Core Principles of HAI Outbreak Investigations

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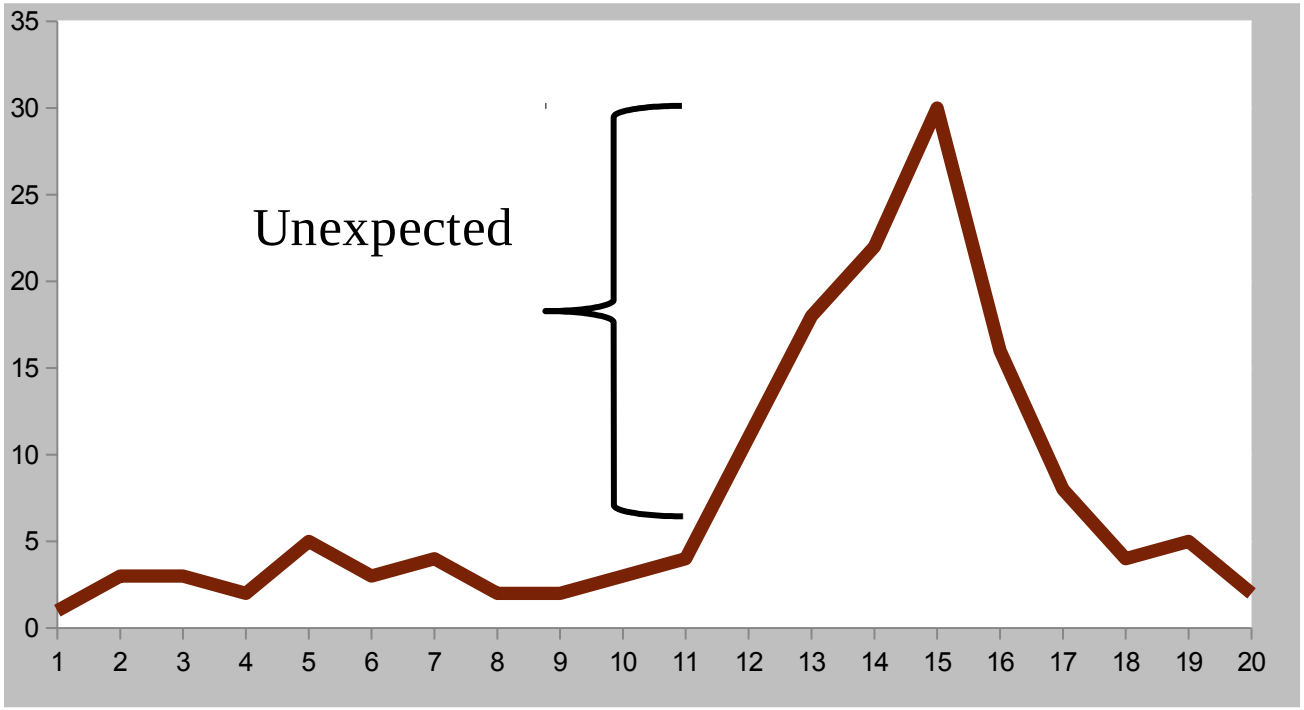
NO DISCLOSURES

Objectives

- Define an outbreak
- Describe epidemiologic and lab methods for investigating outbreaks in healthcare settings
- Discuss effective strategies to manage and control an outbreak of healthcare-associated infections

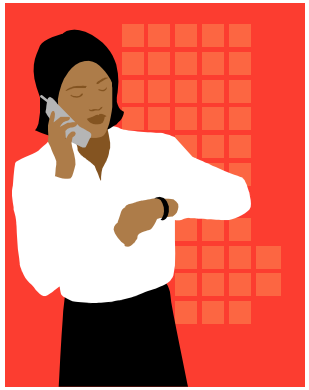
What is an outbreak?

- The occurrence of more cases of a disease than expected for a particular place and time



Identifying a potential outbreak

- Review of surveillance data
- Clinician reports of unusual diagnoses
- Reports from the public
- Media



Why investigate HAI outbreaks?

- Identify the cause of the outbreak
- Control the outbreak
- Prevent similar outbreaks in the future
- Provide new research and insight
- Evaluate existing prevention strategies
- Address public concerns
- Minimize economic and social disruptions

Conducting an HAI Outbreak Investigation

Essential investigation components

1. Verify the diagnosis / confirm the outbreak
2. Inform key partners
3. Construct a case definition
4. Identify cases and collect information
5. Examine descriptive epidemiologic features of cases
6. Observations and review of patient care
7. Generate hypotheses
8. Test hypotheses
9. Collect and test environmental samples
10. Implement control measures
11. Communicate results (staff, patients, press, public)

One thing to remember…

- Outbreak investigations are neither linear nor orderly
- Multiple steps happen simultaneously
- Steps often have to be repeated several times

Before you begin

- Talk to the lab and ask them to save ALL isolates that might be part of the outbreak!

Verify diagnosis and confirm the outbreak

- Verify the diagnosis
  - Signs and symptoms
  - Lab findings
  - Suspected virus, bacteria, or toxin
  - Hospital onset

- Confirm the outbreak
  - Review the reports and data
  - Verify cases are same disease and exceeds normal
  - Confirm healthcare onset

Laboratory confirmation

- Most definitive method for verifying diagnosis
- May help define the incubation period
- Interpret negative results with caution:
  - Organism may not have been tested
  - Specimens collected too late in illness
  - Mishandling of specimen

Inform key partners

- Facility staff
  - ✓ Infection control staff
  - ✓ Administration
- Laboratory staff
  - ✓ Save ALL isolates
- Local and national public officials as appropriate

Case definition

- Elements of a case definition
  - Clinical criteria (signs and symptoms)
  - Person, place, and time criteria
  - Laboratory tests
- Can be based on
  - Etiologic agent
  - Signs and symptoms of infection
- How narrow to make it depends on the pathogen and setting

How do you find cases?

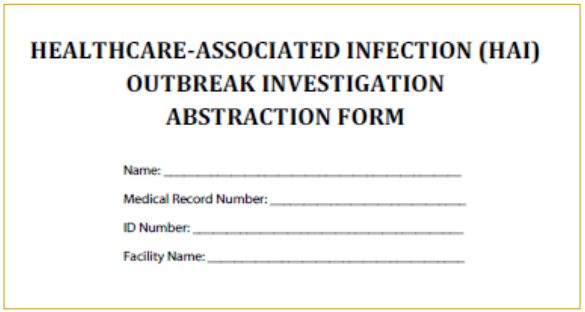
- Microbiology data
- Infection control or surveillance records
- Discussions with clinicians
- Medical records
- Operative notes
- Pathology reports
- Pharmacy records
- Radiology reports
- Central service/supply records
- Occupational health records
- Hospital billing records
- Purchasing Records
- Log Books

Data collection

- Identifying information
- Demographic facts
- Clinical information
- Risk factor information

Case abstraction form

- Systematic collection of case-patient information
- Abstracts data from patient chart and laboratory, radiology
- Designed specifically for investigation to describe cases and potential risk factors depending on type of infection



HEALTHCARE-ASSOCIATED INFECTION (HAI)
OUTBREAK INVESTIGATION
ABSTRACTION FORM

Name: _____

Medical Record Number: _____

ID Number: _____

Facility Name: _____

http://www.cdc.gov/hai/outbreaks/outbreaktoolkit.html

Descriptive epidemiology

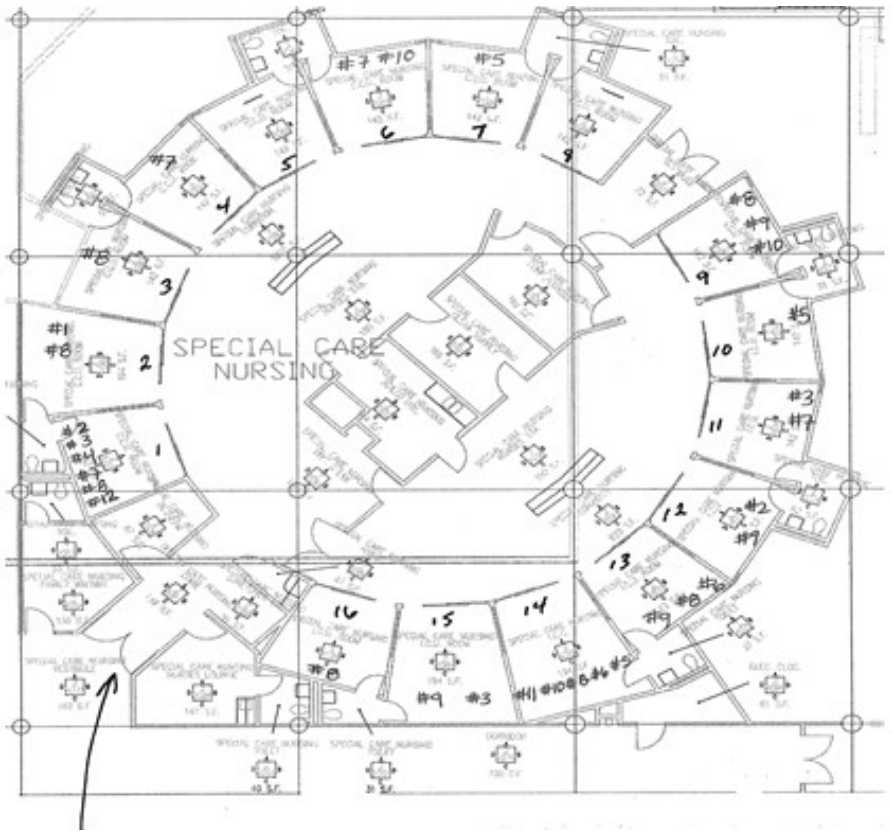
- Who is at risk?
  - Describe data by person, place, time
- Characterizes the outbreak
- Identifies the population at risk
- Provides clues about the agent, source, or mode of transmission
- Provides information to begin control measures
- Familiarizes the investigator with the data

Linelist

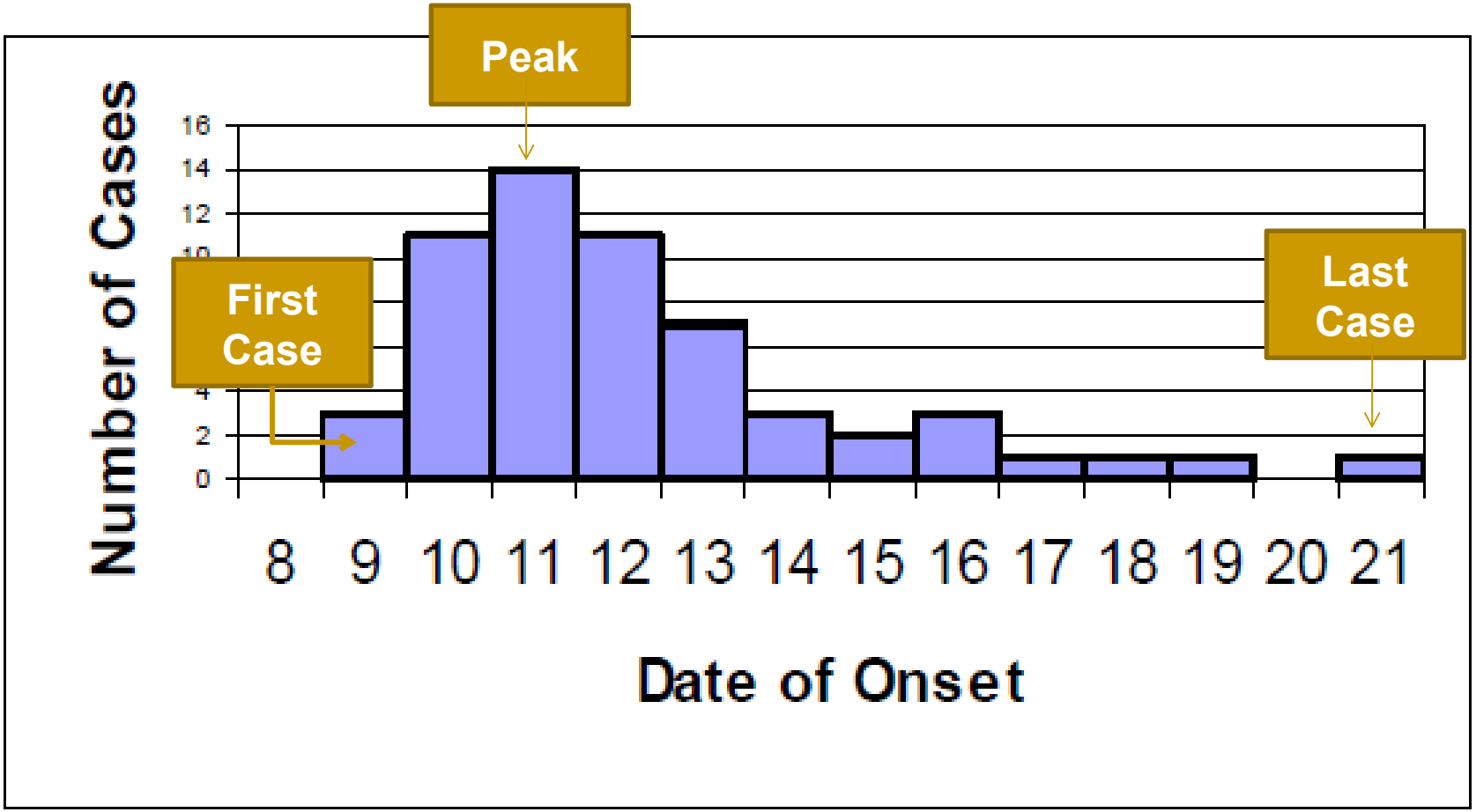
- Created from case data
  - Each row is a case
  - Each column is a variable of interest:
    - Signs and symptoms, onset date – is this an outbreak?
    - Medications, intravenous solutions
    - Invasive procedures, surgery
    - Consults, staff contact
    - Host factors (e.g. age, underlying disease?)
    - Lab results
- **Arguably the single most important part of the investigation since it drives all the investigation efforts!**

Describe the data by “place”

- ICU room layout with room numbers and case-patient locations, Hospital A



Describe an outbreak by “time”: Epi curve



Clinical observations

- Who and what to observe is generally driven by the line list

- Observations can include
  - Medication preparation
  - Vascular access care
  - Hand hygiene practices
  - Adherence to isolation precautions
  - Surgical practices
  - Respiratory care practices

- Ask a lot of questions! Create a standard observation tool, if needed

Environmental sampling

- Can be a powerful and definitive aspect of an investigation
- But can also be expensive, misleading and frustrating
  - Does a negative culture mean the bug was never there or just is not there right now?
  - Did we culture the right things?

Environmental cultures: suggestions

- ***Remember: the environment is big, the swab is small!***
- Culture *after* you have data from the line list and observations
- Talk with the lab about optimal methods
- Culture only things that are likely routes of transmission (high-touch surfaces!)
- Culture what makes sense for the organisms (e.g., *Serratia* – fluids, VRE- objects/surfaces)

Implementing control measures

- Ultimately, primary goal is to stop transmission, not necessarily to find the source

- It's okay to implement a variety of control measures targeting various possibilities based on initial observations

- Examples:
  - Hand hygiene
  - Enhanced cleaning
  - Remove common source (e.g, multi-dose medications)
  - Isolate infected/ colonized patients

Communicate findings

- During the investigation
  - Among team members
  - To the public
  - To health professionals
  - To public health officials/ policy makers

- At the end of the investigation
  - Oral briefing
  - Written report

Conclusions

- Outbreaks remain a major detriment to the safety of patients and healthcare workers and can have substantial massive financial and public relations impacts
- Sentinel events that help us understand and confront emerging challenges in healthcare
- Play an important role in making recommendations that improve overall patient care and provide important opportunities for education

Thank you!

For more information, contact CDC
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