



# Outbreak Investigation

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## How do we detect outbreaks?

### **sources:**

- Surveillance data
- Medical Practitioner
- Affected persons/groups
- Concerned citizens
- Media



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## Why should we investigate outbreaks?

### Main Question: WHAT FOR?

- ✓ Control and Prevention measures
- ✓ Research Opportunities
- ✓ Training
- ✓ Public, Political or Legal concerns
- ✓ Program Considerations



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## Why should we investigate outbreaks?

### ✓ CONTROL AND PREVENTION MEASURES

- Are cases continuing to occur ?
- Is the outbreak just about over ?

#### Source/Mode of transmission

		<u>Source/Mode of transmission</u>	
		Known	Unknown
<i>Causative Agent</i>	Known	Investigation + Control +++	Investigation +++ Control +
	Unknown	Investigation +++ Control +++	Investigation +++ Control +

+++ = highest priority  
+ = lower priority

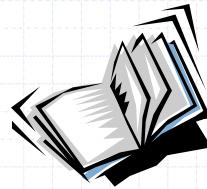
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## Why should we investigate outbreaks ?

### ✓ RESEARCH OPPORTUNITIES

- *Newly recognized disease*
  - define its natural history:
    - » agent
    - » mode of transmission
    - » incubation period
    - » clinical spectrum
  - characterize the populations at risks
  - identify risk factors
- *Well – characterized diseases*
  - assess control measures
  - assess usefulness of new epidemiology and laboratory techniques



## Why should we investigate outbreaks?

### ✓ TRAINING

Develop the following skills through practice and experience:

- diplomacy
- logical thinking
- problem-solving ability
- quantitative skills
- epidemiologic know-how
- judgment



## Why should we investigate outbreaks ?

### ✓ PUBLIC, POLITICAL or LEGAL CONCERNS

- sometimes override scientific concerns in the decision to conduct an investigation
- essential to be “responsibly responsive” even if the concern has little scientific basis



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## Why should we investigate outbreaks ?

### ✓ PROGRAM CONSIDERATIONS

- Program Evaluation
  - identify populations overlooked
  - recognize intervention strategy failures
  - identify changes in the agent or events beyond the scope of the program



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## Steps of an Outbreak Investigation

- Step 1: Prepare for field work
- Step 2: Establish the existence of an outbreak
- Step 3: Verify the diagnosis
- Step 4: Define and identify cases
- Step 5: Perform descriptive epidemiology
- Step 6: Develop hypotheses
- Step 7: Evaluate hypotheses
- Step 8: Execute additional studies
- Step 9: Implement control and prevention measures
- Step 10: Communicate findings
- Step 11: Follow up recommendations



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## Steps of an Outbreak Investigation

### Step 1: Preparing for Field Work

#### Investigation

- scientific knowledge
- supplies
- equipment

#### Administration

- administrative procedures
  - eg travel documents, cash advances
- Personal matters

#### Consultation

- know expected role
- local contact persons



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## Steps of an Outbreak Investigation

### Step 2: Establishing the Existence of an Outbreak

- Compare the current number of cases with the number of cases from comparable period during the previous years.
  - ✓ surveillance records
  - ✓ hospital records, registries, mortality statistics
  - ✓ data from neighboring areas
  - ✓ community survey



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## Steps of an Outbreak Investigation

### Step 2: Establishing the Existence of an Outbreak

**NOTE:**

An excess of cases may not necessarily suggest an outbreak. It could be due to any of the following conditions:

- ❑ changes in local reporting procedures
- ❑ changes in the case definition
- ❑ increased local or national awareness
- ❑ improvements in diagnostic procedures
- ❑ new physician, infection control nurse, or health facility
- ❑ sudden changes in population size (resort areas, college towns, evacuees, etc.)



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## Steps of an Outbreak Investigation

### Step 3: Verifying Diagnosis

- ensure proper diagnosis of reported cases
- rule out laboratory error as the basis for the increase in diagnosed cases
  - ◆ review clinical findings
  - ◆ review laboratory results
  - ◆ summarize the clinical findings with frequency distribution
  - ◆ visit patients



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## Example of a frequency distribution

Table 1. Signs and Symptoms Food Poisoning Outbreak (N=193)  
Casino Filipino Manila Pavilion  
August 3, 1995

SIGNS AND SYMPTOMS	FREQUENCY (NUMBER)	PERCENTAGE (%)
1. Diarrhea	189	97
2. Abdominal Cramps	176	90
3. Fever	98	50
4. Vomiting	59	30
5. Chills	39	20
6. Nausea	15	8
7. Weakness	5	3
8. Headache	4	2
9. Flatulence	2	1



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## Steps of an Outbreak Investigation

### Step 4: Define and Identify Cases

#### A. Establish a Case Definition

- standard set of criteria for the health condition
  - ◆ clinical criteria (signs and symptoms)
  - ◆ restrictions by time, place and person
  - ◆ apply without bias

**NOTE:** *Never include the EXPOSURE or RISK FACTOR in the case definition!*



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### Examples of case definition of diseases used by the National Epidemic Sentinel Surveillance System (NESSS)

**Dengue fever** – fever of 2-7 days duration, (+) tourniquet test &/or petechiae, or any hemorrhagic manifestations &/or low platelet count (<100,000/mm ).

**Measles** – fever of 3-7 days duration, with generalized blotchy maculopapular rashes; with history of cough, coryza, conjunctivitis or Koplik's spots.



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## Steps of an Outbreak Investigation

### Step 4: Define and Identify Cases

#### B. Identify and Count Cases

1. identifying information
  - name, address, telephone no.
2. demographic information
  - age, sex, race, occupation
3. clinical information
  - date of onset, hospitalization, death
4. risk factor information
  - food or water sources, toilet facility
5. reporter information



## Steps of an Outbreak Investigation

### Step 5: Perform Descriptive Epidemiology

#### □ characterize by TIME

- draw an epidemic curve

*can be used to determine:*

- the type of epidemic
- the difference between maximum & minimum incubation period
- the probable time of exposure
- the incubation period when probable time of exposure is known



## Steps of an Outbreak Investigation

### Types of Epidemic Curves:

#### ◆ Common source epidemic

point source  
extended source

#### ◆ Propagated or progressive epidemic



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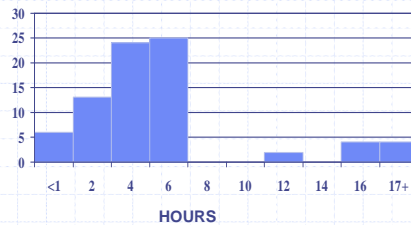
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## Steps of an Outbreak Investigation

### Types of epidemic curves:

#### ➤ Common source epidemic - point source

Incubation Period, Food Poisoning Cases (N=68)  
Laguna, February 1995



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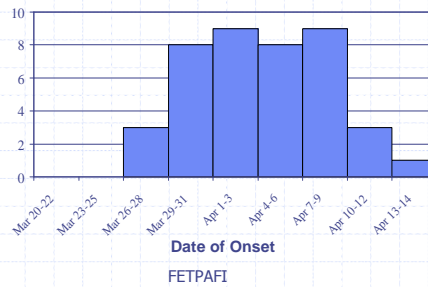
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## Steps of an Outbreak Investigation

### Types of epidemic curves:

- Common source epidemic
  - extended source

Onset of Illness, Cholera Cases (N=48)  
Calima, Pola, Oriental Mindoro  
March 20 - April 15, 1995



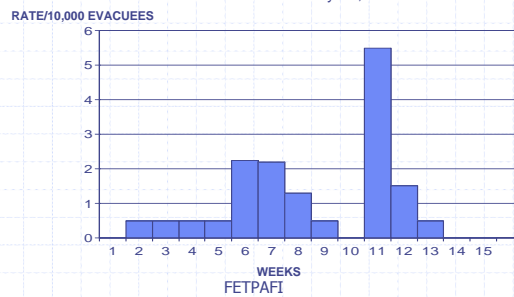
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## Steps of an Outbreak Investigation

### Types of epidemic curves:

- Propagated or progressive epidemic

Measles Morbidity Rate in Evacuation Centers  
Province of Albay  
Feb. 2 - May 17, 1993



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## Steps of an Outbreak Investigation

### Step 5: Perform Descriptive Epidemiology

#### ☐ characterize by **PLACE**

geographic extent

- spot map
- area map



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## Steps of an Outbreak Investigation

### Step 5: Perform Descriptive Epidemiology

#### ☐ characterize by **PERSON**

- host characteristics
  - age    ○ sex
  - race   ○ medical status
- exposures
  - occupation
  - leisure activities
  - tobacco use
  - use of medications/drugs



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## Steps of an Outbreak Investigation

### Step 6: Developing Hypotheses

Consider:

- source of the agent
- mode of transmission
- vectors of transmission
- risk factors

\* hypotheses should be testable



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## Steps of an Outbreak Investigation

### Step 7: Evaluating Hypotheses

**Ways:**

- compare with established facts
- use analytical epidemiology
  - ✓ case-control studies
  - ✓ retrospective cohort studies



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## Steps of an Outbreak Investigation

### Step 8: Refining Hypotheses and Executing Additional Studies

**why:**

- o unrevealing analytic studies
  - poor hypotheses
- o need more specific exposure histories
- o need more specific control group



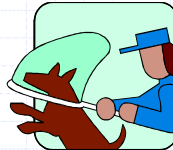
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## Steps of an Outbreak Investigation

### Step 9: Implement Control and Prevention Measures

- Primary public health reason
  - prevent additional cases
  - prevent outbreaks in the future



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## Steps of an Outbreak Investigation

### Step 10: Communicate Findings

Through:

- writing and disseminating full reports
- meetings and discussions
- local and mass media

To the:

- local government officials
- local health workers
- concerned authorities
- regional health authorities
- Department of Health



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## Steps of Outbreak Investigation

### Steps 11: Follow-up Recommendation

- ✓ what activities have been undertaken
- ✓ if health status has improved
- ✓ if health problems has been reduced



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*Thank you!*

