

# General Outbreak Investigation / Notification Protocol

## Definition of an 'Outbreak'

1. **Outbreaks** are defined as an increase in the number of cases of disease *over and above the expected number of cases*.
2. **A foodborne disease outbreak** is defined as two or more persons who experience a similar illness after ingestion of a common food. Please note two exceptions: one case of botulism or chemical poisoning constitutes an outbreak.
3. **A waterborne disease outbreak** is defined as two or more persons who experience a similar illness after consumption or use of water intended for drinking. Outbreaks in association with recreational water may include exposure to or unintentional ingestion of water. Please note that a single case of chemical poisoning also constitutes an outbreak.
4. **A single case constitutes an outbreak of:**
  - a. Anthrax
  - b. Botulism
  - c. Diphtheria
  - d. Monkeypox
  - e. Novel influenza virus
  - f. Polio
  - g. Human rabies
  - h. *Salmonella typhi*,
  - i. *Vibrio cholerae*.
  - j. Smallpox
  - k. Suspect or confirmed illness due to intentional exposure
  - l. Viral hemorrhagic fever
  - m. Other novel or emerging infectious disease with an expected incidence of zero cases in West Virginia.
5. Other definitions:
  - a. Chickenpox:
    - i. Within 1 incubation period: 5 or more cases in children of any age in a school or daycare facility or 3 or more cases in a long-term care facility.
  - b. Clostridium difficile:
    - i. 2 or more cases in a school, daycare or other facility, clustered in place and time.
  - c. Hantavirus:
    - i. 2 or more cases clustered in place and/or time
  - d. Influenza-like illness (ILI) in a nursing home:
    - i. 3 or more cases in a single nursing home unit within a 3 day period.
  - e. Leptospirosis:

- i. 2 or more cases clustered in place and time
- f. Methicillin resistant *Staphylococcus aureus*
  - i. 2 or more epidemiologically-linked cases of CA-MRSA occurring in at least two distinct households:
  - ii. 2 or more cases clustered in time on a sports team; OR
  - iii. An increase in the incidence of CA-MRSA over the expected incidence.
- g. Pertussis:
  - i. 2 or more cases in 2 or more households clustered in place and time with at least one case culture-confirmed.

### **Provider Responsibilities:**

1. Report suspected **outbreaks**, including **foodborne and waterborne disease outbreaks** immediately by phone to the local health department in the jurisdiction where the outbreak is identified.
2. Collaborate with the local health department to obtain appropriate diagnostic laboratory evaluation. For public health investigation of outbreaks, and foodborne and waterborne disease outbreaks, the services of the Office of Laboratory Services (304-558-3530) are available free of charge. Consult the Infectious Disease Epidemiology Program (800-423-1271) or your local health department for advice on confirmation. The local health department can assist with collection of specimens.
3. Collaborate with the local health department to institute appropriate control measures.
4. Collaborate with the local health department on the investigation. Local health departments may request, as needed:
  - a. A line listing of ill persons;
  - b. Completed WVEDSS forms on persons with a reportable condition;
  - c. Other epidemiologically necessary information for investigation and control of the outbreak.

### **Laboratory Responsibilities:**

1. Report suspected **outbreaks**, including **foodborne and waterborne disease outbreaks** immediately by phone to the local health department in the jurisdiction where the outbreak is identified.
2. Collaborate with public health officials to obtain appropriate specimens for testing or confirmation.

3. Collaborate with local health officials on investigation of the outbreak.  
Local officials may request:
  - a. A line listing of ill persons.
  - b. Copies of laboratory reports for persons meeting the outbreak case definition;
  - c. Other epidemiologically necessary information for investigation and control of the outbreak.

### **Local Health Department Responsibilities:**

NOTE: This investigation protocol is NOT a substitute for training and experience in outbreak investigation. Consult an experienced trained epidemiologist for complex outbreak investigations.

1. Educate laboratories and providers to report **outbreaks** including **foodborne and waterborne disease outbreaks** to the local health department immediately upon recognition of the outbreak.
2. When an outbreak is reported, notify IDEP immediately. Discuss investigation strategies and negotiate responsibilities appropriately. As a BT grant requirement, IDEP is now tracking all outbreaks and all notifications about outbreaks. Notification of IDEP; the local health department; the regional epidemiologist; the Office of Laboratory Services; neighboring state(s), if appropriate; and CDC, if appropriate; should ideally occur within 90 minutes of the report (as a condition of BT grant funding). IDEP will record the date and time of report on an outbreak intake form. At the time of intake, IDEP and the local health department will negotiate responsibilities for investigation. IDEP will continue to follow up until the outbreak investigation is closed.
3. When an outbreak is reported, follow these steps of outbreak investigation. Personnel who are learning to do outbreak investigation should be paired with a trained and experienced investigator. These steps may/should be adapted, according to the situation, and should be revisited as more information becomes available:
  - a. Step 1: Identify potential investigation team members and resources / prepare for fieldwork.
    - i. Investigation:
      1. Assemble information on the disease, including protocols, reference books, information sheets and investigation forms. The protocol for the disease will often have specific recommendations on outbreak investigation.

2. Consult with laboratory staff on the proper collection, storage and transportation of laboratory specimens.
  3. If personnel are learning how to do outbreak investigation, identify an experienced investigator to mentor inexperienced staff.
- ii. Administration:
    1. Make arrangements for your regular work to be covered.
    2. Make arrangements to cover personal matters, if needed.
  - iii. Identify a lead investigator:
    1. Clarify your role in the investigation with your supervisor if the outbreak is limited to your jurisdiction.
    2. If the outbreak is limited to one county and county resources are adequate, the appropriate lead investigator may be a member of the local health department staff.
    3. If the outbreak affects multiple jurisdictions or if local resources are inadequate, or if the disease is serious or requires clinical expertise for case ascertainment or control, state involvement may be necessary. If the outbreak affects citizens in another state, IDEP will coordinate with the neighboring state and CDC.
    4. In multi-jurisdiction outbreaks, roles and responsibilities are usually negotiated respectfully between jurisdictions.
- d. Step 2: Establish the existence of an outbreak
- i. Determine the *expected* incidence of the disease by use of health department surveillance records or other sources of data. If the expected incidence of disease is unknown, consult IDEP.
  - ii. Evaluate the possibility of changes in reporting. Have there been changes in reporting procedures? Changes in laboratory testing? Changes in population? Have there been improvements in reporting? That is to say, are there alternative explanations for the observed increase in incidence?
  - iii. Sometimes, active surveillance (Step 5) is necessary to establish the existence of an outbreak.
  - iv. If you are uncertain whether you are dealing with an outbreak, consult IDEP.
- e. Step 3: Verify the diagnosis
- i. Review clinical findings and laboratory results. Compare the results with established case definitions

- ii. Talk to patients with the disease. Ask them their symptoms and learn about the clinical features of the disease. Gather other information: What were their exposures prior to becoming ill? What do they think caused their illness? Do they know anyone else with the disease?
  - iii. Submit laboratory tests if not already done.
  - iv. Consult a physician or medical epidemiologist regarding possible diagnoses, especially if you are unfamiliar with the clinical syndrome.
- f. Step 4: Construct a working case definition
- i. Base your case definition on established case definitions. For example, if you are investigating an outbreak of shigellosis, begin with the CDC case definition for that disease. A good case definition:
    - 1. Uses a few simple clinical criteria
    - 2. May be restricted by person, place and/or time; and
    - 3. Does not include an exposure or risk factor you want to test.
    - 4. Is 'loose' or 'sensitive' if used for case-finding; and 'specific' or 'tight' if used for hypothesis testing.
    - 5. Your case definition may and should change as you acquire more information.
- g. Step 5: Find cases systematically and develop a line listing
- i. As appropriate, identify additional cases through:
    - 1. Enhanced passive surveillance: send / fax a letter or memo to laboratories and/or providers asking them to report cases that meet the case definition.... OR
    - 2. Active surveillance: contact providers personally and request reporting of cases that meet the case definition.
  - ii. Collect the following information, as appropriate, on every case:
    - 1. identifying information (name, address, phone number)
    - 2. demographic information (date of birth, race, ethnicity, gender, occupation)
    - 3. clinical information (signs, symptoms, diagnostic tests)
    - 4. risk factor information
    - 5. names of other people who have a similar illness
    - 6. reporter information
  - iii. Organize the information in a line listing
- h. Step 6: Perform descriptive epidemiology As appropriate, organize the data by:
- i. Time. Construct an epidemic curve, using a unit of time one-eighth to one-third as long as the incubation period.

- ii. Place. Map the cases.
- iii. Person. Calculate the proportion of affected individuals by age and gender. Consider other factors, including occupation or risk behaviors. A school outbreak might be characterized by grade or classroom, teacher or student. A nursing home outbreak might be characterized by nursing unit, room number, resident versus staff...
- iv. **Consult an experienced epidemiologist at this point. This is a critical point for deciding whether to proceed with more complex epidemiological studies. If it is necessary to proceed with case-control or cohort studies, consult an experienced epidemiologist.**
- i. Step 7: Develop hypotheses.
  - i. Review the data collected thus far. What are the implications of your findings?
  - ii. Talk to about 8-10 case-patients in depth. Use open-ended interviewing techniques. In many cases a detailed hypothesis-generating questionnaire may be useful. Contact IDEP for suggestions.
  - iii. Summarize hypotheses.
- j. Step 8: Evaluate hypotheses.
  - i. If the source of infection is obvious, e.g., in a situation where there is clear person-to-person transmission, no formal hypothesis testing is necessary.
  - ii. If the source of infection is not obvious, a cohort or case-control study is frequently necessary to test hypotheses. Contact IDEP for assistance.
- k. Step 9: As necessary, reconsider and refine hypotheses and conduct additional studies. In some cases, analytical studies reveal a source for the illness. In other cases, analytical studies may reveal only part of the answer or no answer at all. A second set of epidemiological, environmental or laboratory studies may be necessary to identify the source of illness. Consult IDEP for assistance.
- l. Step 10: Implement control and prevention measures. In most outbreak investigations, your primary goal will be prevention and control, and these measures should be implemented at the earliest possible time.
- m. Step 11: Communicate your findings. Communication should take two forms
  - i. An oral report. Discuss your findings with the appropriate individuals locally – the owner of the establishment involved in the outbreak, and/or other interested citizens.
  - ii. A written report.

1. Small outbreaks: At a minimum, share with IDEP the following information at close-out (This may be done over the phone):
  - a. Date of close-out;
  - b. West Virginia Counties with cases;
  - c. Final case count;
  - d. Etiologic agent, including results of laboratory studies;
  - e. Your line listing, if applicable;
  - f. Information on the transmission setting(s);
  - g. Information on the mode of transmission or the source of illness;
  - h. A brief summary of the investigation, relevant findings, control measures and outcome, if done.
2. Large outbreaks: Follow the usual scientific format of:
  - a. Introduction
  - b. Background
  - c. Methods
  - d. Results
  - e. Discussion
  - f. Recommendations

Forward a copy of the report to IDEP ASAP. IDEP must report selected outbreaks to CDC within 60 days of the first disease onset.

- I. Step 12: Maintain surveillance to monitor trends and evaluate control/prevention measures.
  - i. Continue surveillance to establish that your prevention and control measures are working.

## **Infectious Disease Epidemiology Program Responsibilities**

1. Train local and regional public health personnel in outbreak investigation.
2. Track all West Virginia outbreaks using the outbreak intake form. Maintain the form on-file with the outbreak report and supporting information including interview forms, results of data analysis, etc. The information should be maintained and summarized on an annual basis.
3. Report foodborne outbreaks to the CDC Electronic Foodborne Outbreak Reporting System (EFORS) within 60 days of first disease onset.
4. Report chickenpox outbreaks to CDC using their outbreak line list (includes age, vaccination status and severity of illness, as well as outbreak setting).

5. Offer technical assistance and other resources on request of the local health department or if the local health department is unable to conduct the outbreak investigation. Infectious Disease Epidemiology Program will generally take a major leadership role in the investigation if:
  - a. The case-patients arise from multiple local jurisdictions;
  - b. The disease is an unusual or emerging disease;
  - c. The disease is unusually severe, i.e., resulting in hospitalization, death or disability;
  - d. The disease requires complicated medical or diagnostic evaluation;
  - e. The local health department is unable to adequately investigate the outbreak;
  - f. An analytical epidemiological study is required for full investigation;  
or
  - g. The disease is part of a multi-state or international outbreak.
6. Communicate the findings of investigations where IDEP takes a lead role as soon as possible.
7. Summarize all outbreaks in the state on an annual basis, including lessons learned.

**Surveillance Objectives:**

1. Detect outbreaks at an early stage.
2. Detect and/or track emerging infectious diseases.
3. Track, characterize and summarize outbreaks in the state of West Virginia, including lessons learned on an annual basis.
4. Evaluate outbreak control and prevention measures.

**Disease Control Objective:**

1. When an outbreak is reported, prevent additional cases through rapid and complete investigation so that control measures can be implemented quickly and additional cases prevented.

**Disease Prevention Objectives:**

1. By thorough investigation of outbreaks,
  - a. Characterize risk factors so that disease can be prevented in the future.
  - b. Test / evaluate interventions to prevent and control disease to expand the scope of knowledge so that future outbreaks or cases of disease may be prevented effectively.
  - c. Remove, eliminate or mitigate ongoing sources of infection or disease.

**Public Health Significance:**

Outbreak investigation is one of the major tools epidemiologists use to understand the epidemiology of a disease. Through outbreak investigation, epidemiologists learn why the outbreak occurred, and how further cases of disease can be prevented or controlled. Foodborne outbreak investigation has been compared with investigation of airplane crashes. The investigation – often after the fact – can be used to enhance knowledge and identify potential hazards in food processing and distribution. This information is then used to prevent future outbreaks.

Outbreak investigations often present opportunities to learn something new about disease prevention, diagnosis, treatment, etc. Investigation of outbreaks is also good training. The investigator who can handle a ‘routine’ pertussis, influenza, chickenpox or norovirus outbreak is better prepared to handle a more ‘complex’ investigation.

Public, political or legal concerns may also influence the decision to investigate an outbreak. Most health departments feel an obligation to be responsive to community concerns. Sometimes, an investigation may be initiated even if the concern has little scientific basis.

Finally, outbreak investigation may help identify weaknesses in public health programs, such as tuberculosis, food safety, immunization, infection control or sexually transmitted disease control. This information can then be used to strengthen the program and correct any problems identified.

The significance of outbreak investigation in learning about emerging infectious disease cannot be underestimated. Outbreak investigations have been used to characterize new diseases such as West Nile virus, intentionally disseminated *Bacillus anthracis*, SARS, monkeypox, avian influenza, and community acquired methicillin-resistant *Staphylococcus aureus*,

## **Case Definitions:**

### **Foodborne Disease Outbreak (1990 Case definition)**

#### Clinical description

Symptoms of illness depend upon the etiologic agent. Please see Appendix B, “Guidelines for Confirmation of Foodborne Disease Outbreaks” in the MMWR 2000; 49 (No. SS-1).

#### Laboratory criteria for diagnosis

Depends upon etiologic agent. Please see Appendix B, "Guidelines for Confirmation of Foodborne-Disease Outbreaks" in the MMWR 2000; 49(No. SS-1).

#### Definition

An incident in which two or more persons experience a similar illness after ingestion of a common food, and epidemiologic analysis implicates the food as the source of the illness.

#### Comment

There are two exceptions: one case of botulism or chemical poisoning constitutes and outbreak.

### **Waterborne Disease Outbreak (1990 Case Definition)**

#### Clinical description

Symptoms of illness depend upon the etiologic agent.

#### Laboratory criteria for diagnosis

Depends upon etiologic agent.

#### Definition

An incident in which two or more persons experience a similar illness after consumption or use of water intended for drinking, and epidemiologic evidence implicates the water as the source of the illness.

#### Comment

In addition, a single case of chemical poisoning constitutes an outbreak if laboratory studies indicate that the water has been contaminated by the chemical. Other outbreaks that should be reported include a) epidemiologic investigations of outbreaks of gastroenteritis (even if not waterborne) on ocean-going passenger vessels that call on U.S. ports, and b) outbreaks of illness associated with exposure to recreational water. Disease outbreaks associated with water used for recreational purposes should meet the same criteria used for waterborne outbreaks associated with drinking water. However, outbreaks associated with recreational water involve exposure to or unintentional ingestion of fresh or marine water, excluding wound infections caused by water-related organisms.

## **Surveillance Indicators:**

1. Proportion of outbreaks reported with complete information:
  - a. Counties of residence of case-patients
  - b. Case Count
  - c. Etiologic agent
  - d. Transmission setting
  - e. Mode of transmission or source of illness
2. Proportion of outbreaks with complete and appropriate laboratory testing.
3. Time lag for notification of the appropriate agencies:
  - a. Local health department
  - b. Regional epidemiologist
  - c. Infectious Disease Epidemiology Program
4. (Statewide) Availability (yes/no) of an outbreak summary for the year, including lessons learned.