Hypothesis Generation Toolkit

hy·poth·e·sis

noun. in a foodborne outbreak, a **reasonable and testable suspicion** of a particular vehicle or exposure as the source of an outbreak; based on facts and circumstances from an initial investigation

Without the RIGHT HYPOTHESIS you will not get the RIGHT ANSWER

In this toolkit:

To help identify food-pathogen pairs, check out these resources:

- CDC's NORS Dashboard: A web-based tool for searching outbreak reports
- FDA's Bad Bug Book
- FDA's Classification of Illness Attributed to Foods
- Atlas of Salmonella in the United States, 1968-2011 has detailed information on past Salmonella outbreaks
- Project [HG] Mercury is a collaborative effort to compile background rates of exposures
- MN Key Points: Using Binomial Probability Calculations During Cluster Investigations
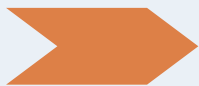
Use the Outbreak Source Prediction Tool to see the probabilities of potential food sources based on historical outbreak data

Interviewing resources:

- National Hypothesis Generating Questionnaire
- Oregon Shotgun Questionnaire
- Minnesota Questionnaire
- CO CoE's Interviewer Toolkit

Additional Resources

- MN Key Points for Obtaining Food Transaction Records provides tips for shopper cards
- The CO CoE's Communication Toolkit: Industry Relations provides additional communication resources for working with food service firms
- CDC: Steps in a Foodborne Outbreak Investigation
- CIFOR's Guidelines for Foodborne Disease Outbreak Response

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Developing a Hypothesis

A hypothesis should be:
- Developed by an investigation team during the earliest stages of the investigation
- Modifiable, reasonable, and testable
- Refined as information is received

The following three guidelines can help you develop a strong hypothesis:

1. Food-pathogen pairs:

Review previous outbreaks, known reservoirs, routes of transmission, and risk factors to make an educated guess about the cause of your outbreak. For example, the top 5 food-pathogen pairs in outbreaks are ciguatera toxin and fish, scombroid toxin and fish, *Salmonella* and chicken, *Campylobacter* and dairy, and *Vibrio parahaemolyticus* and mollusks ([Outbreaks: Top 5 Food-Pathogen Pairs](#)).

2. Descriptive data:

Descriptive data (including person, place, and time characteristics) can also point to potential food sources. When generating a hypothesis, review:

Case demographics – What do your cases look like? If most of your cases are under 15 years old, you will likely look for a food item that consumed by children.

Epidemic curve – What is the pattern of your epidemic curve? Cases spread over a limited time period would suggest a perishable food, whereas a longer time period would suggest a shelf-stable or frozen food item.

Geographic distribution – Outbreaks that occur over a large geographic area are more likely caused by a widely distributed commercial food product (e.g., peanut butter, ground beef, ice cream), whereas local or clustered illnesses are more likely to be caused by a local or regionally distributed food (e.g., restaurant, raw milk dairy, kids' camp).

3. Case-exposure assessment:

Effective interviewing is crucial to assessing case exposure during a foodborne outbreak investigation. Interviewers should be trained in the use of standardized interview forms and techniques.

Additional methods used to obtain case exposure information include obtaining shopper card information, obtaining order information, and reviewing social media posts.

Visit our website for more investigation resources and sign up for our listserv to receive info on our Hypothesis Generation ECHO Series!

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