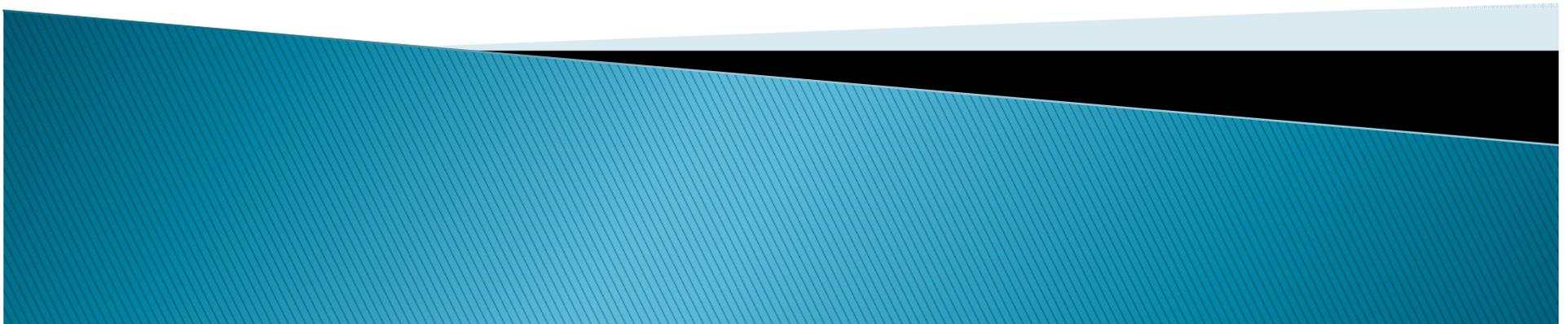
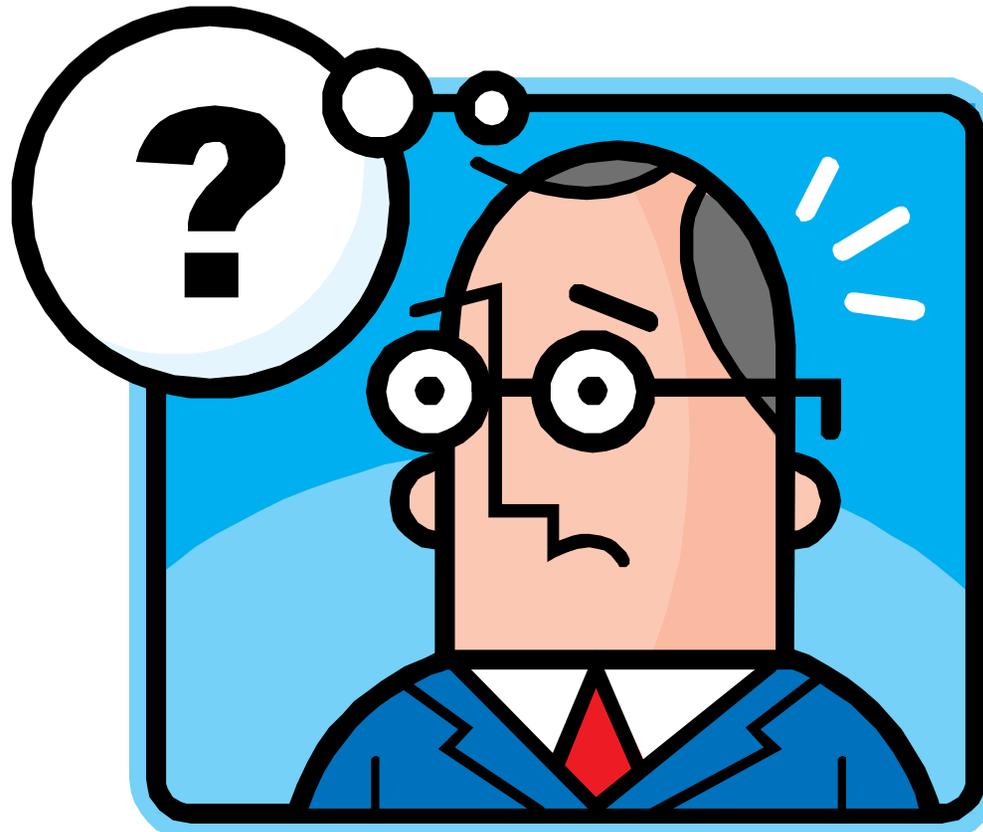


Conducting an Outbreak Investigation

Gail Bennett, RN, MSN, CIC



When do you find out about an outbreak??



Outbreak Definition

- ▶ The occurrence of more cases of disease than expected in a given area or among a specific group of people over a particular period of time
- ▶ Cases above your usual endemic rate



10 Steps in an Outbreak Investigation

OUTBREAK INVESTIGATION FORM

STEPS OF AN INVESTIGATION

1. **Verify the diagnosis; identify the agent.**



Describe the initial magnitude of the problem and what symptoms got the facility's attention.

What diagnosis has been established?

What agent (bacterial, viral, other) has been identified?

Develop a case definition (specific criteria for a case).
Example: All residents who have had 3 or more loose stools in the last 24 hours.

CASE DEFINITION:

2. **Confirm that an outbreak exists.**

Step 1: Verify the diagnosis; identify the agent

- ▶ What got your attention?
- ▶ Is there a specific diagnosis?
- ▶ What agent has been identified?
 - Bacterial
 - Viral
 - Fungal
 - Other



Develop a case definition

- ▶ Define the case—Establish or verify the diagnosis of reported cases, including...
 - WHAT: The pathogen, site, and clinical signs and symptoms
 - WHO: Characteristics of the population in which the problem is occurring
 - WHERE: Geographic location of the problem
 - WHEN: How long the problem has been occurring
- ▶ Keep case definition simple, objective and measurable
- ▶ Definition may need redefining after further data collection



Step 2: Confirm that an outbreak exists

- Case-finding – use your case definition
- Total number of cases so far
- Compare the current incidence with the usual or baseline incidence
- Institute early control measures
- Open lines of communication
- If an outbreak exists, PROCEED.



Is there really a problem?



- ▶ A 2 to 2.5 fold increase in the infection rate of any site, pathogen or site and pathogen combination almost always justifies an evaluation

Step 3: Search for Additional Cases

- ▶ Use the case definition
- ▶ Alert others to report cases
 - Lab
 - MDs
 - Staff
 - Outpatient clinics

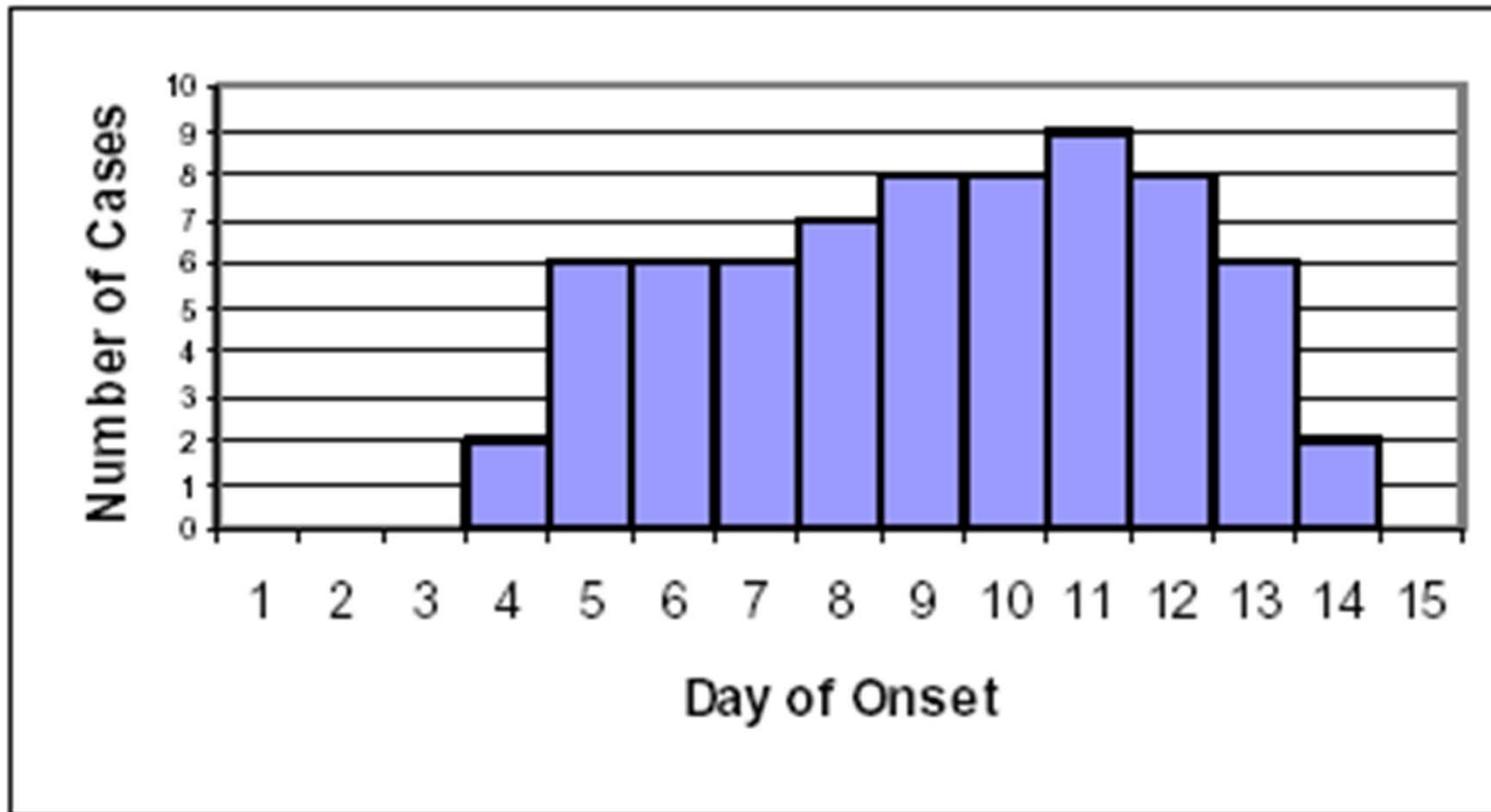


Step 4: Characterize the Cases by Person, Place and Time

- ▶ **Person: characteristics**
 - Age
 - Sex
 - Disease
 - Exposures
 - Treatments
- ▶ **Place**
 - Hall
 - Room
 - Unit
 - Outside exposures
- ▶ **Time**
 - Period of the outbreak
 - Probable source



Develop an Epidemic Curve



What is an Epidemic Curve and How Can it Help in an Outbreak?

- ▶ An epidemic curve (epi curve) is a graphical depiction of the number of cases of illness by the date of illness onset

- ▶ Epi Curve slides from UNC School of Public Health



What is an Epidemic Curve and How Can it Help in an Outbreak?

- ▶ An epi curve can provide information on the following characteristics of an outbreak:
 - Pattern of spread
 - Magnitude
 - Outliers
 - Time trend
 - Exposure and/or disease incubation period



Outbreak Pattern of Spread

- ▶ The overall shape of the epi curve can reveal the type of outbreak
 - Common source
 - Point source
 - Propagated

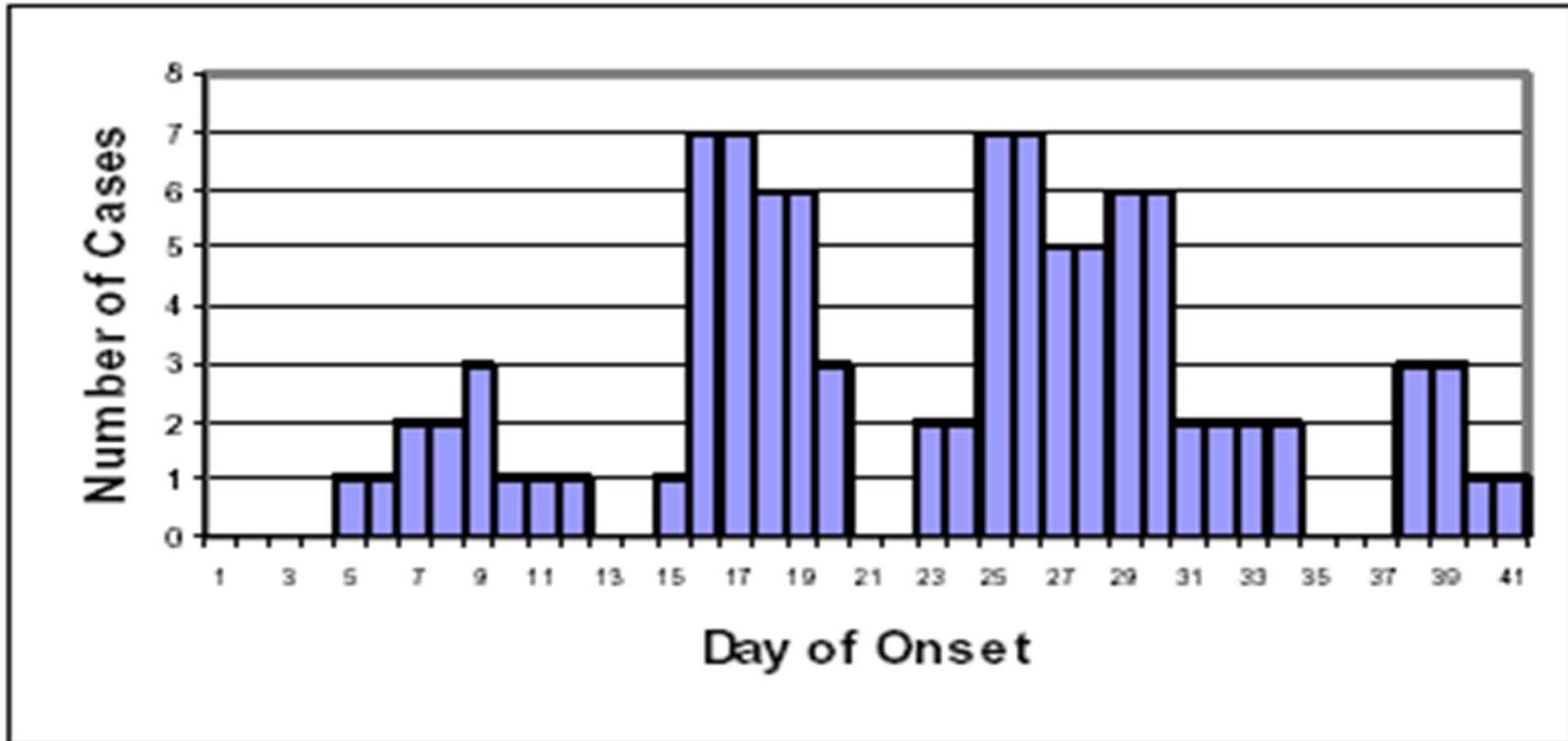


Outbreak Pattern of Spread– Common Source

- ▶ People are exposed continuously or intermittently to a harmful source
- ▶ Period of exposure may be brief or long
- ▶ Intermittent exposure often results in an epi curve with irregular peaks that reflect the timing and the extent of exposure



Example of an Epi Curve for a Common Source Outbreak with Intermittent Exposure

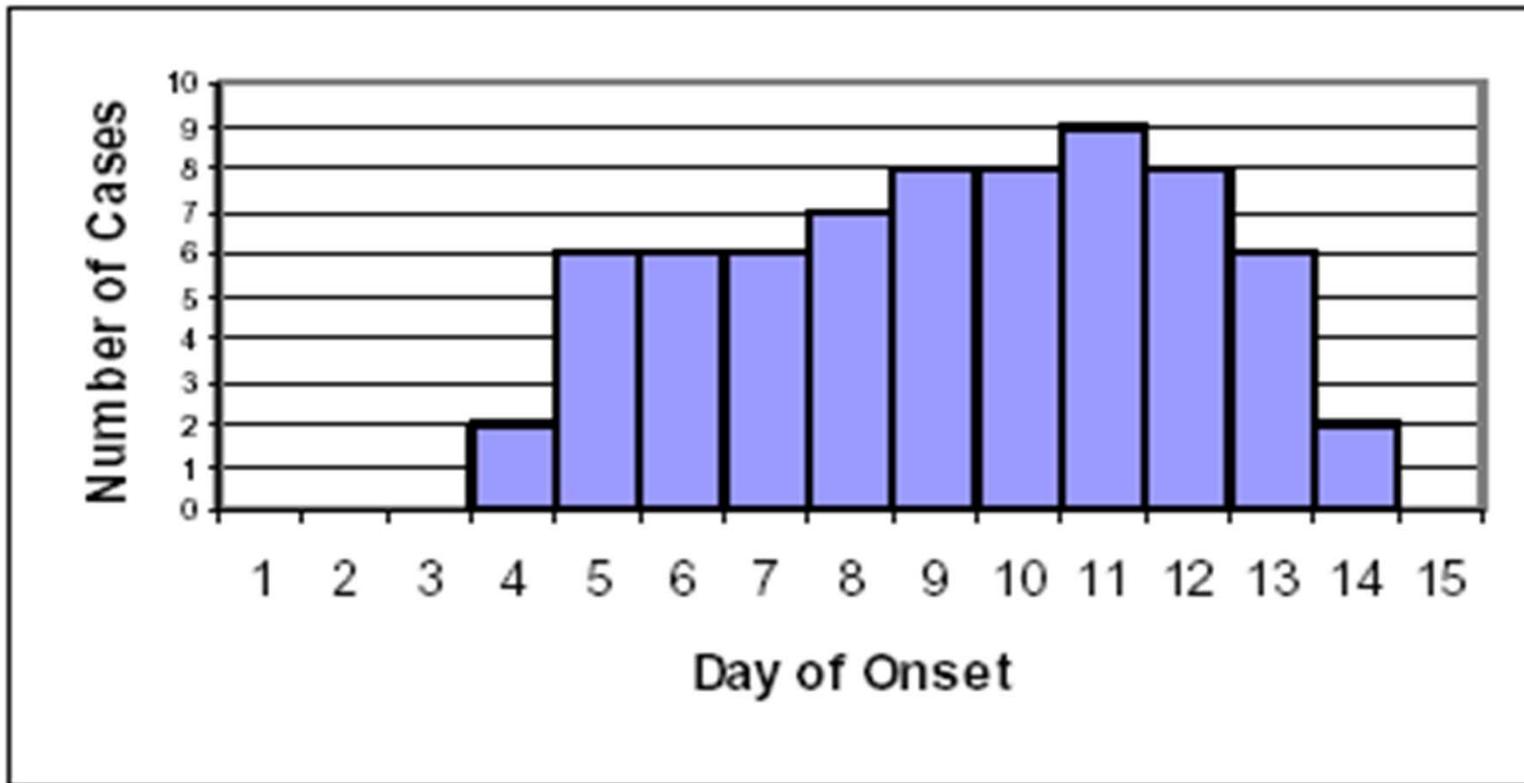


Outbreak Pattern of Spread– Common Source

- ▶ Continuous exposure will often cause cases to rise gradually (and possibly to plateau, rather than to peak)



Example of an Epi Curve for a Common Source Outbreak with Continuous Exposure

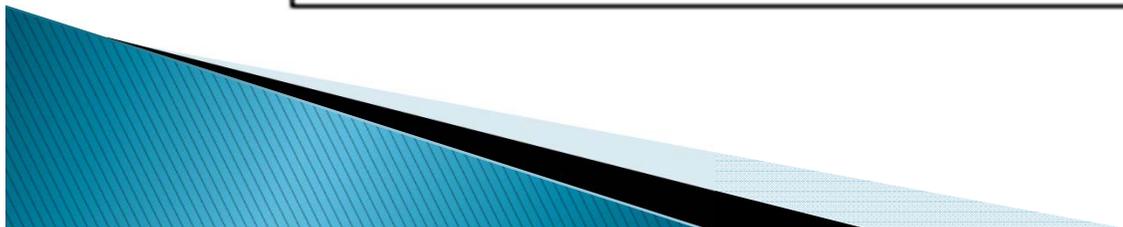
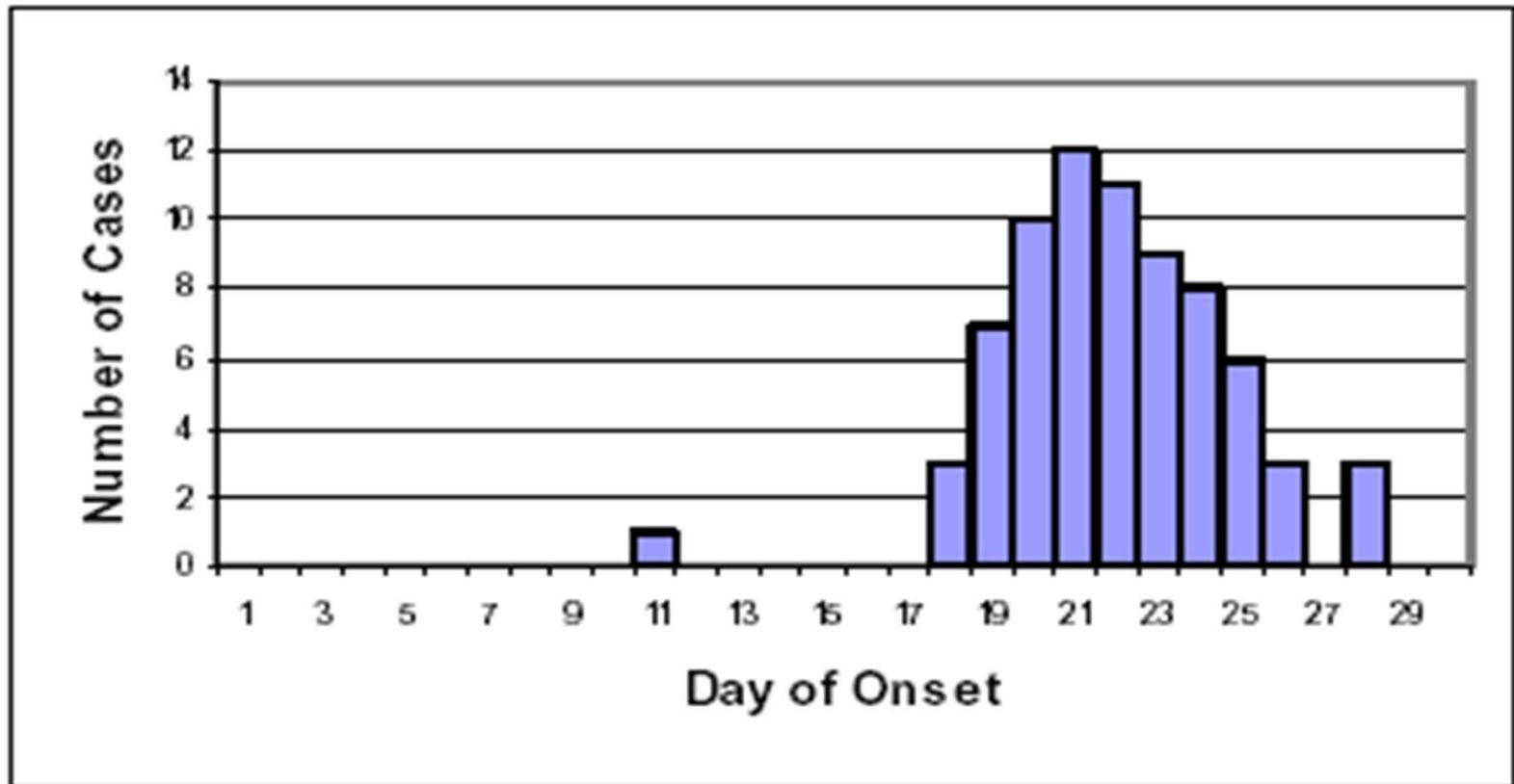


Outbreak Pattern of Spread-Point Source

- ▶ Typically shows a sharp upward slope and a gradual downward slope
- ▶ Is a common source outbreak in which the period of exposure is brief, and all cases occur within one incubation period



Example of an Epi Curve for a Point Source Outbreak

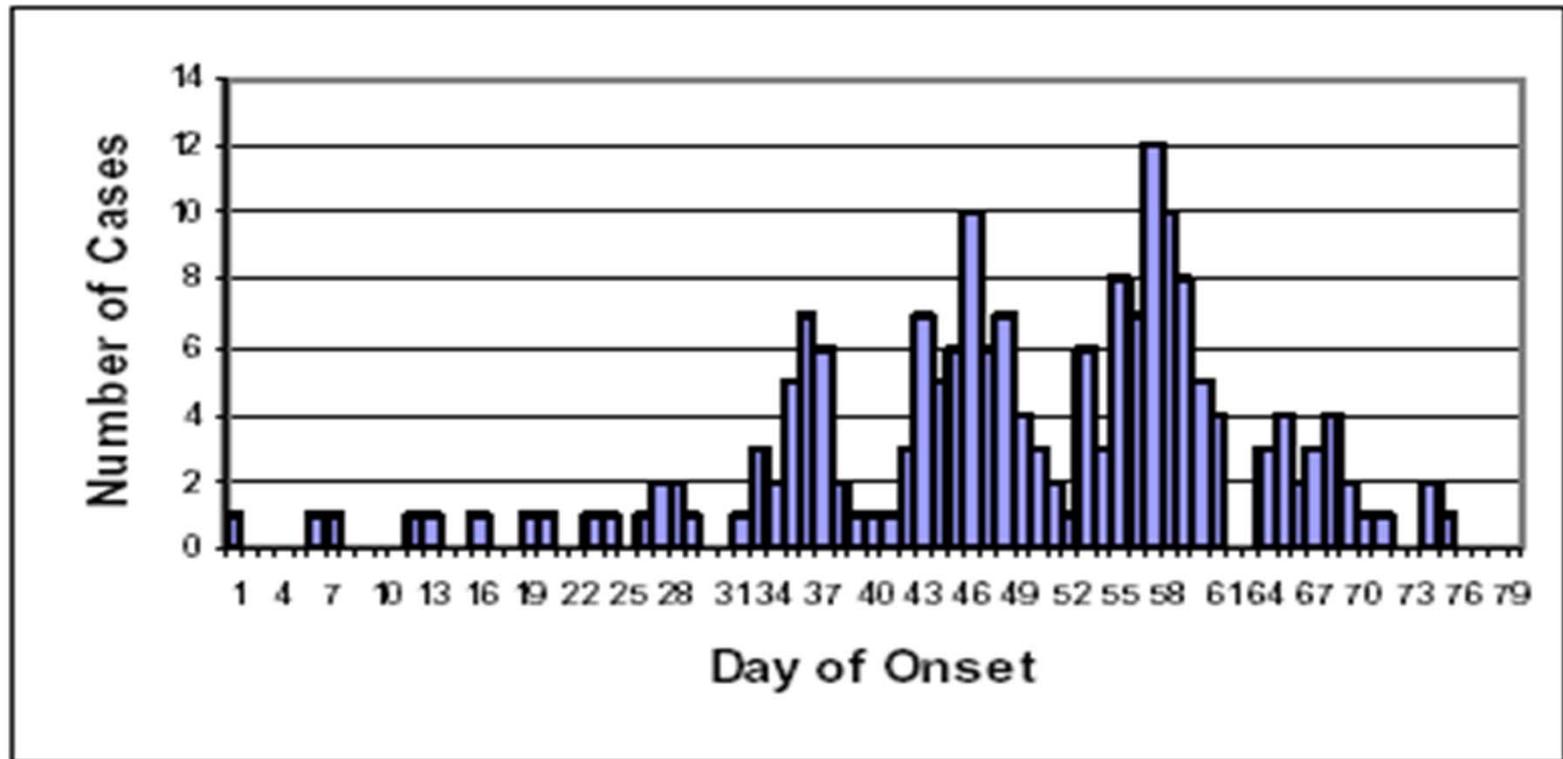


Outbreak Pattern of Spread-Propagated

- ▶ Is spread from person to person
- ▶ Can last longer than common source outbreaks
- ▶ May have multiple waves
- ▶ The classic epi curve for a propagated outbreak has progressively taller peaks, an incubation period apart



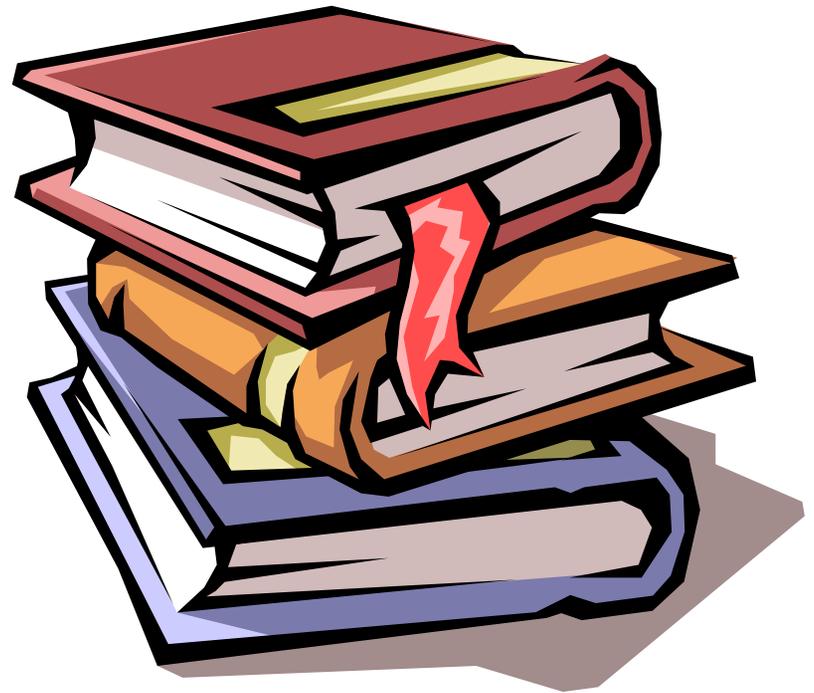
Example of an Epi Curve for a Propagated Outbreak



Step 5: Form a Tentative Hypothesis

What is your best guess?

- ▶ Review the literature
- ▶ Best guess re:
 - Reservoir
 - Source
 - Mode of Transmission

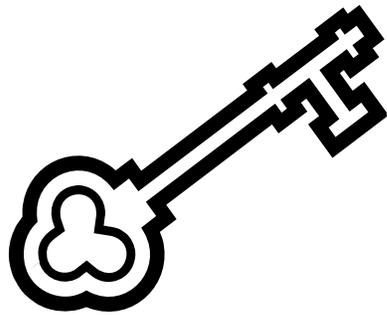


Formulate Tentative Hypothesis

- ▶ Don't forget: Commercially supplied medications and devices suspected as causes of an outbreak should be reported to the CDC and FDA immediately
- ▶ Slide courtesy of Connie Steed



Data Collection and Specimen Management



- ▶ Save everything!
- ▶ Cohort supplies which might be suspect in the outbreak
- ▶ Contact microbiology lab to save all patient isolates
- ▶ Slide courtesy of Connie Steed



Data Collection and Specimen Management

- ▶ Use a notebook to keep accurate documentation of activities
- ▶ Collect information on all cases: Decide ahead of time what you will need to look at
 - Demographic data—name, age, sex, date of admission, infection onset
 - Risk factors—procedures, medical devices, medication
 - Host factors—diabetes malignancy, immunodeficiency
- Slide courtesy of Connie Steed



Review and Expand, if necessary, Control Measures

- ▶ Document control measures and when implemented
- ▶ Is assistance needed??

Control measures	Date added



Step 7: Test your Hypothesis

- ▶ Outbreak may end before you get to this point
- ▶ Epidemiologic studies may be necessary
- ▶ Get help if needed



Step 8: Refine the Control Measures

- ▶ Add additional measures if needed
- ▶ Delete any not determined to be helpful



Step 9: Monitor and Evaluate the Control Measures

- ▶ Insure compliance!
- ▶ If you don't look, you don't know!
- ▶ Have cases stopped?
 - If not, consider additional measures



Step 10: Prepare and Disseminate a Report

- ▶ Your outbreak investigation paperwork – forms, line listings, etc may become part of your report



Publish It!!

