

12 Steps to Conducting an Outbreak Investigation

1-Prepare for Field Work

When information begins to come in that there may be an outbreak occurring, you have to begin preparing yourself and/or your staff for working in the field.

Activities to Begin

Researching the disease
Identify team members
Assign duties
Determine contacts from partnering agencies
Activate department protocols

Equipment for the Field

Laptop
Cell Phone
Camera
Specimen Collection kits
Interview forms
Infectious Disease Manual

Possible Team Members

Epidemiologists
Clinicians
Lab Personnel
Sanitarians
Infection Control Staff
Administrators (large outbreaks)

2-Confirm the Existence of an Outbreak

When reports of illness begin to surface, it is important to determine if an outbreak is truly occurring. A true outbreak may be occurring or it may be periodic and unrelated cases of the same disease or even unrelated cases of similar, but different diseases.

Step 1: Determine the expected number of cases before deciding if the observed number exceeds the expected.

Step 2: Comparing observed numbers of cases with expected values using surveillance records, hospital discharge data, disease registries, mortality statistics, lab data, other agencies, health care providers & community surveys.

3-Verify the Diagnosis

The diagnosis must be verified and cases separated from non-cases.

LABS

- Ensure proper diagnosis and rule out lab error
- Subtype the organism to help refine the case definition or rule out other cases as the investigation progresses.

CLINICIANS

- Review and summarize clinical findings and lab results
- Characterize the spectrum of disease
- Begin to develop criteria for a case definition

PATIENTS

If possible, interview patients in person or over the phone to help:

- Better understand clinical features
- Gain a mental image of disease and the patients affected
- Identify a possible source of exposure, include patient's perspective
- Identify others with similar illness
- Generate ideas for hypothesis about the etiology and spread

5-Identify Cases & Exposed Persons

Once initial cases have been identified, it is important to identify any additional cases, infectious sources, or exposed people. Four ways in which public health professionals can find additional cases:

1. Contact health care facilities either through enhanced passive surveillance or active surveillance
2. Alerting the public through the media
3. Always ask case-patients if they know of any others ill with the same symptoms
4. Survey the entire exposed population (effective when restricted to a small number of individuals in a focused setting)

6-Choose a Study Design

Before questioning large numbers of people, choose a study design. This directs who to interview estimates of the numbers of interviews needed.

Cohort Studies start with a person's exposure status and then investigate the presence of disease

When to use: Well defined group (ex. receptions, worksites, cruises)
- Attack rate is high among exposed and low among those not exposed
How to execute: interview everyone in attendance (small groups) or take a random sample (large groups)
How to evaluate: Relative Risk

Case-Control Studies start with a person's disease and review exposures.
When to use: Population not well defined (large events, communities)
How to execute: Case patients and comparison group (controls) questioned about exposure(s) – try to match
How to evaluate: Odds Ratio

7-Develop a Questionnaire

Key Information to Collect

Demographic Information (name, birth date, contact information)

Illness History (onset date/time, treatment by clinicians)
Symptoms (type and duration)
Travel History

Exposure History (food, water, chemicals, specific behaviors)

Other questions to ask include
- Will they provide a sample (stool, urine, blood, sputum) for testing?
- Do they have any additional information to add?
- Can they be re-contacted if more information is needed?

8-Descriptive Epidemiology

Place

Geographic extent of problem
Clusters or patterns providing clues
Possible exposure sites (homes, work, etc)

Person

Determine what population at risk
Numerator = number of cases
Denominator = number of people at risk

Time

Epi Curve: histogram of the number of cases by their date of onset and shows the time course of the outbreak
Gives the probable period of exposure
Indicates whether control measures are effective in reducing new cases

9-Formulate, Evaluate and Refine the Hypothesis

A good hypothesis should address the: 1) source of the agent, 2) mode of transmission and 3) exposure that caused the disease.

Formulate: consider what is already known about the disease. However, don't disregard information collected in the course of the investigation.

Evaluate: talk with others involved or test the hypothesis against known cases.

Refine: fit what is being observed and needed to be tested for this outbreak.

- 1 Prepare for Fieldwork
- 2 Confirm the Existence of an Outbreak
- 3 Verify the Diagnosis
- 4 Define Case Definition
- 5 Identify Cases and Exposed Persons
- 6 Choose a Study Design
- 7 Develop a Questionnaire
- 8 Descriptive Epidemiology
- 9 Formulate, Evaluate and Refine the Hypothesis
- 10 Conduct Studies
- 11 Implement Control and Prevention Measures
- 12 Communicate Findings

10-Conduct Studies

During the course of an outbreak investigation, there are many studies that can and must be conducted.

ENVIRONMENTAL: These studies often take place in the initial phases of an outbreak investigation to help determine the source of exposure and mode of transmission.

LABORATORY: Laboratory analysis is used to confirm that a particular agent or chemical is present in clinical or environmental samples.

ANALYTICAL: Finally, further epidemiologic studies may need to be conducted if the disease continues to persist in a community or if the disease in question is new and undocumented.

11-Implement Control and Prevention Measures

Implementing control measures should really be done as soon as possible. Short or long term measures can be aimed at the agent, source, or reservoir.

Examples of Control Measures

- Recalling or destroying any contaminated products
- Offering immunizations to those who are unvaccinated
- Restricting infected workers from high-risk occupations
- Changing or correcting procedures that may have lead to a contamination
- Education (hand washing, food handling, proper sanitation of surfaces, etc)
- Vector control

12-Communicate Findings

The last step in conducting an outbreak investigation (one that often gets forgotten) is to communicate the findings of the investigation. This can be done either through written reports or orally within the department or with the community using the media.

Arizona Health Departments

Reportable Diseases in Arizona

- Apache**
Ph. 928.337.4364
Fax 928.337.2062
- Cochise**
Ph. 520.432.9472
Fax 520.432.9480
- Coconino**
Ph. 928.522.7800
Fax 928.522.7808
- Gila**
Ph. 928.425.3189
Fax 928.425.0794
- Graham**
Ph. 928.428.0110
Fax 928.428.8074
- Greenlee**
Ph. 928.865.2601
Fax 928.865.1929
- La Paz**
Ph. 928.669.1100
Fax 928.669.6703
- Maricopa**
Ph. 602.506.6900
Fax 602.506.0272

Arizona Department of Health Services
Infectious Disease Epidemiology/
Communicable Disease
Ph. 602.230.5932
Fax 602.263.4943

- Mohave**
Ph. 928.753.0743
Fax 928.718.5547
- Navajo**
Ph. 928.524.4750
Fax 928.524.4754
- Pima**
Ph. 520.740.8261
Fax 520.623.1432
- Pinal**
Ph. 520.868.7301
Fax 520.868.7358
- Santa Cruz**
Ph. 520.375.7900
Fax 520.761.4813
- Yavapai**
Ph. 928.771.3122
Fax 928.771.3369
- Yuma**
Ph. 928.317.4550
Fax 928.317.4591

- *O Amebiasis
- Anthrax
- Aseptic meningitis: viral
- Basidiobolomycosis
- Botulism
- Brucellosis
- *O Campylobacteriosis
- Chancroid
- Chlamydia infection, genital
- * Cholera
- Coccidioidomycosis (valley fever)
- Colorado tick fever
- Conjunctivitis: acute
- Creutzfeldt-Jakob disease
- *O Cryptosporidiosis
- Cyclospora infection
- Cysticercosis
- Dengue
- Diarrhea, nausea, or vomiting
- Diphtheria
- Ehrlichiosis
- Emerging or exotic disease
- Encephalitis, viral or parasitic
- Enterohemorrhagic *Escherichia coli*
- Enterotoxigenic *Escherichia coli*
- *O Giardiasis
- Gonorrhea
- Haemophilus influenzae*:
invasive disease
- Hansen's disease (Leprosy)
- Hantavirus infection
- Hemolytic uremic syndrome
- *O Hepatitis A
- Hepatitis B and D
- Hepatitis C
- *O Hepatitis E
- Herpes genitalis
- HIV infection and related disease
- Kawasaki syndrome
- Legionellosis (Legionnaires' disease)
- Leptospirosis
- Listeriosis
- Lyme disease
- Lymphocytic choriomeningitis
- Malaria
- Measles (rubeola)
- Meningococcal invasive disease
- Mumps
- Pertussis (whooping cough)
- Plague
- Poliomyelitis
- Psittacosis (ornithosis)
- Q fever
- Rabies in a human
- Relapsing fever (borreliosis)
- Reye syndrome
- Rocky Mountain spotted fever
- * Rubella (German measles)
- Rubella syndrome, congenital
- *O Salmonellosis
- Scabies
- Severe acute respiratory syndrome
- *O Shigellosis
- Smallpox
- Streptococcal Group A: Invasive disease
- Streptococcal Group B: Invasive disease in infants
younger than 90 days of age
- Streptococcus pneumoniae* (pneumococcal invasive disease)
- Syphilis
- *O Taeniasis
- Tetanus
- Toxic shock syndrome
- Trichinosis
- Tuberculosis
- Tuberculosis infection in a child
younger than 6 (positive test result)
- Tularemia
- Typhoid fever
- Typhus fever
- Unexplained death with a history of fever
- Vaccinia-related adverse event
- Vancomycin-resistant *Enterococcus* spp.
- Vancomycin-resistant or Vancomycin-intermediately susceptible
Staphylococcus aureus
- Vancomycin-resistant *Staphylococcus epidermidis*
- Varicella (chickenpox)
- *O *Vibrio* infection
- Viral hemorrhagic fever
- West Nile virus infection
- Yellow fever
- *O Yersiniosis (A.A.C. R9-6-202, 301)

How Are Cases Classified?

How a case is classified varies for each disease. The standard classifications are Confirmed, Probable, and Suspect. However there are other classifications that may apply. In Arizona, a case can be defined in different ways to indicate the extent to which a person fits the case definition for a particular disease (although every disease may not be able to be classified in each of these ways).

Clinically compatible case – a clinical syndrome generally compatible with the disease's clinical description

***Confirmed case** - a case that is classified as confirmed for reporting purposes (often laboratory-confirmed)

Epidemiologically linked case – a case in which (a) the patient has had contact with one or more persons who either have/had been exposed to a point source of infection and (b) transmission of the agent by the usual modes of transmission is plausible. A case may be considered 'epi linked' to a laboratory- confirmed case if at least one case in the chain of transmission is laboratory confirmed.

Laboratory-confirmed case – a case that is confirmed by one or more of the laboratory methods specific for that disease (see Manual for specifics).

***Probable case** – a case that is classified as probable for reporting purposes (often cases with the typical clinical syndromes without laboratory confirmation).

Supportive or presumptive laboratory results – Laboratory results that are consistent with the diagnosis, yet do not meet the criteria for laboratory confirmation.

***Suspected case** – a case that is classified as suspected for reporting purposes (often cases with some, but not all of the clinical features).

* Arizona Communicable Disease Report form terms

Submit a report by telephone or through an electronic reporting system authorized by the Department within 24 hours after a case or suspect case is diagnosed, treated, or detected or an occurrence is detected.

* If a case or suspect case is a food handler or works in a child care establishment or a health care institution, instead of reporting within the general reporting deadline, submit a report within 24 hours after the case or suspect case is diagnosed, treated, or detected.

Submit a report within one working day after a case or suspect case is diagnosed, treated, or detected.

Submit a report within five working days after a case or suspect case is diagnosed, treated, or detected.

Submit a report within 24 hours after detecting an outbreak.