

## Foodborne Outbreaks

This is a collaborative document of the Virginia Department of Health and the Virginia Department of Agriculture and Consumer Services (VDACS).

### **I. Public Health Implications**

Foodborne outbreaks are defined as two or more cases of the same disease with the same exposure occurring within one incubation period of each other. Examples of causes of foodborne outbreaks include heavy metal intoxication, botulism, Staphylococcal enterotoxin, *Salmonella*, *Shigella*, *Clostridium perfringens*, *Bacillus cereus* enterotoxin, *Cyclospora*, hepatitis A, *Escherichia coli* O157:H7, and small round structured viruses such as the Norwalk virus. See the Botulism section of this manual for guidance when a case of that disease is reported.

When an outbreak is first reported, the disease-causing agent and the specific exposure may not be known. An investigation is initiated to confirm that an outbreak occurred, identify the causative organism, and determine the source of illness, with the goal of preventing further spread. The investigation should begin as soon as the outbreak is suspected or identified. A collaborative team approach should be used to assess the situation and consult about likely place(s) and time(s) of exposure as well as disease-causing agents, which clinical and/or environmental specimens to collect, whether to administer a questionnaire, and what control measures must be implemented.

The first phone call that the health department receives may provide important information to help determine whether or not an outbreak has occurred. From information obtained from initial interviews (number of ill persons, symptoms, possible common times and places of exposure, potential number exposed), the likelihood that an outbreak truly occurred may be assessed. If it appears that an outbreak has occurred, an initial determination of the likely cause of the illness, risk to the general public, and need for public health action should be made. Any recommendations regarding prevention and control measures will be influenced by the nature of the outbreak and if it represents an ongoing or potentially recurring situation in which others might continue to be at risk.

### **II. Reporting Procedure** - Regulations of the Board of Health require that foodborne outbreaks be reported to the local health departments by the most rapid means available, i.e., by telephone. These calls may come to Nursing or Environmental Health. The Office of Epidemiology should, in turn, be notified by telephone (804-786-6261).

Within VDACS, reports of foodborne illness are most often reported to the Office of Dairy and Foods (ODF), (804-786-8899). The Office of Meat and Poultry Services (OMPS), (804-786-4569), will notify ODF when they are notified of a possible outbreak. The ODF will notify the Office of Epidemiology by telephone.

### III. Disease Characteristics

- A. **Period of Communicability** - Depends on the organism involved.
- B. **Mode of Transmission** - Foodborne outbreaks are usually transmitted through:
  - 1. The ingestion of foods that are naturally contaminated and mishandled, or
  - 2. The ingestion of foods that have been contaminated by an infected foodhandler or cross-contaminated by other foods.
- C. **Incubation Period** - Depends on the organism involved.
- D. **High Risk Situations** - Foodborne outbreaks occur in a variety of settings, including commercial restaurants, private homes, social gatherings (festivals, weddings, church suppers, etc.), and institutions (schools, nursing homes, etc.).

### IV. Public Health Investigation and Follow-Up

- A. **The Reported Case** -  
See case management recommendations for the specific disease causing the outbreak.
- B. **Contacts of the Case** -  
See contact management recommendations for the specific disease causing the outbreak.

### V. Outbreak Situation

NOTE: Although this outline may appear straightforward, many activities must occur simultaneously and the investigation may quickly become confusing and overwhelming. It is advisable for persons who have little experience conducting outbreak investigations to seek guidance and advice from those with more experience, such as epidemiologists in the Office of Epidemiology both at the initiation of an investigation and throughout the steps of the outbreak investigation.

- A. Establish the existence of an outbreak by asking the following questions of the person first reporting the outbreak and a sample of ill persons.
  - 1. How many persons are ill? [Determine if the extent of this illness is greater than ordinarily expected.]
  - 2. What are the reported symptoms of the illness?
  - 3. When did illness begin? How long does it last?

4. Are people still ill? Are new people getting ill?
5. What is/are the suspected exposure(s)? When? Where? What foods? A three day food history is usually required in order to gather information on all potential relevant exposures (Case History Form B may be used for this). When *E. Coli* O157:H7 is the suspect organism, a seven-day food history should be obtained. Be careful not to allow the last meal eaten prior to illness to automatically be implicated as the source.
6. How many persons were potentially exposed?
7. From this information you may be able to determine the urgency of the situation, the likely incubation period, suspected agent, and other important details.

**B.** After gathering the above initial information and suspecting that an outbreak may have occurred, begin assembling an investigation team. A team approach is recommended during an outbreak investigation in order to accomplish the variety of tasks that are involved, many of which need to be accomplished simultaneously and often during a short period of time. The investigation team may include the following members:

1. Health department team members:
  - a. District Health Director
  - b. Nursing/Epidemiology
  - c. Environmental Health
  - d. Office of Epidemiology (Central Office 804-786-6261, Eastern Epi Field Office 757-363-3874, Western Epi Field Office 540-676-5520)
  - e. Any other team members, such as support staff, according to District policy.
2. At times, VDACS needs to be added to the investigation team. This is usually when a facility regulated by VDACS is involved (such as a grocery store, convenience store, or seafood market) or when the distribution of a contaminated food may be the source of the illness. Whenever you think VDACS might need to be notified, call the Office of Epidemiology (804-786-6261). Epidemiology will call VDACS' Office of Dairy and Foods (ODF, (804) 786-8899), who will in turn notify the Office of Meat and Poultry Services when appropriate. VDACS' responsibility during outbreak investigations will involve ensuring that food samples are submitted to DCLS, conducting an inspection of the facility, and engaging in product traceback activities when appropriate.

3. Whenever both VDH and VDACS are involved in an investigation, coordinate outbreak-related activities to avoid duplication and share pertinent information to keep staff of both agencies updated.
- C.** Verify the diagnosis.
1. Use firsthand information from patients and physicians.
  2. Determine if any cases have been confirmed via laboratory tests.
  3. Contact the Division of Consolidated Laboratory Services for advice on samples to take and appropriate transport media to use.
  4. Collect samples for laboratory testing as necessary, including samples from people who are/have been ill and samples of food. Collect at least 100 grams of each food that is to be tested. Any human specimens would be collected by health department employees. VDACS employees would collect food samples when facilities they regulate are involved.
- D.** Conduct a site visit with appropriate team member(s). At a minimum, the site visit should include an inspection of any location/facility where food was processed, prepared or served, review of time and temperature of food storage, food preparation procedures, and an assessment of illness among foodhandlers (including dates of illness, symptoms, work duties). Each foodhandler should be interviewed individually and in private to obtain this information. Make preliminary disease control recommendations (e.g., providing education about handling and storing food, restricting symptomatic foodhandlers from working, closing a restaurant).
- E.** Inform the public if a health hazard warrants a public warning. Be careful to release only factual information that has been confirmed and that the public needs to know in order to be protected. If you publicly state the hypotheses that have not been proven, it will bias the epidemiologic study.
- Decide if there will be media attention surrounding the outbreak and designate someone to serve as the media contact person. Health department employees who are the most involved in the technical aspects of conducting the investigation should not be the ones to work with the media. In many instances, the District Director has served as the media contact person.
- F.** Interview the population at risk. [If the population cannot be identified (e.g., the outbreak occurred at a large festival attended by an unknown number of participants or a restaurant where all patrons cannot be identified), call the Office of Epidemiology to discuss how to select a sample of ill and well persons to include in a study.]
1. Develop a standardized interview form.
  2. Collect data on ill and well individuals so that comparisons of risk can be made.

3. Conduct surveillance, i.e., actively search for cases and for all persons exposed to the suspected source of illness. Ill persons or group organizers may be able to identify others who had the same exposure (that is, attended the same event) and who need to be interviewed, regardless of their illness status. If the outbreak occurred among a group attending a meeting in a hotel or other place where multiple groups can meet simultaneously, a contact person from the other groups who held meetings at the same location should be contacted to see if any illness has occurred. If the illness is not confined to an identifiable group, such that illness may be occurring in the community, cases may also be found by contacting emergency departments, physician offices, ambulatory care centers, etc.
4. Collect appropriate specimens to submit to the laboratory for analysis, if this has not already been done.

**G.** Organize the data (Case History Form C may be used for this). Establish a working case definition and orient the data (descriptive epidemiology) as to:

1. Time - When persons became ill. Create an epidemic curve by plotting the number of cases by time of occurrence (hour, day, or week).
2. Place - Where they became ill or may have been exposed (for example, plot the cases on a floor plan if an institution is involved or a spot map if cases are occurring in the community),
3. Person - Who they are (compile the number of cases by age, sex, race, occupation, etc.)
4. This will help you develop tentative hypotheses that explain:
  - ! Source of infection,
  - ! Mode of transmission,
  - ! Duration and type of illness, etc.
5. Through this information, a suspect causal organism may also be deduced in the absence of laboratory confirmation.

**H.** Analyze the data to test your hypotheses and quantify who is at risk (analytic epidemiology).

1. Calculate the percentage of people who became ill. This is the overall attack rate.

$$\text{Attack rate} = \frac{\# \text{ sick}}{\# \text{ at risk}} \times 100$$

2. Calculate the food specific attack rates so that you can compare what sick and not sick people ate. (The Investigation of a Foodborne Outbreak form may be used for this.) For each food item:

$$\text{Attack rate in the exposed} = \frac{\# \text{ people who ate the food and got sick}}{\text{total \# of people who ate the food}} \times 100$$

$$\text{Attack rate in the unexposed} = \frac{\# \text{ people who did not eat the food and got sick}}{\text{total \# of people who did not eat the food}} \times 100$$

3. Calculate the relative risk for each food item, using the formula shown below. (See V.I.1. for information on how to use the relative risks to help recommend control measures.)

$$\text{Relative Risk} = \frac{\text{Attack rate in the exposed}}{\text{Attack rate in the unexposed}}$$

- I. Continue the study in more detail and with more refinement of the case definition and use of other statistical techniques, such as 2 X 2 tables, as needed.

Seek help with this from the Office of Epidemiology.

- J. Recommend control and surveillance measures.

1. Some measures would have been implemented early in the outbreak but should be modified as more information becomes available.

! Compare the relative risks for the different food items to determine the probable source of illness.

! Discuss methods of preparation of high risk foods with foodhandlers to identify errors that may have contributed to the outbreak.

! Determine if a food traceback and/or recall may be required. If so, VDH employees should call and discuss this with someone in the Office of Epidemiology (804-786-6261) and VDACS employees should call the Office of Dairy and Foods at 804-786-8899. The Central Offices of the two agencies will consult with each other and determine the need for and logistics of a recall, including whether FDA needs to be involved. VDACS Dairy and Foods office will notify Meat and Poultry for actions in accordance with the FSIS Directive (see Appendix E).

2. Educate foodhandlers and consumers regarding steps that should be taken and procedures that should be changed to prevent future outbreaks.

- K.** Write up the investigation.
1.
    - a. Briefly provide an introduction, then describe the methods of collecting data and laboratory samples and of conducting environmental inspections, the results of your analyses, interpretation of findings, and conclusions.
    - b. The conclusions should be understandable by people who do not necessarily have knowledge of epidemiology.
  2. Forward a copy of the report to the Office of Epidemiology, along with a completed Investigation of a Foodborne Outbreak form (CDC 52.13). If a report is not prepared, you must still submit a completed CDC form 52.13 to the Office of Epidemiology.
- If VDACS was involved, you may want to include a copy of their Sanitation Inspection report, if applicable, and also forward a copy of the report to the Office of Dairy and Foods.

**VI. Forms, Reports, and Logs**

- A.** Notification of outbreaks should be telephoned to the Office of Epidemiology as soon as the outbreak is detected.
- B.** Complete the Investigation of a Foodborne Outbreak form (CDC 52.13) and forward a copy to the Office of Epidemiology along with a copy of the outbreak report, if a report was prepared. Also forward a copy of the report to the VDACS Office of Dairy and Foods if they were involved.
- C.** Follow District policy for other outbreak-related paperwork, e.g., interview forms or questionnaires.

**VII. Attachments**

- A.** Case History Form B and C
- B.** Investigation of a Foodborne Outbreak form (CDC 52.13)
- C.** General Instructions for Collecting Specimens during an Outbreak
- D.** Summary of the CDC Guidelines for the Collection and Handling of Specimens for *E. Coli* O157:H7 Isolation
- E.** FSIS Directive 8080.1, Rev.2 — Recall of Inspected Meat and Poultry Products