MINNESOTA DEPARTMENT OF HEALTH

Environmental Health Services and Acute Disease Investigation and Control Sections

PROCEDURES FOR RESPONDING TO FOODBORNE DISEASE OUTBREAKS IN FOOD SERVICE ESTABLISHMENTS IN MINNESOTA

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I. Introduction

The Minnesota Department of Health (MDH) has developed a model for investigating foodborne illness using a centralized group of interviewers (Team Diarrhea) coordinated with local environmental health assessment of the establishment(s) involved in the outbreak. This approach allows MDH to rapidly respond to reports of outbreaks, standardize outbreak investigations, maintain a statewide database of foodborne diseases, and distribute information quickly and consistently.

When local agencies learn of a possible outbreak, they should notify the Minnesota Department of Health Acute Disease Investigation and Control Section (ADIC) immediately to initiate an appropriate outbreak response.

During investigations, epidemiologists at MDH and local agencies work with a network of environmental health specialists and other health agencies to evaluate critical elements for the outbreak. Environmental health specialists focus on restaurant inspections, interviewing employees, and assessing food preparations and safety, while the central group of epidemiologists coordinate patron interviews, stool collections and testing, and data analysis.

Detailed and thorough outbreak reports are critical in assessing the burden of foodborne disease outbreaks in Minnesota and nationally. MDH is responsible for compiling and storing outbreak data and for summarizing outbreaks; however, local agencies are invited to write or contribute to all final reports. MDH has an outbreak report template available for agencies that choose to write their own final reports. All final reports should be faxed or mailed to MDH within a month of completion of the outbreak investigation. Minnesota outbreak reports are included in the annual Minnesota Department of Health Gastroenteritis Outbreak Summary. MDH forwards outbreak information to the Centers for Disease Control and Prevention for national archiving.

This model of foodborne disease outbreak investigation, with a core group of epidemiologists and an extensive network of environmental health specialists, local, state, and federal health agencies, and field epidemiologists distributed across the state provides Minnesotans with an efficient foodborne disease surveillance system.

II. Purpose of the Document

The purpose of this document is to enable both State and Local Environmental Health Agencies to work together more effectively during food and waterborne outbreak investigations to protect the health of the citizens of Minnesota. This document outlines procedures for responding to foodborne disease outbreaks in food service establishments (FSE) and delineates the roles of food safety staff by 1) identifying the activities necessary to recognize and investigate foodborne outbreaks; 2) assigning outbreak response roles and responsibilities; and 3) articulating mechanisms for communicating and sharing responsibilities.

Abbreviations used throughout this document include:

ADIC – Acute Disease Investigation and Control Section, MDH

CDC – Centers for Disease Control and Prevention

CO – Communications Office, MDH

EFS – Epidemiology Field Services, MDH

EHS – Environmental Health Services Section, MDH

FDA – United States Food and Drug Administration

FSE – Food Service Establishment

FVZDU – Foodborne, Vectorborne, and Zoonotic Disease Unit, MDH

IDEPC – Infectious Disease Epidemiology, Prevention and Control Division, MDH

LPH – Local Public Health

MDA – Minnesota Department of Agriculture

MDH – Minnesota Department of Health

PHL – Public Health Laboratory, MDH

PIO – Public Information Officer, MDH or LPH

USDA – United States Department of Agriculture

III. Identification of Outbreaks

The MDH Acute Disease Investigation and Control Section (ADIC) identifies foodborne outbreaks **(Appendix 4)** through:

- Calls from individuals reporting illness - often through the Minnesota Foodborne Illness Hotline **(Appendices 2 & 3)**
- Routine surveillance of laboratory isolates of reportable pathogens
- Reports by food service facilities of ill patrons
- Reports by health care providers of increased gastrointestinal illness
- Reports by local public health agencies of illness
- Reports from schools, day cares and health care facilities
- PulseNet
- Other sources

IV. Organizing Response to a Foodborne Disease Outbreak (Appendix 4)

ADIC will notify the Environmental Health Services (EHS) Outbreak Coordinator, local epidemiology, and the appropriate local environmental health department as necessary to arrange a conference call. The purpose of this conference call is to 1) identify the primary contacts, 2) plan the response activities, 3) make decisions about the investigation, and 4)

identify agencies needing notification such as the Unites States Department of Agriculture (USDA), the Food and Drug Administration (FDA), Centers for Disease Control and Prevention (CDC), and Minnesota Department of Agriculture (MDA). It is essential that this team of individuals communicate frequently to exchange information throughout the outbreak investigation.

If the outbreak falls within the jurisdiction of MDH EHS, the Foodborne, Vectorborne, and Zoonotic Disease Unit (FVZDU) Manager or the ADIC Section Manager will assign a principal epidemiologist to lead the outbreak investigation. The EHS Outbreak Coordinator will assign an environmental health specialist(s) to be the field investigator at the implicated facility.

If the outbreak occurs in a delegated jurisdiction, the FVZDU Manager or the ADIC Section Manager will assign a principal epidemiologist to lead the outbreak investigation. MDH will contact the responsible jurisdiction which must then assign an environmental health specialist(s) to be the field investigator.

If the outbreak occurs in a jurisdiction that has its own epidemiology capacity (such as Hennepin County, the cities of Bloomington and Richfield, Washington County, or Olmsted County), ADIC will assign an epidemiologist to assist with communication and coordination. The local jurisdiction will assign a local epidemiologist and a field environmental health specialist(s).

V. Outbreak Investigation Process

A. Epidemiologic investigation

When there is evidence of an outbreak in a food service establishment, ADIC staff or the local epidemiologist may conduct an epidemiologic investigation to help identify the cause of the outbreak, determine the spread of disease, and identify appropriate control measures. The MDH epidemiologist assigned to the outbreak investigation will immediately notify the EHS Outbreak Coordinator by telephone (the EHS Section Manager, or designated replacement, should be contacted in the absence of the EHS Outbreak Coordinator). The MDH or local public health epidemiologist leading the investigation is responsible for:

1) Communication

a) Scheduling a conference call with the appropriate environmental health staff, MDH Epidemiology, and PHL (as needed)

b) Providing the following information during the call:

- Name and address of the FSE
- Number of known ill patrons
- Suspected or confirmed etiology
- How the outbreak was identified
- Other relevant background information

2) **Laboratory coordination**

a) Obtaining a project number from MDH FVZDU for stool submissions

b) Providing stool kits for foodworkers and ill patrons as necessary

c) Disseminating the laboratory results to all relevant staff involved in the investigation, as well as the specimen submitters

3) **Conducting an epidemiological investigation**

a) Creating a case definition and creating interview forms and Tennessen warnings for patrons and foodworkers

b) Ensuring that patrons/event attendees are interviewed **(Appendices 2 & 7)**

c) Deciding whether to collect stool samples from cases and foodworkers

d) Delivering stool kits to and from cases **(Appendices 9 & 10)**

e) Statistical data analysis

f) Developing hypotheses about the cause and spread of disease

g) Confirming an outbreak using available data

h) Making recommendations about preventing the spread of disease

4) **Writing a final report summarizing the outbreak and investigation (Appendix 8)**

A summary report will be written for both confirmed and probable outbreaks.

a) The summary report should include all epidemiologic findings, laboratory test results, and environmental health findings specifically related to the cause or the extent of the outbreak.

b) The principal epidemiologist will draft a copy of the report within one month of the conclusion of an outbreak investigation and receipt of the draft EHS report. The epidemiologist will forward the draft report to the environmental health specialist involved in the investigation for comments.

c) ADIC will send the final report to the EHS Outbreak Coordinator

B. Environmental health investigation (Appendix 4)

MDH Environmental Health Services, or the local environmental health agency, is responsible for:

1) **Facility assessment**

Environmental health staff will conduct an on-site assessment of the implicated FSE as soon as possible after the start of an epidemiologic investigation, preferably within 24 hours after being notified of the outbreak. The facility assessment will focus on **(Appendix 12)**:

a) Identifying and correcting critical violations that may have contributed to the outbreak **(Appendices 4 & 11)**

b) Collecting information about key aspects of the establishment's operation

c) Obtaining a list of all foodworkers and their phone numbers

d) Interviewing foodworkers for illness history and requesting stool samples, if necessary **(Appendices 5 & 6)**

e) Evaluating foodworker work history and job duties

f) Assessing management oversight

g) Obtaining customer names, reservation lists, or credit card receipts for case/control finding

h) Obtaining menus

i) Collecting food samples or embargoing food, if necessary

2) Coordinating a meeting with the FSE management

If necessary, the environmental health specialist will coordinate a meeting or conference call with the management of the facility. When agreed upon, the principal epidemiologist and other appropriate staff may participate in person or via conference call. The purpose of the meeting is to explain the status of the investigation, and make detailed recommendations regarding operations to the facility's management. The FSE will be informed of media requests and all participants will develop consistent messages for the media and the public.

3) Interviewing food workers when appropriate (Appendices 6 & 7)

a) Environmental health staff ensure that all foodworkers are interviewed using a standardized questionnaire. The epidemiologist leading the investigation is responsible for providing the interview form to environmental health specialists who will complete the interviews. The standardized questionnaire will include appropriate Tennessen warnings, including asking foodworkers' permission to share findings with FSE management, and include questions about:

- Work history or schedule during the identified critical time period
- Job tasks and responsibilities
- Illness history
- Recent illness among household members
- Other establishments where employees work

b) Conducting a review of foodworker illness records

4) Coordinating Stool Testing of Foodworkers (Appendix 5)

The environmental health specialist is responsible for coordinating with the principal epidemiologist for submission of foodworker stool specimens to the PHL. The principal epidemiologist will communicate foodworker test results to the environmental health specialist, the individual foodworkers and the FSE management when appropriate. To ensure compliance with foodworker interviews, sometimes a deadline may need to be established with the restaurant. Employees that have not completed an interview by this deadline cannot work until they are interviewed.

5) Closing and reopening a Food Service Establishment involved in an outbreak

The licensing jurisdiction has the authority and responsibility for closing a FSE during an outbreak investigation if they feel it is warranted. The epidemiologist will provide advice regarding the prevention of disease transmission from a FSE implicated in an outbreak, and issue employee work restrictions when necessary. If closure orders are issued, a copy of the orders should be faxed to the epidemiologist as soon as possible after issuance. The decision to reopen a FSE that was closed because of an outbreak must be reached by consensus.

6) Writing Final Reports (Appendix 8)

The environmental health specialist will give the principal epidemiologist a written report summarizing the environmental health findings related to the cause of the outbreak within two weeks of the conclusion of the environmental health investigation. The environmental health specialist is responsible for sending a copy of the final outbreak report to the food service establishment, if requested.

C. Laboratory investigation

The appropriate section (Clinical Laboratory or Environmental Laboratory) of the PHL will coordinate its investigative response activities with ADIC, EFS and environmental health agency. The roles and responsibilities of PHL include:

- Making recommendations for proper collection of specimens
- Recommending appropriate transport conditions for specimens
- Making recommendations for testing strategies when the etiologic agent is unknown
- Assisting in the interpretation of laboratory results
- Notifying ADIC of test results of cases and food workers

VI. Information Exchange

A. Communication between MDH/LPH and the FSE

The environmental health specialist will be the main point of contact with the FSE. All communications to the FSE regarding the outbreak will take into account epidemiologic and laboratory information discovered during the investigation.

B. Communication between Epidemiology and Environmental Health

The principal epidemiologist and the environmental health specialist are expected to remain in regular communication with one another throughout the investigation.

VII. Food Product Recall

ADIC is responsible for coordinating tracebacks with MDA, FDA, USDA, and CDC, as appropriate. Environmental Health will assist by obtaining pertinent information from the FSE.

VIII. Communications

A. Response to media inquiries

Inquiries from the media regarding an outbreak will be referred to the MDH Communications Office (CO) as well as the local Public Information Officer (PIO) if the outbreak is in a delegated jurisdiction. The CO, in collaboration with staff from ADIC and EHS, will coordinate the development of media messages relating to the outbreak.

The environmental health specialist will have primary responsibility for communicating with FSE management regarding any anticipated contact with the media about the outbreak. The principal epidemiologist and the CO may assist the environmental health specialist in providing such notification. Information provided to the FSE will include:

- Current status of the outbreak
- An explanation of the legal obligations of MDH/LPH with regard to the handling of public information
- Available information detailing how the outbreak is likely to be handled by the media
- A delineation of responsibility for responding to media inquiries
- A consistent message that can be used by MDH and the FSE in responding to the media

B. Response to legal inquiries

Legal inquiries regarding an outbreak will be referred to the MDH Epidemiology Field Services or to the epidemiologist working on the investigation, if it is known at the time of the inquiry. EFS should contact EH to verify all materials are included in the file.

C. Public announcement or proactive notification of media regarding an outbreak

The decision to proactively notify the public about an outbreak will be made by IDEPC management, Environmental Health management, LPH (if in a delegated jurisdiction) and the Commissioner of Health in consultation with the principal epidemiologist and the environmental health specialist. The CO will coordinate news conferences, development and distribution of news releases, and other vehicles for notifying the public about an outbreak if they are deemed appropriate. In general, the public will be notified about an outbreak only when such notification is necessary to 1) alert individuals who may have been exposed to a foodborne illness to seek medical attention or take other protective measures, 2) inform individuals who may be at risk of exposure, or who could expose others, to take appropriate steps to prevent the transmission of illness, and 3) find additional cases in order to appropriately characterize the outbreak.

IX. Data Maintenance

ADIC and LPH will maintain paper records and electronic databases for all outbreaks investigated in the state. The MDH epidemiologist will ensure the electronic record includes all information requested on CDC's outbreak report form. These data are entered into CDC's secure web-based Electronic Foodborne Outbreak Reporting System, and transmitted to CDC in real-time for national storage and comparison. In addition, ADIC will compile and publish a Gastroenteritis Outbreak Summary for each calendar year.

X. Follow-Up MDH Activities

For selected investigations, ADIC and EHS (and other agencies as appropriate) will meet to discuss the lessons learned from the outbreak investigation and opportunities for improvement. Situations in which this may happen include:

- A breakdown in the process
- Any deviation from protocol
- New or unique situations
- Periodic verification or self-evaluation

APPENDIX 1 - OUTBREAK DEFINITIONS

Confirmed Foodborne Outbreaks

A confirmed foodborne disease outbreak is defined as an incident in which two or more persons experience a similar illness after ingestion of a common food or meal; and epidemiologic evaluation implicates the meal or food as the source of illness. Confirmed outbreaks may or may not be laboratory-confirmed.

Confirmed outbreaks may be classified as:

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

Probable Foodborne Outbreaks

A probable foodborne disease outbreak is defined as an incident in which two or more persons experience a similar illness after ingestion of a common food or meal, and a specific food or meal is suspected but person-to-person transmission or other exposures cannot be ruled out.

Confirmed and Probable Waterborne Outbreaks

Waterborne outbreaks are similar to foodborne outbreaks, except that epidemiologic analysis implicates water as the source of illness. Waterborne outbreaks may be associated with drinking water or with recreational water.

Outbreaks with Other or Unknown Routes of Transmission

These outbreaks are defined as two or more cases of illness related by time and place in which an epidemiologic evaluation suggests either person-to-person transmission occurred, or a vehicle other than food or water (e.g., animal contact) is identified. This category also includes outbreaks for which the route of transmission could not be determined.

APPENDIX 2 - FOODBORNE ILLNESS COMPLAINT FORM

Revised 3/2009

Foodborne Illness Report
Minnesota Department of Health
Phone: (651) 201-5414 Fax: (651) 201-5082

Stool kit delivered ☐
Daily ☐

Complaint date: ____/____/____ Hotline call: ☐ How you got #_____ Tennessen: ☐

Agency: _____ Reporter: _____

First Name:_____ Last Name: _____ Age: _____ ☐ Female ☐ Male

Address: _____ Zip: _____ Email: _____

Home phone: (_____)_____ Work phone: (_____)_____ Cell: (_____)_____

Establishment that the complainant suspects: _____

Number of persons exposed: _____ Number ill: _____

Did complainant call the establishment?: ☐Y ☐N If yes, who did they speak with: _____

**If a retail food product is suspected, please fill out page 4 (Retail Food Product Complaint) in addition to the 4-day food history*

ILLNESS HISTORY Illness Onset: ____/____/____ Time: _____ Recovery: ____/____/____ Time: _____

Vomiting ☐Y ☐N Onset: ____/____/____ Time: _____ Recovery: ____/____/____ Time: _____

Diarrhea ☐Y ☐N Onset: ____/____/____ Time: _____ Recovery: ____/____/____ Time: _____

# of stools per 24-hr. period (max): _____ Cramps ☐Y ☐N Fever ☐Y ☐N (temp:____) Bloody stools ☐Y ☐N

Other symptoms: _____ Visited health care provider ☐Y ☐N

If yes, name and location: _____ Date of visit: ____/____/____

Provider requested stool sample ☐Y ☐N If yes, date stool submitted: ____/____/____ Hospitalized ☐Y ☐N

FOOD HISTORY

If only one person is ill or if all ill persons live in same household, complete the entire four-day food history.
If more than one person is ill and they live in different households, record only the common meals.

Meal Time Date: ____/____/____ *(work backward starting with onset date)* Hours to Illness Onset

Brk: _____ location: _____ food/drinks: _____ _____

_____

Lun: _____ location: _____ food/drinks: _____ _____

_____

Sup: _____ location: _____ food/drinks: _____ _____

_____

Other: _____ location: _____ food/drinks: _____ _____

Meal Time Date: ____/____/____ Hours to Illness Onset

Brk: _______ location: ______________________ food/drinks: ______________________ ______

____

Lun: _______ location: ______________________ food/drinks: ______________________ ______

____

Sup: _______ location: ______________________ food/drinks: ______________________ ______

____

Other: ______ location: ______________________ food/drinks: ______________________ ______

Meal Time Date: ____/____/____ Hours to Illness Onset

Brk: _______ location: ______________________ food/drinks: ______________________ ______

____

Lun: _______ location: ______________________ food/drinks: ______________________ ______

____

Sup: _______ location: ______________________ food/drinks: ______________________ ______

____

Other: ______ location: ______________________ food/drinks: ______________________ ______

Meal Time Date: ____/____/____ Hours to Illness Onset

Brk: _______ location: ______________________ food/drinks: ______________________ ______

____

Lun: _______ location: ______________________ food/drinks: ______________________ ______

____

Sup: _______ location: ______________________ food/drinks: ______________________ ______

____

Other: ______ location: ______________________ food/drinks: ______________________ ______

Complainant occupation: ______________________ Daycare exposure: Y N

Have you been swimming in the past 2 weeks: Y N If yes, where______________________ Date: ____/____/____

Did you drink any well water in the past 2 weeks: Y N If yes, where ______________________

Any ill household members in the last week: Y N If yes, who______________________ Date: ____/____/____

AGENCIES NOTIFIED ☐ MDH-EHS ☐ MDH-District Office ☐ MN Dept of Ag ☐ FDA ☐ USDA

☐ Local Agencies: ______________________

Comments ______________________

HISTORY OF OTHERS ILL Original Complainant's Name:_____

First name:_____ Last name:_____ Age:____

Address: _____ Phone: _____

Illness Onset: ___/___/___ Time: _____ Recovery: ___/___/___ Time: _____

Vomiting ☐Y ☐N Onset:___/___/___ Time:_____ Recovery: ___/___/___ Time: _____

Diarrhea ☐Y ☐N Onset ___/___/___ Time: _____ Recovery: ___/___/___ Time: _____

# of stools per 24-hr. period (max): _____ Cramps ☐Y ☐N Fever ☐Y ☐N (temp:____) Bloody stools ☐Y ☐N

Other symptoms: _____ Incubation period from common event (hrs): _____

Foods eaten at common event: _____

_____

First name:_____ Last name:_____ Age:____

Address: _____ Phone: _____

Illness Onset: ___/___/___ Time: _____ Recovery: ___/___/___ Time: _____

Vomiting ☐Y ☐N Onset:___/___/___ Time:_____ Recovery: ___/___/___ Time: _____

Diarrhea ☐Y ☐N Onset ___/___/___ Time: _____ Recovery: ___/___/___ Time: _____

# of stools per 24-hr. period (max): _____ Cramps ☐Y ☐N Fever ☐Y ☐N (temp:____) Bloody stools ☐Y ☐N

Other symptoms: _____ Incubation period from common event (hrs): _____

Foods eaten at common event: _____

_____

First name:_____ Last name:_____ Age:____

Address: _____ Phone: _____

Illness Onset: ___/___/___ Time: _____ Recovery: ___/___/___ Time: _____

Vomiting ☐Y ☐N Onset:___/___/___ Time:_____ Recovery: ___/___/___ Time: _____

Diarrhea ☐Y ☐N Onset ___/___/___ Time: _____ Recovery: ___/___/___ Time: _____

# of stools per 24-hr. period (max): _____ Cramps ☐Y ☐N Fever ☐Y ☐N (temp:____) Bloody stools ☐Y ☐N

Other symptoms: _____ Incubation period from common event (hrs): _____

Foods eaten at common event: _____

_____

_____

Original Complainant's Name:_____

RETAIL FOOD PRODUCT COMPLAINT *(please fill in as much information as you can)*

Name of product (please be specific): _____

Brand of product: _____

Manufacturer and/or distributor information (name and address): _____

_____

Container type, size and weight (18 oz. plastic bottle, 1 lb. paper carton, etc.): _____

USDA establishment number (if a packaged meat product): _____

UPC code (12-digit bar code): _____

Product/Lot/Best if Used By Date (BIUB) code: _____

_____

_____

Purchase location (name of store): _____

Address of purchase location: _____

Purchase date: _____

Does consumer still have the product or other containers of the same product?: _____

_____

Other information: _____

_____

APPENDIX 3 **- KEY PHONE NUMBERS**

ACUTE DISEASE INVESTIGATION AND CONTROL (ADIC):

651-201-5414 or 877-676-5414

Foodborne illness reporting hotline: Toll Free (out state) 1-877-366-3455; (local) 651-201-5655

Foodborne, Vectorborne, and Zoonotic Disease Unit Manager

Kirk Smith: 651-201-5240

ADIC Section Manager

Richard Danila: 651-202-5116

ENVIRONMENTAL HEALTH SERVICES (EHS):

Metro daytime: 651-201-4500

Office of Emergency Preparedness 24/7 emergency pager: 651-201-5700 or 651-201-5735 (after hours)

EHS Section Manager

Colleen Paulus: 651-201-4507 (Office), 651-402-0638 (Cell)

EHS Outbreak Coordinator

April Bogard: 651- 201-5076 (Office), 612-296-8118 (Cell)

MDH EPIDEMIOLOGY FIELD SERVICES (EFS):

651-201-5414 or 877-676-5414

MDH COMMUNICATIONS OFFICE:

651-201-4989

MDH EXECUTIVE OFFICE:

651-201-5000

MINNESOTA STATE DUTY OFFICER:

Metro: 651-649-5451 (24 hour)

Statewide: 800-422-0798 (24 hour)

APPENDIX 4 **- INVESTIGATION GUIDELINES**

ADIC Foodborne Disease Outbreak Investigation Guidelines

Minnesota Department of Health

Phone: (651) 201-5414 Fax: (651) 201-5082

MDH Procedure for Conducting an Environmental Investigation of Foodborne Disease Outbreaks

A. Introduction

A systematic environmental investigation is a critical aspect of foodborne illness outbreak investigations. The environmental investigation aims to:

1. Identify and eliminate the factors that could lead to further transmission;
2. Clarify the nature and mechanism of disease transmission; and
3. Provide information needed to design effective strategies to prevent future outbreaks.

The environmental investigation should be initiated as soon as notice of a suspect foodborne disease outbreak is received, but no later than 24 hours after being notified. The investigation of a suspect foodborne disease outbreak is different from a routine inspection. Such an investigation requires a systematic assessment of critical food handling procedures, focusing as much as possible on procedures suggested by preliminary epidemiological and/or laboratory information. The environmental investigation will be coordinated by an Environmental Health Specialist/Sanitarian with involvement of laboratory and epidemiology staff. Any information gathered during the environmental investigation will be done in a manner that is consistent with the Data Practices Act.

B. Information Sharing

EHS personnel involved in the environmental investigation of the implicated FSE will be the main point of contact between the FSE and MDH. Regular communication with ADIC/LPH staff throughout the investigation is necessary to know of the status of the epidemiologic and laboratory investigations. In addition, the following persons should be updated on the progress of the environmental investigation on an on-going basis:

1. EHS Outbreak Coordinator, if the outbreak is in MDH jurisdiction
2. Your supervisor

3. The principal epidemiologist (epidemiologist working on the outbreak)

Note: Media requests for information should be directed to the MDH communications office or the LPH PIO.

C. Conduction the Investigation

1. **Conference Call**

   In most cases, a conference call between ADIC and EHS/LPH staff will be held during the initial phase of foodborne disease outbreak investigations. Pay special attention to any working hypotheses that are developed during the conference call. If a conference call is not held or is delayed, consult key staff from each program (ADIC, EHS, and PHL) regarding likely explanations for the outbreak, sample/specimen collection options and strategies, and enforcement options. Key information obtained during this call might include:

   a) Demographic information about cases
   b) Illness history for cases
   c) Number of cases
   d) Food consumption history
   e) Name and address of implicated establishment
   f) How the outbreak was identified
   g) Information about any suspect food vehicles
   h) Information regarding the suspected agent(s)
   i) Recent inspection reports (covering at least 2 inspections)

   This information is helpful in developing hypotheses regarding the likely agent, the likely vehicle, how and where the vehicle became contaminated and could suggest actions needed to reduce or eliminate the risk of further transmission.

2. **Contact the Establishment**

   Contact the implicated establishment and request that the manager(s) or senior staff member(s) be available for a meeting with the on-site investigation team at the facility at a specified time. Also, when necessary, request information about:

   a) Menus
   b) Customer receipts or credit card receipts
   c) Employee work schedules
   d) Employee illness

   In some situations, the facility's management may be instructed to fax/e-mail information to designated individuals in ADIC or LPH.

3. **Select Tools for On-site Investigation**

   Certain items are needed to facilitate collection of information and/or samples during an outbreak. It may be helpful to prepare an outbreak "kit" containing the following items for the on-site investigation:

   a) MDH foodborne outbreak investigation manual
   b) Foodworker interview forms
   c) Fact sheets about suspected agents

d) Information about handwashing and foodworker illness

e) Sterile sampling containers

f) Specimen containers (stool kits)

g) Appropriate media (transport or enrichment)

h) Disinfection and sterilizing agents

i) Cooler and ice packs

j) Sterile implements for sample collection (e.g. scoops, spoons, tongs, tongue depressors, swabs)

k) Telephone/pager numbers of key MDH/LPH personnel (including after hours contact numbers)

l) Thermometers and data loggers

m) pH meter

n) Water activity meter

o) Enforcement guide

p) Camera

D. On-site Investigation

1. **Management Meeting**

   Upon arriving at the implicated establishment introduce yourself to the FSE management and explain the purpose of your visit.

   a) Provide an overview of the investigation process, including a brief description of the roles of ADIC, LPH, and PHL

   b) Answer questions and provide details regarding what is known about the outbreak up to that point.

   <u>Note:</u> Under no circumstances should protected information, such as a complainant's name be shared with establishment personnel (consult the data practices guide or your supervisor for further information).

   c) Request management's assistance in:

      i. Arranging employee interviews

      ii. Providing records for review (food temperature logs, employee illness records, food purchasing records, etc)

      iii. Providing workspace for field team where possible

      iv. Arranging for sample/specimen collection and submission to PHL, if needed

2. **Assess Management Control and Operation**

   a) Ask about the training and experience of the manager

   b) Identify the Person in Charge (PIC) at key times suggested by the initial outbreak information

   c) Obtain information about the operation such as: days and times of operation, number of staff, number of shifts, staffing needs, etc

   d) Ask about the duties performed by each staff member (including manager). In particular, ask about the food handling responsibilities of all staff.

e) Ask about the establishment's policy regarding ill workers and ask to view the employee illness logs

3. **Conduct Hazard Analysis (Appendix 12)**
    a) Obtain flow charts of preparation procedures for potentially hazardous foods (PHF's), focusing on items suggested by initial outbreak information
    b) Identify critical control points (CCP) and likely hazards (consult annex 5 of 2001 FDA Food Code for further information)
    c) Evaluate the establishment's monitoring procedures for CCP's by reviewing records, interviewing staff, or observing practices
    d) Assess whether critical limits for PHF's are/were met by reviewing records, interviewing staff, taking measurements, and/or observing food preparation activities
    e) Determine if there is an appropriate mechanism for taking corrective actions when critical limits are exceeded. This can be accomplished by reviewing the establishments records, interviewing staff, or observation.

    Note: This approach to hazard analysis is applicable in all outbreaks linked to FSE's. An analysis based on formal HACCP principles should be attempted even in establishments that are not required to have HACCP plans.

4. **Review Sanitation Standard Operating Procedures (SSOP's)**
    a) Observe establishment layout and food flow (look for opportunities for cross-contamination)
    b) Check cleanliness of equipment and utensils
    c) Check cleanliness of floors, walls, and ceilings
    d) Obtain cleaning schedules and procedures (note the use of high pressure sprayers)
    e) Review sanitization procedures (type of sanitizer, appropriateness of use, appropriateness of concentration used)
    f) Evaluate water and wastewater systems

5. **Collect Environmental and Stool Samples**
    a) Collect samples of food remaining from suspect meal (if available and only after consultation with ADIC and PHL)
    b) Collect foods prepared in the same way as the suspect food, if none of the suspect food is available (only after consultation with ADIC and PHL)
    c) Label samples and establish chain of custody
    d) Store samples in a manner appropriate for the agent under suspicion
    e) Arrange for collection and submission of stool samples
    f) Arrange delivery of samples to PHL as soon as possible but no later than 12 hours after collection

    Note: Use appropriate sampling techniques and collect enough sample to aid identification of suspect agent (contact the PHL for further information).

6. **Enforcement**

Enforcement actions against a FSE implicated in a foodborne disease outbreak should focus on operations and/behaviors that are the likely cause of the outbreak. All observed critical violations must be noted and orders issued for immediate correction of each (see Minnesota Food Code for definition of critical violations). Enforcement actions may include:

a) Closing the facility;

b) Issuing a fine;

c) Excluding or restricting ill workers;

d) Issuing embargo orders;

e) Condemning food; and/or

f) Issuing correction orders.

Note: Some of the above enforcement actions require special considerations to ensure the desired effect. As a general rule, review all enforcement decisions with your supervisor before taking action.

7. **Closing a FSE**

Closing a FSE may be necessary to eliminate the risk for further transmission of a foodborne disease agent. The recommendation to close a FSE should only be made after carefully assessing the following factors with your supervisor:

a) Evidence of ongoing transmission or insufficient information regarding whether transmission has been arrested

b) The overall sanitary status of the establishment (including the availability of safe drinking water and adequate waste disposal facilities)

c) The establishment's record related to the correction of critical violations

d) The availability of a qualified food service manager(s)

e) The number and type of critical violations observed

f) The likely impact on food safety of mandatory staff exclusions and/or restrictions

g) The agent involved in the outbreak

h) The population at risk

Note: Orders to close a FSE must be communicated to management in writing. The orders must specify when the facility is to be closed, why the facility is being closed, and the conditions that must be met before the facility is allowed to re-open.

8. **Re-opening a FSE**

Once it is determined by re-inspection that all conditions specified in the closure orders are met and after consultation with ADIC, the FSE must be permitted to re-open. Permission to re-open must be granted in writing.

9. **Report**

Upon completing the environmental investigation prepare a summary report containing the following headings and information:

a) Background

i. Name and address of the establishment

ii. Number of ill patrons

iii. The suspect etiologic agent
iv. How the outbreak was identified
v. How and when EHS was notified

b) Findings
i. Critical violations and repeat critical violations
ii. Food/surface testing results
iii. Unusual food preparation procedures
iv. Employee illness information
v. Any other information that could have a bearing on the outbreak

c) Actions
i. Steps taken to confirm the cause of the outbreak
ii. Steps taken to curtail the outbreak (with dates)
iii. Education

d) Conclusions

Offer some explanation of why the outbreak occurred (based on environmental, epidemiological, and/or laboratory findings).

Note: Copies of summary report and any other documents pertaining to the environmental investigation such as photographs, orders, or video recordings must be submitted to the principal epidemiologist two weeks after completing the environmental investigation. A copy of the final report may be submitted to the FSE, plaintiff's attorneys, or other eligible parties if requested in writing (see data practices policies for further information).

10. Wrap-up (Lessons learned)

Each outbreak provides an opportunity to evaluate the effectiveness of our efforts to prevent foodborne disease outbreaks. At the conclusion of the outbreak investigation, you may be asked to collaborate with ADIC, LPH and PHL staff to identify any lessons learned, and develop fact sheets and other educational materials that could be used in to train public health staff and food service workers.

APPENDIX 5 **- FOODWORKER CONSENT FORM**

Foodworker Consent Form
Outbreak Investigation

The Minnesota Department of Health, in conjunction with ***LOCAL PUBLIC HEALTH AGENCY NAME***, is conducting an investigation of a possible outbreak of foodborne illness that may be associated with ***RESTAURANT NAME***. It is important for public health officials to determine the source of the outbreak so that transmission can be stopped. We can learn more about how transmission is occurring through interviewing persons who work in food service and may be asking that food service employees provide stool specimens. If any samples are collected, they will be tested for bacteria and viral pathogens at no charge to you. You will be provided with results once they are available. In addition we would like to ask you questions about any recent illnesses that you may have had and your work duties in food service at ***RESTAURANT NAME***. If you have been ill or test positive for any pathogen that can be transmitted by food, it is important that you not return to work in food service for 72 hours after your recovery.

Results of the stool tests and any other information collected from you are considered private data. Only public health officials from the Minnesota Department of Health who are directly involved in investigating this outbreak will have access to this information collected from you. In addition, because it may be important that you not return to work until you recover (if you have been ill), we are requesting your permission to share this information with management staff at ***RESTAURANT NAME***.

You are not required to participate in this investigation. However, the information that you provide will improve our understanding of how this outbreak occurred and will help us to prevent any further transmission.

Do you have any questions? If all of your questions have been answered to your satisfaction, do you consent to providing a stool specimen to the Minnesota Department of Health if requested, and answering a brief questionnaire?

_____ YES, I consent to providing a stool specimen

_____ YES, I consent to answering a brief questionnaire

_____ YES, the information about me obtained by the Minnesota Department of Health may be shared with management staff at ***RESTAURANT NAME***.

Print name: _____ Date_____

Signature:_____

Interviewer Signature_____ Date_____

APPENDIX 6 **- FOODWORKER INTERVIEW FORM**

MINNESOTA DEPARTMENT OF HEALTH
FOOD SERVICE EMPLOYEE QUESTIONNAIRE

Tennessen: _____ Interview date: ___/___/___
Interviewed conducted by: _____

Employee's Name: _____ Age _____ ☐ Female ☐ Male

Address: _____ Phone: (____)_____

Job title/description: _____

Have you been ill with any of the following symptoms any time since ***FILL IN DATE***? Yes No

Onset date:___/___/___ time (2400 hrs):_____ Recovery date:___/___/___ time (2400 hrs):_____

☐ Nausea ☐ Vomiting (onset: ___/___) ☐ Cramps ☐ Fever ☐ Blood in stool

☐ Diarrhea (# stools/24 hrs: _____)(onset: ___/___) ☐ Other _____

Did you submit a stool culture? Yes No Would you be willing to provide a stool culture? Yes No

Did you work while experiencing diarrhea or vomiting? Y N If yes, when?_____

If no, on what date did you return to work?_____

Please list work schedule and all duties performed from ***FILL IN DATE*** to ***FILL IN DATE***:

Date	**Day of Week**	**Hours**	**Duties Performed**
___/___/___	M T W Th F S Su	_____ - _____	_____
___/___/___	M T W Th F S Su	_____ - _____	_____
___/___/___	M T W Th F S Su	_____ - _____	_____
___/___/___	M T W Th F S Su	_____ - _____	_____
___/___/___	M T W Th F S Su	_____ - _____	_____

What foods/beverages did you eat at the restaurant:_____

_____

_____

Do you work at any other food service facilities? If so, where and how often:_____

Have any members of your household been ill with diarrhea or vomiting since ***FILL IN DATE***? Yes No

What symptoms did they have? ☐ Nausea ☐ Vomiting (onset: ___/___) ☐ Cramps

☐ Diarrhea (# stools/24 hrs: ____) (diarrhea onset: ___/___) ☐ Fever ☐ Blood in stool

Were any stool samples collected on ill family member(s)? Y N Results: _____

APPENDIX 7 **- PATRON TENNESSEN FORM**

Generic Patron Tennessen

Outbreak name: _____

Principal investigator: _____

Date: _____

We are investigating some reports of possible foodborne illness and are interviewing people who ate at **RESTAURANT NAME** on **DATE**. It is not yet known whether the reported illnesses are associated with this event. To assist in our investigation, **RESTAURANT NAME** has given us your name as a possible patron.

Would you be willing to answer a few questions about your food consumption at **RESTAURANT NAME** and any symptoms of illness you may have had?

For your protection, before beginning an interview, we are required to give you the following information regarding your participation in this investigation and your right to privacy:

We are collecting this information to determine what the cause of this reported illness may be. All information we collect about your health is private; the only persons who will have access to this information will be public health staff from the Minnesota Department of Health and staff from local public health agencies who work on this investigation. Under no conditions will your name be released to anyone else without your permission. You are under no obligation to participate in this investigation. There is no penalty if you choose not to participate in this investigation. However your participation may help us identify an outbreak of foodborne illness, identify its cause, and prevent further illness.

APPENDIX 8 - GUIDANCE FOR WRITING FOOD AND WATERBORNE OUTBREAK REPORTS

The final report will be entered into the statewide outbreak database and included in the state's annual summary of food and waterborne disease outbreaks. All reports should include the following information:

Background

- Date the investigating agency was notified of the outbreak
- Description of the initial report made to the investigating agency
- Date of the event
- Date of initiation of the investigation

Methods

- Who provided information about event attendees (names and/or phone numbers)
- Other agencies that were notified of the outbreak and investigation
- The number of people who attended the event
- The case definition used for the outbreak (the standard definition is vomiting or diarrhea, ≥ 3 stools in a 24-hour period, following the event)
- The number of people interviewed (at least one control should be interviewed per case, and ideally two or more controls should be interviewed per case)
- The number of stools collected for testing
- The pathogens that were tested for in the stool specimens
- Relevant environmental health measures implemented

Results

- The number of people interviewed who met the case definition
- The number of people interviewed with gastrointestinal symptoms who did not meet the case definition
- The percentage of interviewed cases with each of the following symptoms: diarrhea (≥ 3 stools in a 24-hour period), vomiting, fever, bloody stools, and abdominal cramps. Other symptoms may be listed as appropriate.
- The median incubation period and incubation range
- The median duration of illness and duration range
- Hospitalization status of cases
- Results of the stool testing (including PFGE results, if applicable)
- Food items or events that were statistically associated with illness
- The odds ratio(s), p-values, and confidence intervals of the implicated item(s)

- Results of foodworker interviews (the number of ill foodworkers, any corrective actions taken)
- Results of foodworker stool cultures
- All relevant information found in the environmental investigation

Conclusion

- Etiologic agent
- Implicated vehicle(s)
- Discussion of route of transmission
- Contributing factors to contamination and/or transmission (discuss all plausible sources of contamination when necessary)
- Defense of conclusion, if needed (for example, how do the symptoms, incubation period, and duration suggest a particular pathogen?)

APPENDIX 9 - STOOL SAMPLE INSTRUCTIONS

INSTRUCTIONS FOR SUBMITTING A STOOL SAMPLE TO MDH

1. Fill out the top portion of lab slip (white area).

2. Legibly write first and last name on the vial.

3. Place collection container on toilet seat as shown.
   Deposit stool in tissue portion of collection device.

4. Unscrew orange lid on vial.
   Use attached scoop to fill vial with stool until fluid reaches the red line.
   Replace the lid on the orange vial.

5. Remove tissue portion of collection device from cardboard portion.
   Flush tissue portion and dispose of cardboard in trash.

6. Place vial into clear plastic biohazard bag along with the absorbent cloth.
   Seal clear plastic biohazard bag.
   Wash hands thoroughly with soap and water.

7. Place sealed clear plastic biohazard bag in to the white biohazard envelope. Also place the completed lab slip in the white biohazard envelope. Seal the envelope.

8. Place white biohazard envelope(s) in the box. Close the box according to the instructions on the box. Place the box in the mailbox.

***Note: Please ignore the instruction booklet that is enclosed with the Protocult™ Collection Device. There are no restrictions due to red meat consumption or non-prescription pain medications.*

Please call_____at _____ if you have any questions. Thank You.

APPENDIX 10 **- STOOL SAMPLE INSTRUCTIONS - SPANISH**

INSTRUCTIONS FOR SUBMITTING A STOOL SAMPLE TO MDH

INSTRUCCIONES PARA MANDAR UNA MUESTRA DE EXCREMENTO A DEPARTAMENTO DE SALUD PUBLICA DE MINNESOTA

1. Fill out the top portion of lab slip (white area).
   Por favor, complete la porción blanca del formulario.
   Ponga la fecha de colección de la muestra.

2. Legibly write first and last name on the vial.
   Escriba claramente su nombre y apellido en el frasco.

3. Place collection container on toilet seat as shown.
   Deposit stool in tissue portion of collection container.
   Coloque el dispositivo de papel en el asiento del inodoro/lavabo.
   Deposite su excremento en la parte de papel.

4. Unscrew orange lid on vial.
   Use attached scoop to fill vial with stool until fluid reaches the red line.
   Replace the lid on the orange vial.
   Abra la tapa anaranjada. Use la cucharita en la parte de adentro de la tapa para traspasar el excremento al frasco. Llene el frasco hasta que el liquido llegue a la raya roja. Póngale firmemente la tapa al frasco.

5. Remove tissue portion of collection container from cardboard portion.
   Flush tissue portion and dispose of cardboard in trash.
   Remueva la parte del papel del dispositivo, y descártelo en el inodoro/lavabo. Tire la parte de cartón en la basura.

6. Place vial into clear plastic biohazard bag along with the absorbent cloth.
   Seal clear plastic biohazard bag. Wash hands thoroughly with soap and water.
   Ponga el frasco en la bolsa de plástico que dice "biohazard". Cierre la bolsa. Lávese las manos con agua y jabón.

7. Place sealed clear plastic biohazard bag in to the white biohazard envelope.
   Also place the completed lab slip in the white biohazard envelope. Seal the envelope.
   Ponga la bolsa de plástico adentro del sobre blanco. Tambien ponga el formulario adentro del sobre. Cierre el sobre.

8. Place white biohazard envelope(s) in the box. Close the box according to the instructions on the box. Place the box in the mailbox.
   Ponga el sobre adentro de la caja. Cierre la caja. Ponga la caja en el correo (no tiene que ponerle estampillas o pagar para mandarlo).

Por favor llame a_____ al teléfono _____si tiene preguntas. Muchas Gracias.

APPENDIX 11 **– REPORTABLE FOODBORNE & WATERBORNE ILLNESSES**

Amebiasis (*Entamoeba histolytica/dispar*)
Botulism (*Clostridium botulinum*)
Campylobacteriosis (*Campylobacter* spp.)
Cholera (*Vibrio cholerae*)
Cryptosporidiosis (*Cryptosporidium* spp.)
Cycolosporiasis (*Cyclospora* spp.)
Enteric *E. coli* infections
Enterobacter sakazakii
Giardiasis (*Giardia lamblia*)
Hemolytic uremic syndrome
Hepatitis (all primary viral types including A, B, C, D, and E)
Listeriosis (*Listeria monocytogenes*)
Salmonellosis, including typhoid (*Salmonella* spp.)
Shigellosis (*Shigella* spp.)
Trichinosis (*Trichinella spiralis*)
Typhoid (via salmonellosis)
Vibrio spp.
Yersiniosis, enteric (*Yersinia* spp.)

APPENDIX 12 **– GENERAL GUIDELINES FOR FOCUSING AN ENVIRONMENTAL HEALTH INVESTIGATION BASED ON A SUSPECTED ETIOLOGY**

The recommendations given below are guidelines for the environmental health investigation of a potential foodborne outbreak based on the suspected etiology. The etiology can often be surmised by the symptoms and incubation periods of the initial complainants, even if an etiology hasn't been laboratory-confirmed **(Appendix 13)**. These are general guidelines and are by no means absolute. Each investigation should be conducted on a case-by-case basis with Environmental Health and Epidemiology working together to determine the focus of the investigation.

Norovirus

Areas of focus:

1. All employees should be interviewed as soon as possible **(See Appendix 6)**
2. Review the employee illness log and make a copy if possible
3. Ask about foodworker exclusion policies. During the investigation period the manager should ask each foodworker every day if they have experienced vomiting or diarrhea within the past 72 hours. Foodworkers who have had vomiting or diarrhea MUST BE EXCLUDED FROM THE RESTAURANT FOR 72 HOURS AFTER RESOLUTION OF SYMPTOMS.
4. The EH assessment should focus on handwashing, bare hand contact, and cleaning and sanitizing of equipment
5. Take note of ready-to-eat food items that may have been prepared by ill foodworkers during the time period in question and request that the manager discard any that may potentially be contaminated

Salmonella

Areas of focus:

1. Review the employee illness log and make a copy if possible
2. Foodworkers will likely need to be interviewed. They may be required to submit stool specimens and have two negative stool results before they return to work.
3. The EH assessment should pay particular attention to food preparation practices which may lead to cross-contamination, especially from raw meat, poultry or eggs. Also keep an eye out for inadequate cooking of meat, poultry, or egg products.
4. Pay particular attention to proper handwashing in the facility
5. If there is a possibility that a food item came into the facility already contaminated, copies of invoices may need to be obtained

***Bacterial Intoxications (e.g. – those caused by C. perfringens* or *B. cereus*)**

Areas of focus:

1. Ask detailed questions about food preparation practices of all food items in question - specifically heating, cooling, and reheating procedures, the length of time the food items were hot-held, etc. Meat and gravy products and rice are often implicated in these types of outbreaks.
2. If food items similar to those in question are currently being prepared, make note of relevant preparation practices (e.g. - the temperature of food items in the cooler, hot-holding temperatures, or cooling procedures such as ice baths).

Outbreaks where there is not enough information to determine a suspected pathogen, or outbreaks where other pathogens are suspected (e.g. - *E. coli* O157:H7 or Hepatitis A) will require detailed discussions between Environmental Health and Epidemiology before the investigation proceeds.

APPENDIX 13 **– DATA PRACTICES ACT RELEASE FORM**

MINNESOTA GOVERNMENT
DATA PRACTICES ACT RELEASE FORM

I, _____, understand that under Minnesota Statutes Section 13.3805 (2003) any epidemiologic information maintained by the Minnesota Department of Health, from which I may be identified, is classified as private data, that is, accessible only to me or those whom I designate.

Understanding my rights under the Minnesota Government Data Practices Act, I authorize the Commissioner of Health, her agents, and attorneys, to make accessible for review and/or to photocopy and send all records about me concerning

_____

_____

to: (condition, diagnosis, treatment, incident, outbreak, etc)

_____
(Representative, Agency, Attorney, etc.)

_____
(Address) (City) (State) (Zip)

The person or entity to whom I am releasing this information will use it now and in the future to

_____

_____.

I understand that copies of my records may be released to the above-named party before I have had an opportunity to review either the records or the Department of Health's evaluation of the records.

I save and hold harmless the Commissioner of Health, her agents and her attorneys for revealing or releasing these records.

These records may not be re-released without a separate and specific authorization. This authorization expires 60 days from the date of my signature.

If the data subject is a minor or deceased, I attest that I am authorized to sign on the minor's or the decedent's behalf.

_____ _____
Name of subject/guardian, decedent Guardian's or representative's relationship to subject

_____
Address

_____ _____
Signature of subject/guardian, representative Date

Witness _____
Name

APPENDIX 14 **- FOODBORNE ILLNESSES**

Foodborne Illnesses (Bacterial)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Bacillus anthracis	2 days to weeks	Nausea, vomiting, malaise, bloody diarrhea, acute abdominal pain.	Weeks	Insufficiently cooked contaminated meat.	Blood.	Penicillin is first choice for naturally acquired gastrointestinal anthrax. Ciprofloxacin is second option.
Bacillus cereus (diarrheal toxin)	10-16 hrs	Abdominal cramps, watery diarrhea, nausea.	24-48 hours	Meats, stews, gravies, vanilla sauce.	Testing not necessary, self-limiting (consider testing food and stool for toxin in outbreaks).	Supportive care
Bacillus cereus (preformed enterotoxin)	1-6 hrs	Sudden onset of severe nausea and vomiting. Diarrhea may be present.	24 hrs	Improperly refrigerated cooked and fried rice, meats.	Normally a clinical diagnosis. Clinical laboratories do not routinely identify this organism. If indicated, send stool and food specimens to reference laboratory for culture and toxin identification.	Supportive care.
Brucella abortus, B. melitensis, and *B. suis*	7-21 days	Fever, chills, sweating, weakness, headache, muscle and joint pain, diarrhea, bloody stools during acute phase.	Weeks	Raw milk, goat cheese made from unpasteurized milk, contaminated meats.	Blood culture and positive serology.	*Acute:* Rifampin and doxycycline daily for ≥6 weeks. Infections with complications require combination therapy with rifampin, tetracycline and an aminoglycoside.
Campylobacter jejuni	2-5 days	Diarrhea, cramps, fever, and vomiting; diarrhea may be bloody.	2-10 days	Raw and undercooked poultry, unpasteurized milk, contaminated water.	Routine stool culture; *Campylobacter* requires special media and incubation at 42°C to grow.	Supportive care. For severe cases, antibiotics such as erythromycin and quinolones may be indicated early in the diarrheal disease. Guillain-Barré syndrome can be a sequela.
Clostridium botulinum – children and adults (preformed toxin)	12-72 hrs	Vomiting, diarrhea, blurred vision, diplopia, dysphagia, and descending muscle weakness.	Variable (from days to months). Can be complicated by respiratory failure and death.	Home-canned foods with a low acid content, improperly canned commercial foods, home-canned or fermented fish, herb-infused oils, baked potatoes in aluminum foil, cheese sauce, bottled garlic, foods held warm for extended periods of time (eg, in a warm oven).	Stool, serum, and food can be tested for toxin. Stool and food can also be cultured for the organism. These tests can be performed at some State Health Department Laboratories and CDC.	Supportive care. Botulinum antitoxin is helpful if given early in the course of the illness. Contact the state health department. The 24-hour number for state health departments to call is 770 488-7100
Clostridium botulinum – infants	3-30 days	In infants <12 months, lethargy, weakness, poor feeding, constipation, hypotonia, poor head control, poor gag and sucking reflex.	Variable	Honey, home-canned vegetables and fruits, corn syrup	Stool, serum, and food can be tested for toxin. Stool and food can also be cultured for the organism. These tests can be performed at some State Health Department laboratories and CDC.	Supportive care. Botulism immune globulin can be obtained from the Infant Botulism Prevention Program, Health and Human Services, California at 510 540-2646. Botulinum antitoxin is generally not recommended for infants.
Clostridium perfringens toxin	8-16 hrs	Watery diarrhea, nausea, abdominal cramps; fever is rare.	24-48 hrs	Meats, poultry, gravy, dried or precooked foods, time- and/or temperature-abused food.	Stools can be tested for enterotoxin and cultured for organism. Because *Clostridium perfringens* can normally be found in stool, quantitative cultures must be done.	Supportive care. Antibiotics not indicated.
Enterohemorrhagic *E. coli* (EHEC) including *E. coli* 0157:H7 and other Shiga toxin-producing *E. coli* (STEC)	1-8 days	Severe diarrhea that is often bloody, abdominal pain and vomiting. Usually, little or no fever is present. More common in children <4 years.	5-10 days.	Undercooked beef especially hamburger, unpasteurized milk and juice, raw fruits and vegetables (e.g. sprouts), salami (rarely), and contaminated water.	Stool culture; *E. coli* O157:H7 requires special media to grow. If *E. coli* O157:H7 is suspected, specific testing must be requested. Shiga toxin testing may be done using commercial kits; positive isolates should be forwarded to public health laboratories for confirmation and serotyping.	Supportive care, monitor renal function, hemoglobin, and platelets closely. *E. coli* O157:H7 infection is also associated with hemolytic uremic syndrome (HUS), which can cause lifelong complications. Studies indicate that antibiotics may promote the development of HUS.
Enterotoxigenic *E. coli* (ETEC)	1-3 days	Watery diarrhea, abdominal cramps, some vomiting.	3->7 days	Water or food contaminated with human feces.	Stool culture. ETEC requires special laboratory techniques for identification. If suspected, must request specific testing.	Supportive care. Antibiotics are rarely needed except in severe cases. Recommended antibiotics include TMP-SMX and quinolones.
Listeria monocytogenes	9-48 hrs for gastrointestinal symptoms, 2-6 weeks for invasive disease	Fever, muscle aches, and nausea or diarrhea. Pregnant women may have mild flu-like illness, and infection can lead to premature delivery or stillbirth. Elderly or immunocompromised patients may have bacteremia or meningitis.	Variable	Fresh soft cheeses, unpasteurized or inadequately pasteurized milk, ready-to-eat deli meats, hot dogs.	Blood or cerebrospinal fluid cultures. Asymptomatic fecal carriage occurs; therefore, stool culture usually not helpful. Antibody to listerolysin O may be helpful to identify outbreak retrospectively.	Supportive care and antibiotics; Intravenous ampicillin, penicillin, or TMP-SMX are recommended for invasive disease.
	At birth and infancy	Infants infected from mother at risk for sepsis or meningitis.				

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Salmonella spp.	1-3 days	Diarrhea, fever, abdominal cramps, vomiting. *S.* Typhi and *S.* Paratyphi produce typhoid with insidious onset characterized by fever, headache, constipation, malaise, chills, and myalgia; diarrhea is uncommon, and vomiting is usually not severe.	4-7 days	Contaminated eggs, poultry, unpasteurized milk or juice, cheese, contaminated raw fruits and vegetables (alfalfa sprouts, melons). *S.* Typhi epidemics are often related to fecal contamination of water supplies or street-vended foods.	Routine stool cultures.	Supportive care. Other than for *S.* Typhi and *S.* Paratyphi, antibiotics are not indicated unless there is extra-intestinal spread, or the risk of extra-intestinal spread, of the infection. Consider ampicillin, gentamicin, TMP-SMX, or quinolones if indicated. A vaccine exists for *S.* Typhi.
Shigella spp.	24-48 hrs	Abdominal cramps, fever, and diarrhea. Stools may contain blood and mucus.	4-7 days	Food or water contaminated with human fecal material. Usually person-to-person spread, fecal-oral transmission. Ready-to-eat foods touched by infected food workers, e.g. raw vegetables, salads, sandwiches.	Routine stool cultures.	Supportive care. TMP-SMX recommended in the US if organism is susceptible; nalidixic acid or other quinolones may be indicated if organism is resistant, especially in developing countries.
Staphylococcus aureus (preformed enterotoxin)	1-6 hrs	Sudden onset of severe nausea and vomiting. Abdominal cramps. Diarrhea and fever may be present.	24-48 hrs	Unrefrigerated or improperly refrigerated meats, potato and egg salads, cream pastries.	Normally a clinical diagnosis. Stool, vomitus, and food can be tested for toxin and cultured if indicated.	Supportive care
Vibrio cholerae (toxin)	24-72 hrs	Profuse watery diarrhea and vomiting, which can lead to severe dehydration and death within hours.	3-7 days. Causes life-threatening dehydration.	Contaminated water, fish, shellfish, street-vended food, typically from Latin America or Asia.	Stool culture; *Vibrio cholerae* requires special media to grow. If *V. cholerae* is suspected, must request specific testing.	Supportive care with aggressive oral and intravenous rehydration. In cases of confirmed cholera, tetracycline or doxycycline is recommended for adults, and TMP-SMX for children (<8 years).
Vibrio parahaemolyticus	2-48 hrs	Watery diarrhea, abdominal cramps, nausea, vomiting.	2-5 days	Undercooked or raw seafood, such as fish, shellfish.	Stool cultures. *Vibrio parahaemolyticus* requires special media to grow. If *V. parahaemolyticus* is suspected, must request specific testing.	Supportive care. Antibiotics are recommended in severe cases: tetracycline, doxycycline, gentamicin, and cefotaxime.
Vibrio vulnificus	1-7 days	Vomiting, diarrhea, abdominal pain, bacteremia, and wound infections. More common in the immunocompromised, or in patients with chronic liver disease (presenting with bullous skin lesions). Can be fatal in patients with liver disease and the immunocompromised.	2-8 days	Undercooked or raw shellfish, especially oysters; other contaminated seafood, and open wounds exposed to sea water.	Stool, wound, or blood cultures. *Vibrio vulnificus* requires special media to grow. If *V. vulnificus* is suspected, must request specific testing.	Supportive care and antibiotics; tetracycline, doxycycline, and ceftazidime are recommended.
Yersinia enterocolytica and *Y. pseudotuberculosis*	24-48 hrs	Appendicitis-like symptoms (diarrhea and vomiting, fever, and abdominal pain) occur primarily in older children and young adults. May have a scarlitiniform rash with *Y. pseudotuberculosis.*	1-3 weeks, usually self-limiting	Undercooked pork, unpasteurized milk, tofu, contaminated water. Infection has occurred in infants whose caregivers handled chitterlings.	Stool, vomitus or blood culture. *Yersinia* requires special media to grow. If suspected, must request specific testing. Serology is available in research and reference laboratories.	Supportive care. If septicemia or other invasive disease occurs, antibiotic therapy with gentamicin or cefotaxime (doxycycline and ciprofloxacin also effective).

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See the reverse side for information hotlines and list of notifiable diseases.

Foodborne Illnesses (Parasitic)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Angiostrongylus cantonensis	1 week to ≥ 1 month	Severe headaches, nausea, vomiting, neck stiffness, paresthesias, hyperesthesias, seizures, and other neurologic abnormalities.	Several weeks to several months	Raw or undercooked intermediate hosts (eg, snails or slugs), infected paratenic (transport) hosts (eg, crabs, fresh water shrimp), fresh produce contaminated with intermediate or transport hosts.	Examination of CSF for elevated pressure, protein, leukocytes, and eosinophils; serologic testing using ELISA to detect antibodies to *Angiostrongylus cantonensis*.	Supportive care. Repeat lumbar punctures and use of corticosteroid therapy may be used for more severely ill patients.
Cryptosporidium	2-10 days	Diarrhea (usually watery), stomach cramps, upset stomach, slight fever.	May be remitting and relapsing over weeks to months	Any uncooked food or food contaminated by an ill food handler after cooking, drinking water.	Request specific examination of the stool for *Cryptosporidium*. May need to examine water or food.	Supportive care, self-limited. If severe consider paromomycin for 7 days. For children aged 1-11 years, consider nitazoxanide for 3 days.
Cyclospora cayetanensis	1-14 days, usually at least 1 week	Diarrhea (usually watery), loss of appetite, substantial loss of weight, stomach cramps, nausea, vomiting, fatigue.	May be remitting and relapsing over weeks to months	Various types of fresh produce (imported berries, lettuce).	Request specific examination of the stool for *Cyclospora*. May need to examine water or food.	TMP/SMX for 7 days.
Entamoeba histolytica	2-3 days to 1-4 weeks	Diarrhea (often bloody), frequent bowel movements, lower abdominal pain.	May be protracted (several weeks to several months)	Any uncooked food or food contaminated by an ill food handler after cooking, drinking water.	Examination of stool for cysts and parasites – may need at least 3 samples. Serology for long-term infections.	Metronidazole and a luminal agent (iodoquinol or paromomycin).
Giardia lamblia	1-2 weeks	Diarrhea, stomach cramps, gas.	Days to weeks	Any uncooked food or food contaminated by an ill food handler after cooking, drinking water.	Examination of stool for ova and parasites – may need at least 3 samples.	Metronidazole.
Toxoplasma gondii	5-23 days	Generally asymptomatic, 20% may develop cervical lymphadenopathy and/or a flu-like illness. In immunocompromised patients: central nervous system (CNS) disease, myocarditis, or pneumonitis is often seen.	Months	Accidental ingestion of contaminated substances (eg, soil contaminated with cat feces on fruits and vegetables), raw or partly cooked meat (especially pork, lamb, or venison).	Isolation of parasites from blood or other body fluids; observation of parasites in patient specimens via microscopy or histology. Detection of organisms is rare; serology (reference laboratory needed) can be a useful adjunct in diagnosing toxoplasmosis. However, IgM antibodies may persist for 6-18 months and thus may not necessarily indicate recent infection. PCR of bodily fluids. For congenital infection: isolation of *T. gondii* from placenta, umbilical cord, or infant blood. PCR of white blood cells, CSF, or amniotic fluid, or IgM and IgA serology, performed by a reference laboratory.	Asymptomatic healthy, but infected, persons do not require treatment. Spiramycin or pyrimethamine plus sulfadiazine may be used for pregnant women. Pyrimethamine plus sulfadiazine may be used for immunocompromised persons, in specific cases. Pyrimethamine plus sulfadiazine (with or without steroids) may be given for ocular disease when indicated. Folinic acid is given with pyrimethamine plus sulfadiazine to counteract bone marrow suppression.
Toxoplasma gondii (congenital infection)	In infants at birth	Treatment of the mother may reduce severity and/or incidence of congenital infection. Most infected infants have few symptoms at birth. Later, they will generally develop signs of congenital toxoplasmosis (mental retardation, severely impaired eyesight, cerebral palsy, seizures) unless the infection is treated.		Passed from mother (who acquired acute infection during pregnancy) to child.		
Trichinella spiralis	1-2 days for initial symptoms; others begin 2-8 weeks after infection	Acute: nausea, diarrhea, vomiting, fatigue, fever, abdominal discomfort followed by muscle soreness, weakness, and occasional cardiac and neurologic complications.	Months	Raw or undercooked contaminated meat, usually pork or wild game meat, eg, bear or moose.	Positive serology or demonstration of larvae via muscle biopsy. Increase in eosinophils.	Supportive care + mebendazole or albendazole.
Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment

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Foodborne Illnesses (Viral)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Hepatitis A	28 days average (15-50 days)	Diarrhea, dark urine, jaundice, and flu-like symptoms, i.e., fever, headache, nausea, and abdominal pain.	Variable, 2 weeks-3 months	Shellfish harvested from contaminated waters, raw produce, contaminated drinking water, uncooked foods and cooked foods that are not reheated after contact with infected food handler.	Increase in ALT, bilirubin. Positive IgM and anti-hepatitis A antibodies.	Supportive care. Prevention with immunization.
Noroviruses (and other caliciviruses)	12-48 hrs	Nausea, vomiting, abdominal cramping, diarrhea, fever, myalgia, and some headache. Diarrhea is more prevalent in adults and vomiting is more prevalent in children.	12-60 hrs	Shellfish, fecally contaminated foods, ready-to-eat foods touched by infected food workers (salads, sandwiches, ice, cookies, fruit).	Routine RT-PCR and EM on fresh unpreserved stool samples. Clinical diagnosis, negative bacterial cultures. Stool is negative for WBCs.	Supportive care such as rehydration. Good hygiene.
Rotavirus	1-3 days	Vomiting, watery diarrhea, low-grade fever. Temporary lactose intolerance may occur. Infants and children, elderly, and immunocompromised are especially vulnerable.	4-8 days	Fecally contaminated foods. Ready-to-eat foods touched by infected food workers (salads, fruits).	Identification of virus in stool via immunoassay.	Supportive care. Severe diarrhea may require fluid and electrolyte replacement.
Other viral agents (astroviruses, adenoviruses, parvoviruses)	10-70 hrs	Nausea, vomiting, diarrhea, malaise, abdominal pain, headache, fever.	2-9 days	Fecally contaminated foods. Ready-to-eat foods touched by infected food workers. Some shellfish.	Identification of the virus in early acute stool samples. Serology. Commercial ELISA kits are now available for adenoviruses and astroviruses.	Supportive care, usually mild, self-limiting. Good hygiene.
Etiology	**Incubation Period**	**Signs and Symptoms**	**Duration of Illness**	**Associated Foods**	**Laboratory Testing**	**Treatment**

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Foodborne Illnesses (Non-infectious)

Etiology	Incubation Period	Signs and Symptoms	Duration of Illness	Associated Foods	Laboratory Testing	Treatment
Antimony	5 min-8 hrs. usually <1 hr	Vomiting, metallic taste.	Usually self-limited	Metallic container.	Identification of metal in beverage or food.	Supportive care.
Arsenic	Few hrs	Vomiting, colic, diarrhea.	Several days	Contaminated food.	Urine. May cause eosinophilia.	Gastric lavage, BAL (dimercaprol).
Cadmium	5 min-8 hrs. usually <1 hr	Nausea, vomiting, myalgia, increase in salivation, stomach pain.	Usually self-limited	Seafood, oysters, clams, lobster, grains, peanuts.	Identification of metal in food.	Supportive care.
Ciguatera fish poisoning (ciguatera toxin).	2-6 hrs	GI: abdominal pain, nausea, vomiting, diarrhea.	Days to weeks to months	A variety of large reef fish. Grouper, red snapper, amberjack, and barracuda (most common).	Radioassay for toxin in fish or a consistent history.	Supportive care, IV mannitol. Children more vulnerable.
	3 hrs	Neurologic: paresthesias, reversal of hot or cold, pain, weakness.				
	2-5 days	Cardiovascular: bradycardia, hypotension, increase in T wave abnormalities.				
Copper	5 min-8 hrs. usually <1 hr	Nausea, vomiting, blue or green vomitus.	Usually self-limited	Metallic container.	Identification of metal in beverage or food.	Supportive care.
Mercury	1 week or longer	Numbness, weakness of legs, spastic paralysis, impaired vision, blindness, coma. Pregnant women and the developing fetus are especially vulnerable.	May be protracted	Fish exposed to organic mercury, grains treated with mercury fungicides.	Analysis of blood, hair.	Supportive care.
Mushroom toxins, short-acting (muscinol, muscarine, psilocybin, coprius artemetaris, ibotenic acid)	<2 hrs	Vomiting, diarrhea, confusion, visual disturbance, salivation, diaphoresis, hallucinations, disulfiram-like reaction, confusion, visual disturbance.	Self-limited	Wild mushrooms (cooking may not destroy these toxins).	Typical syndrome and mushroom identified or demonstration of the toxin.	Supportive care.
Mushroom toxin, long-acting (amanitin)	4-8 hrs diarrhea; 24-48 hrs liver failure	Diarrhea, abdominal cramps, leading to hepatic and renal failure.	Often fatal	Mushrooms.	Typical syndrome and mushroom identified and/or demonstration of the toxin.	Supportive care; life-threatening, may need life support.
Nitrite poisoning	1-2 hrs	Nausea, vomiting, cyanosis, headache, dizziness, weakness, loss of consciousness, chocolate-brown colored blood.	Usually self-limited	Cured meats, any contaminated foods, spinach exposed to excessive nitrification.	Analysis of the food, blood.	Supportive care, methylene blue.
Pesticides (organophosphates or carbamates)	Few min to few hrs	Nausea, vomiting, abdominal cramps, diarrhea, headache, nervousness, blurred vision, twitching, convulsions, salivation and meiosis	Usually self-limited	Any contaminated food.	Analysis of the food, blood.	Atropine; 2-PAM (Pralidoxime) is used when atropine is not able to control symptoms and is rarely necessary in carbamate poisoning.
Puffer fish (tetrodotoxin)	<30 min	Paresthesias, vomiting, diarrhea, abdominal pain, ascending paralysis, respiratory failure.	Death usually in 4-6 hrs	Puffer fish.	Detection of tetrodotoxin in fish.	Life-threatening, may need respiratory support.

Scombroid (histamine)	1 min-3 hrs	Flushing, rash, burning sensation of skin, mouth and throat, dizziness, uriticaria, paresthesias.	3-6 hrs	Fish: bluefin, tuna, skipjack, mackerel, marlin, escolar and mahi mahi.	Demonstration of histamine in food or clinical diagnosis.	Supportive care, antihistamines.
Shellfish toxins (diarrheic, neurotoxic, amnesic)	Diarrheic shellfish poisoning (DSP) – 30 min to 2 hrs	Nausea, vomiting, diarrhea, and abdominal pain accompanied by chills, headache, and fever.	Hrs to 2-3 days	A variety of shellfish, primarily mussels, oysters, scallops, and shellfish from the Florida coast and the Gulf of Mexico.	Detection of the toxin in shellfish; high-pressure liquid chromatography.	Supportive care, generally self-limiting. Elderly are especially sensitive to ASP.
	Neurotoxic shellfish poisoning (NSP) – few min to hrs	Tingling and numbness of lips, tongue, and throat, muscular aches, dizziness, reversal of the sensations of hot and cold, diarrhea, and vomiting.				
	Amnesic shellfish poisoning (ASP) – 24-48 hrs	Vomiting, diarrhea, abdominal pain and neurological problems such as confusion, memory loss, disorientation, seizure, coma.				
Shellfish toxins (paralytic shellfish poisoning)	30 min-3 hrs	Diarrhea, nausea, vomiting leading to paresthesias of mouth, lips, weakness, dysphasia, dysphonia, respiratory paralysis.	Days	Scallops, mussels, clams, cockles.	Detection of toxin in food or water where fish are located; high-pressure liquid chromatography.	Life-threatening, may need respiratory support.
Sodium fluoride	Few min to 2 hrs	Salty or soapy taste, numbness of mouth, vomiting, diarrhea, dilated pupils, spasms, pallor, shock, collapse.	Usually self-limited	Dry foods (such as dry milk, flour, baking powder, cake mixes) contaminated with sodium fluoride-containing insecticides and rodenticides.	Testing of vomitus or gastric washings. Analysis of the food.	Supportive care.
Thallium	Few hrs	Nausea, vomiting, diarrhea, painful paresthesias, motor polyneuropathy, hair loss.	Several days	Contaminated food.	Urine, hair.	Supportive care.
Tin	5 min-8 hrs, usually <1 hr	Nausea, vomiting, diarrhea.	Usually self-limited	Metallic container.	Analysis of the food.	Supportive care.
Vomitoxin	Few min to 3 hrs	Nausea, headache, abdominal pain, vomiting.	Usually self-limited	Grains such as wheat, corn, barley.	Analysis of the food.	Supportive care.
Zinc	Few hrs	Stomach cramps, nausea, vomiting, diarrhea, myalgias.	Usually self-limited	Metallic container.	Analysis of the food, blood and feces, saliva or urine.	Supportive care.
Etiology	**Incubation Period**	**Signs and Symptoms**	**Duration of Illness**	**Associated Foods**	**Laboratory Testing**	**Treatment**

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