Outbreaks and Unusual Infection Occurrences
Objectives

• Discuss unusual infections or disease occurrences that require action

• List steps to begin an outbreak investigation

• Discuss development of line lists and epidemiology curves for investigating, confirming, and managing an outbreak

• Describe internal and external communication
Unusual Infectious Disease Occurrences and Emergencies

• Infectious disease outbreaks and other healthcare emergencies must be reported to local public health and CDPH

• In licensed facilities, all cases of reportable diseases and conditions* must be reported to local public health and CDPH (L&C)

• Single cases of certain diseases are emergencies and require immediate action (e.g., meningococcal infections)

* California Reportable Diseases and Conditions list
Examples of Unusual Infectious Disease Occurrences in Hospitals

- Cluster of healthcare-associated infections (HAI)
- Increase in cases of a reportable disease and conditions (Title 17)
- Cluster of MRSA colonized babies in NICU
- New antimicrobial resistant organism never seen in facility or appearance of organism after long absence
Notify Public Health Officials

• **Coordinate** with your facility administration; discuss situation and how it affects patient safety
• **Determine** who makes the phone call and have information available about the occurrence and steps your team is taking to keep patients and staff safe.
• **Contact:** local public health office – Acute Communicable Disease Unit.
• **Contact:** California Department of Public Health Licensing and Certification district office
Recognizing an Outbreak

• Any increase in infection incidence found during routine surveillance may be an outbreak
  • Example: resistant Acinetobacter in sputum in several ICU patients

• An unusual pathogen or infection is identified
  • Example: Botulism, Legionella, CRE

• Reports of a cluster of patients or employees with same symptoms during same time period
  • Example: sudden onset of GI symptoms or diarrhea
Sources for Identifying Potential Outbreaks

• Microbiology lab: Reviews culture reports for trends and unusual pathogens
• Local physicians: Receives reports from patients with similar or unusual symptoms
• Public health: Detects an increase of an illness in the community
• Nursing units: Observes new symptoms common to multiple patients or employees
• Emergency Department: Triaging increases in symptoms (e.g., nausea, vomiting, respiratory symptoms)
Common Healthcare-Related Outbreaks

Related to:

• Food
  • Salmonella, campylobacter, norovirus, staphylococcus
• Improper sterilization or disinfection
  • Pseudomonas related to scope processing
• Community respiratory infections; increases in ER visits
  • Influenza, measles, pertussis
• Improper infection prevention practices
  • MRSA, VRE, Acinetobacter, C. difficile
  • Scabies transmission
Endemic vs. Epidemic Infections

Time

Endemic

Epidemic

No. of Cases of a Disease
Confirming an Outbreak

If you suspect an outbreak:

• Evaluate initial data or reports of disease
  • Look carefully at laboratory or clinical reports to confirm initial findings
  • Interview staff
  • Rule out misdiagnoses or lab errors

• Ask microbiology lab to save isolates

Note: Suspected outbreaks may be pseudo-outbreaks that result from problems with collection methods, rumors, data inaccuracies
Is it an Outbreak?

An increase in number of cases of disease above what is normally expected (e.g., baseline) on a particular unit or specific site

- Influenza
- Norovirus
- *Clostridium difficile*
- Carbapenem-Resistant Enterobacteriaceae (CRE)
- One case of healthcare-associated *Legionella* or *Salmonellosis*
- One case of post-operative group A *streptococcus* infection
Steps in an Outbreak Investigation

• Verify the diagnosis and confirm possible outbreak
• Define a case; refine as you learn more
  • Example: “patient with new onset diarrhea after surgery”
• Conduct case finding
  • Make a line list
  • Characterize by person, place, time
Steps in an Outbreak Investigation - 2

• Identify outbreak investigation team members (e.g., ICU director, lab manager)
• Implement immediate control measures if needed
• Evaluate control measures; check for new cases
• Communicate findings with appropriate parties throughout the investigation
Document the Outbreak Investigation

Tips:

• Start a file folder immediately
• Make notes of
  • What you did each day
  • Who was notified
  • Dates and times
• Keep a timeline
• Keep everything!
  • Your documentation will be needed
Case Finding

- Look back in time for more cases
  - Lab or medical records may be able to help
- Collect specimens, if needed
  - Patient cultures
  - Environmental cultures
  - Be wary of swabbing noses of employees
- Characterize cases of disease by person, place and time
  - Who got sick?
  - Where were they when they got sick?
  - When did they get sick?
Develop a Line List

• Include:
  • Name
  • Medical record number
  • Age
  • Sex
  • Diagnosis
  • Unit or location

• Admission date
• Date of onset
• Procedures
• Symptoms
• Positive cultures

• Use a spread sheet to organize notes
  • Blank outbreak logs may be available from local public health
Investigate Symptomatic Patients

• What are the prominent symptoms?
• When did symptoms begin?
• Did fever occur? When? Describe other vital signs.
• Who may have been exposed?
  • Maintain census for affected unit
  • List staff who provided care
• How many people and who ate which foods? Who became ill?
Sample Line List

Checkpoint: What do these patients have in common?

<table>
<thead>
<tr>
<th>Name</th>
<th>MR#</th>
<th>Admit Date</th>
<th>Age</th>
<th>Sex</th>
<th>Unit / Room</th>
<th>Culture</th>
<th>Surgery</th>
<th>Surgeon Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith</td>
<td>23456</td>
<td>3/1</td>
<td>49</td>
<td>F</td>
<td>313</td>
<td>MRSA</td>
<td>CABG</td>
<td>Doe / 6</td>
</tr>
<tr>
<td>Jones</td>
<td>54328</td>
<td>3/2</td>
<td>55</td>
<td>M</td>
<td>314</td>
<td>MRSA</td>
<td>Appy</td>
<td>Moore / 5</td>
</tr>
<tr>
<td>Brown</td>
<td>34567</td>
<td>3/2</td>
<td>61</td>
<td>F</td>
<td>315</td>
<td>MRSA</td>
<td>Chole</td>
<td>Stone / 4</td>
</tr>
</tbody>
</table>
### Sample Line List for Foodborne Outbreak

<table>
<thead>
<tr>
<th>Name</th>
<th>MR #</th>
<th>Unit/Room</th>
<th>Symptoms</th>
<th>Onset</th>
<th>Foods Eaten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lopez</td>
<td>64654</td>
<td>414</td>
<td>N/V/D</td>
<td>3/3</td>
<td>Potato Salad Tuna Sandwich Iced Tea</td>
</tr>
<tr>
<td>Ball</td>
<td>45463</td>
<td>623</td>
<td>N/V/D</td>
<td>3/3</td>
<td>Potato Salad Meat Loaf Lemonade</td>
</tr>
<tr>
<td>Penn</td>
<td>76785</td>
<td>733</td>
<td>N/V/D</td>
<td>3/3</td>
<td>Potato Salad Ham Sandwich Pepsi</td>
</tr>
<tr>
<td>Newby</td>
<td>33435</td>
<td>544</td>
<td>N</td>
<td>3/3</td>
<td>Macaroni &amp; Cheese Coffee</td>
</tr>
</tbody>
</table>
At the Beginning of the Investigation

- Talk to your lab personnel
  - Ask them to save all isolates that might be part of the outbreak
- Save potential reservoirs (e.g., multidose medications, antiseptics, equipment, food) for possible culturing later
Implement Outbreak Control Measures Based on Working Hypothesis

• Food outbreak:
  • Stop serving suspected food item
  • Ask dietary to save food because testing may be useful

• Suspect contaminated IV fluids:
  • Remove from use and save suspected lot numbers
  • Consider culturing
  • Notify manufacturer or distributor
Implement Outbreak Control Measures Based on Working Hypothesis - 2

• Acinetobacter cluster in ICU:
  • Review hand hygiene compliance
  • Observe equipment and cleaning protocol
  • Cohort or isolate as appropriate
Develop an Epidemic Curve

- Create a graph showing all cases of disease during the epidemic period
- Plot cases by illness onset date or time
  - Helps to determine:
    - Whether problem is ongoing
    - If additional cases are forthcoming
    - If control measures are effective
- Visualizing cases with and without suspected exposure variables can assist in determining cause of the outbreak
Epi Curve of Point Source Outbreak

- Most common form of epi curve
- Illustrates infection after single common exposure, such as food-borne disease outbreak
- Population is exposed for a short period of time
Epi Curve of Extended Exposure Time

• CDC investigation of persons infected with the outbreak stains of E. coli 0157:H7 by date of illness

https://www.cdc.gov/ecoli/2014/o157h7-05-14/epi.html
Follow-Up Questions for Outbreaks

• Hepatitis C transmission in an outpatient clinic
  • Are proper injection practices being used?
  • Is the medication preparation area clean?

• Cluster of NICU pseudomonas infections
  • Who cleans the respiratory therapy equipment?
  • Are common bags of medication used?
Follow-Up Questions for Outbreaks - 2

• Patients with positive Legionella test
  • Can you identify if exposed in the facility? Can you rule out community exposure?
  • Did you have units out of service for some time? Water lines may be contaminated.
Outbreak Investigation Considerations

• Investigation may not occur in a step-wise fashion
• Steps are often done simultaneously
• Information is constantly evolving
• Case definitions may change
• Things can move very quickly
• May not know which intervention was most effective
• Sometimes the cause of the outbreak cannot be identified
Additional Resources and References

• Local public health officer
• APIC Text
• Worldwide Database for Nosocomial Outbreaks www.outbreak-database.com
• Centers for Disease Control and Prevention www.cdc.gov
Questions?

For more information, please contact any HAI Liaison IP Team member

Or email

HAIProgram@cdph.ca.gov