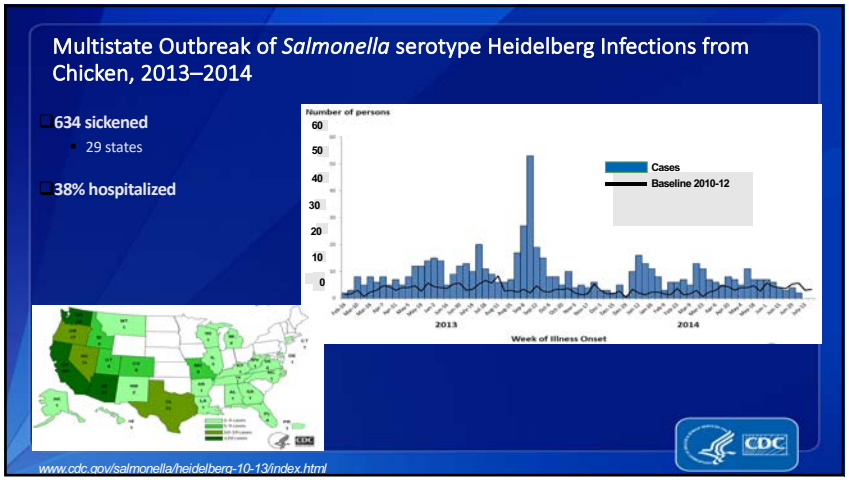

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SPEEDING UP THE PROCESS

- Tracking and tracing ill people and suspected food takes a long time to end.
- In the case on the previous slide, the best tool available at the time was Pulse Field Gel Electrophoresis, or PFGE.
- It came before Whole Genome Sequencing, or WGS.

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A NEW TECHNOLOGY IS SPEEDING THINGS UP!

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Whole Genome Sequencing (WGS)

One of the biggest innovations in foodborne investigations.

First used in 2013 on samples of *Listeria monocytogenes.*

Can find matches of pathogens with human, food, and environmental samples about 100 times faster than PFGE.

Uses the **whole** genome, rather than just some of the genome, represented by the spikes.

Combining these data with geographic information helps narrow the search for the source of a contaminated ingredient, even if it is half way around the world. This video from FDA explains the advantages of this new technology.

https://www.youtube.com/watch?v=oFv_82p94QU#action=share

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PULSENET

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- PulseNet is a network of more than 83 laboratories across the country in seven US regions.
- PulseNet uses Whole Genome Sequencing of DNA fingerprints, or patterns of genetic material from pathogens, to detect thousands of local and multistate outbreaks.
- PulseNet identifies outbreaks early, which allows investigators to find the source, alert the public sooner, and find the failures in the food safety system that otherwise would not be recognized.
- **PulseNet tracks foodborne illness like the FBI tracks criminals**.

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INTERNATIONAL PFGE - PULSENET

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- Modern food supply chain is global as seen earlier.
- Food comes from across the country and around the world.
- Many pathogens look the same until unique differences in their genetic 'fingerprint' distinguishes them.
- These unique fingerprints can match samples taken from international locations.
- PulseNet is one database for these national and international fingerprints.

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CAPTURING NATIONAL AND INTERNATIONAL DATA

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- National Center for Biotechnology Information
- Federal, State, and international agencies contribute WGS information to this database.
- National and international public health agencies use this information to help with real-time tracking of pathogens and foodborne illness.
- Like PulseNet, it tracks foodborne illness like the FBI tracks criminals.

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NCBI
NATIONAL CENTER FOR BIOTECHNOLOGY INFORMATION

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- Holds WGS information on bacterial pathogens obtained from food, the environment, and human patients:
  - Samples come from the environmental, such as deli cases in grocery stores, work counters in retail operations, production lines in manufacturing, such as food contact surfaces and drains, or field samples on farms.
  - Human stool or blood samples.
  - Food produced by manufacturers, or retail operations, that are collected during routine sampling, or taken as a result of an outbreak.

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NCBI
NATIONAL CENTER FOR BIOTECHNOLOGY INFORMATION

FoodHandler

Some 25 pathogens currently are in the database.

- NCBI data helps discover possible sources of contamination related to human illness.
  - Data can spot an outbreak before it has a chance to spread to more people.
  - An emerging outbreak can be detected and stopped before it has a chance to become much broader.
- Aids traceback investigations and facilitates outbreak responses from public health and regulatory agencies.

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THE BENEFITS OF WGS

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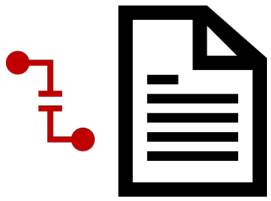
- Traces human illness outbreak data to foods.
- Identifies harborage areas of pathogens in production locations.
- Finds cross-contamination areas of pathogens in facilities.
- Finds genes that tell how infectious an organism is.
- Tells how well it survives and resists sanitizers and antimicrobials for cleaning purposes.



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THE IMPORTANCE OF TRACEBACK!

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- Traceback looks for the origin of the contamination.
- Involves taking samples of remaining food for analysis and taking samples from the point of origin, such as a processing facility, restaurant, or deli, and the like.
- During traceback, the faster information is gathered, the faster it is put into the investigation equation and the faster the outbreak can be solved.
- Investigators need information and assistance from industry.

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THE IMPORTANCE OF INFORMATION!

- Everyone involved in food production, preparation and service should know their suppliers and vendors.
- Vendors should have records on their production.
- From the source of their food – One Step Back.
- To the recipient of their food – One Step Forward.
- Make records such as, receipts, labels, invoices, bills of lading, packing slips, shopper/club card history and other information available for investigators.
- Electronic records provide information much more quickly than paper records in files, or notebooks.

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FINDING THE END OF AN OUTBREAK

- When is it declared "over?"
- When no more illnesses are reported over a period of time.
- Watch the "epi curve."

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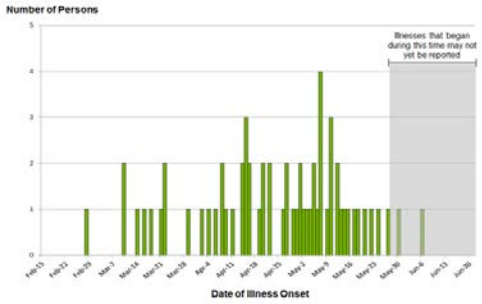
ANOTHER "EPI CURVE"



http://www.cdc.gov/salmonella/montevideo-06-12/epi.html

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ALWAYS BE READY!

- Monitor communications for foodborne illness reports.
- Keep useful traceback information in good order.
  - Make it digital, if possible.
- Create a form, or get one from your local health department, that captures information that investigators will need:
  - Reports of customer illness
  - Vendor supply information
  - Notes on foods served on particular days, or span of dates
  - Samples of food served held in freezer a week at a time, if possible

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ALWAYS BE READY!

- Follow food safety procedures in your operation to assure that food is kept safe and wholesome.
- If your food is suspected, work with investigators to search either contaminated food that you received, or that you sent forward.
- New analytical techniques, such as WGS, can rapidly identify sources of illness and keep the number of affected people low.

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RESOURCES

- Burden of Foodborne Illness: Methods and Data Sources https://www.cdc.gov/foodborneburden/2011-methods.html
- FDA video on Genome Trakr: Transforming Food Safety https://www.youtube.com/watch?v=oFv_82p94QU#action=share
- Fairfax County, VA 'Food and Food Handling Code' issued in 2006. https://www.fairfaxcounty.gov/health/sites/health/files/assets/documents/pdf/food-handling-code.pdf

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QUESTIONS?

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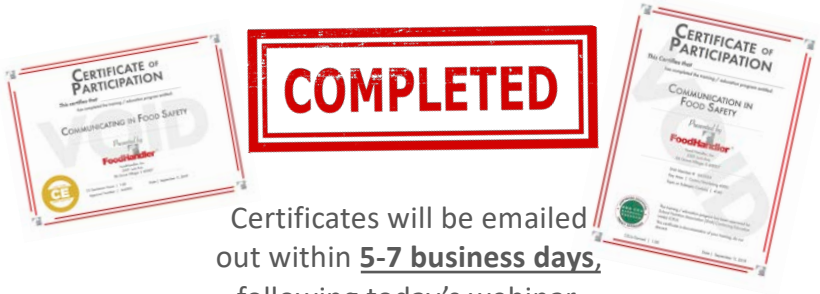
CERTIFICATES



Certificates will be emailed out within **5-7 business days**, following today's webinar.

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WEBINAR RESOURCE

For more information about our webinars and registration:

foodhandler.com/education-training/

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JOIN US FOR FUTURE WEBINARS!

Final 2020 WEBINARS

November 18 Chill Out! Implementing Safe Food Cooling Practices

Each is preapproved for 1 hour of Continuing Education Credit by the School Nutrition Association (SNA) and the Certifying Board for Dietary Managers (CBDM)

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FOODHANDLER FOOD SAFETY RESOURCES

Downloads

- Restaurant Re-Opening Guidelines
- Daily Temperature Logs
- Temperature Chart For Safe Food
- Refrigerator Storage Chart
- Food Safety Doesn't Happen By Accident

Videos

- Handwashing
- Why To Glove
- When To Glove
- How To Glove

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FOODHANDLER FOOD SAFETY RESOURCES

Past Blogs

- Emergency Preparedness
- Hand Hygiene
- Reopening Best Practices
- Allergies in Foodservices
- Identifying a Foodborne Illness

Upcoming Blogs

- Cooling Practices

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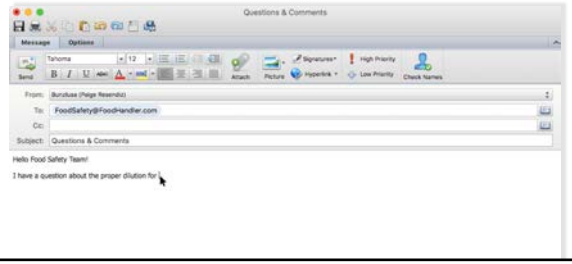
FOODHANDLER FOOD SAFETY RESOURCES

Please send us your questions or comments at:
FoodSafety@foodhandler.com



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THANK YOU FOR JOINING US!

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from FoodHandler

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