Outbreaks: What Skilled Nursing Facilities Need to Know

Dawn Terashita MD, MPH
Acute Communicable Disease Control
Los Angeles County Department of Public Health
September 28, 2016
Objectives

• Describe public health and reporting requirements
• Discuss how to conduct an outbreak investigation
  • List steps in an outbreak (i.e. line lists and epi curves) for confirmation, investigation, and control
• Describe actual outbreak scenarios
LAC FACTS

• 99 acute care hospitals
• Over 350 sub-acute/long-term care facilities

MISSION:

• To reduce communicable diseases (other than tuberculosis, sexually transmitted diseases and HIV) in Los Angeles County
Antimicrobial Resistance, Influenza, and Skilled Nursing Facilities (ARIS)

- Serve as liaisons between Public Health and LAC skilled nursing facilities
- Improve infection control and patient safety
- Conduct infection control assessments
- Oversee influenza surveillance and reporting of community associated S. aureus/MRSA
Healthcare Outreach Unit

• Serve as liaisons between Public Health and LAC Hospitals and other Healthcare Facilities
• Increase mandatory disease reporting
• Investigate and manage CRE hospital & ambulatory care outbreaks
• Characterize burden of HAIs and AR in LAC
Health Facilities Inspection Division (Licensing & Certification)

- Acute care hospitals
- LTAC
- Skilled Nursing Facilities (SNFs)
- Homes for the developmentally disabled
- Hospice Programs
- Ambulatory surgical centers
- Dialysis clinics
- Primary care clinics
- Home Health Agencies
- Congregate Living Facilities
LAC Reported Outbreaks, 2015

- Community: N=334, (75%)
- SNF: N=96, (21%)
- GACH: N=19, (4%)
## LAC Reported Outbreaks

[outbreaks (patients)]

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>GACH</td>
<td>27 (316)</td>
<td>16 (217)</td>
<td>24 (228)</td>
<td>19 (122)</td>
<td>25 (218)</td>
</tr>
<tr>
<td>SNF</td>
<td>111 (1121)</td>
<td>110 (1510)</td>
<td>124 (2292)</td>
<td>98 (1782)</td>
<td>85 (1253)</td>
</tr>
<tr>
<td>Com.</td>
<td>145 (2060)</td>
<td>227 (3261)</td>
<td>227 (2970)</td>
<td>229 (3553)</td>
<td>363 (3607)</td>
</tr>
</tbody>
</table>
Reported Outbreaks in Non-Acute Healthcare Facilities

- Rash/scabies
- GI/noro
- Resp/flu
- Other

Year:
- 2010
- 2011
- 2012
- 2013
- 2014
What Is Reportable?

- Over 88 communicable diseases, conditions, syndromes
- Unusual diseases
- Emerging diseases
- Outbreaks of any disease
Why Report?

• Required by law
  o California Code of Regulations, Title 17, Public Health, Section 2500
    ▪ Outbreaks of any disease—Report immediately by telephone
• Determine extent of morbidity
• Evaluate risk of transmission
• Implement rapid interventions
  o Protect public/healthcare workers
Urgency Reporting Requirements

• Report immediately by phone
  – Meningococcal infection
  – Outbreaks of any disease
• Report within 1 working day
  – Scabies, atypical or crusted
• Report within 7 calendar days
  – Legionellosis
Unusual Infectious Disease Occurrences and Emergencies

- Infectious disease outbreaks and other healthcare emergencies must be reported to local public health and CDPH Health Facilities

- All cases of reportable diseases and conditions* must be reported to local public health

- Single cases of certain diseases are emergencies and require immediate action, e.g. influenza and crusted scabies infections

* Refer to California or LAC Reportable Diseases and Conditions list (see references)
OUTBREAK INVESTIGATION
Steps in an Outbreak Investigation

• Verify the diagnosis and confirm possible outbreak
• Define a case; refine as you learn more
  o Example “patient with new onset diarrhea after surgery”
• Conduct case finding
  o Make a line list
  o Characterize by **person, place, time**
• Identify team members, e.g. ICU director, lab manager
• Implement immediate control measures if needed
• Evaluate control measures – any new cases?
• Communicate findings with leadership throughout
Recognizing an Outbreak

Greater number of infections than usual are found during routine surveillance

• Example: Resistant Acinetobacter in sputum in several ICU patients

An unusual pathogen or infection is identified

• Example: Botulism, Legionella

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**: Phone calls or office visits from patients reporting similar unusual symptoms
- **Public Health**: Seeing large volume of an illness in community
- **Nursing units**: New symptoms common to multiple patients or ill employees
- **Emergency Department**
Is it an Outbreak?

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

- Influenza
- Norovirus
- Clostridium difficile
- Carbapenem-Resistant Enterobacteriaceae (CRE)
- One case of healthcare-associated *Legionella, Salmonellosis*
- One case of post-operative group A *streptococcus* infection
Endemic vs. Epidemic Infections

- Time

![Graph showing endemic vs. epidemic infections](image-url)
Notification of 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 you and your team are 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
Common Healthcare-related Outbreaks

• Related to food
  o Salmonella, campylobacter, norovirus, staph

• Related to improper sterilization / disinfection
  o Pseudomonas related to scope processing

• Related to community visits to ER / admits
  o Influenza, measles, pertussis

• Related to improper infection prevention practices
  o Cluster of MRSA, VRE, Acinetobacter, C difficile
  o Scabies transmission
Confirming an Outbreak

If you suspect an outbreak

• Don’t panic
  o Many suspected outbreaks are “pseudo-outbreaks”
  o Result from problems with collection methods, rumors, data inaccuracies

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

• Ask microbiology lab to save isolates
Case Finding

• Look back in time for more cases
  o Lab or pharmacy records may be able to help

• May need to collect specimens
  o Patient cultures
  o Environmental cultures
  o Be wary of swabbing noses of employees/physicians

• Characterize cases of disease by person, place and time – add info to your line list
  o Who got sick?
  o Where were they when they got sick?
  o When did they get sick?
Investigate Symptomatic Patients

- What are the prominent symptoms?
- When did they begin?
- Did fever occur? When? Other vital signs?
- Who may have been exposed?
  - Maintain census for affected unit
  - List staff who provided care
- How many and who ate which foods? Who became ill?
Develop a Line List

• Include
  o Name and Medical Record Number
  o Age, Sex, Diagnosis
  o Unit or location
  o Date of Admission / Date of onset
  o Procedures
  o Symptoms
  o Positive cultures

• Use of an Excel spread sheet can be helpful

• Blank outbreak logs may be available from local public health
# Sample Line List

<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</th>
<th>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</td>
<td>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</td>
<td>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</td>
<td>4</td>
</tr>
</tbody>
</table>

Checkpoint: What do these patients have in common?
Before you begin...

- Talk to the lab and 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.
PATIENT SAFETY CONCERNS or Other Considerations

• Is transmission ongoing?
• Does the unit need to be closed?
• Is the outbreak isolated only to this facility?
  ○ Consult with LACDPH, CDPH and CDC

• Does the public need to know? Is patient safety compromised?
Implement Outbreak Control Measures

Based on working hypothesis

• Acute blood borne pathogen infection?
  o Review policies and procedures for anything that comes in contact with blood and body fluids (glucometers)
  o Review consultants (dental, podiatry)

• Multidrug resistant organism cluster?
  o Review hand hygiene compliance
  o Observe equipment and cleaning protocol
  o Need to cohort/isolate?
Develop an Epidemic Curve

• Graph showing all cases of disease during the epidemic period
  o Cases plotted by illness onset date or time

• Helps to determine
  o whether problem is ongoing
  o if additional cases are forthcoming
  o if control measures are effective

• Visualization of cases with and without suspected exposure variables can assist in determining cause of the outbreak
Epi Curve Example

Norovirus Illness in a SNF by Date of Onset (n=42)
Outbreak Investigation Considerations

- Investigation may not occur in a step-wise fashion
- Steps often done simultaneously
- Information constantly evolving
- Case definition may change
- You may feel like you are “drinking from a fire hose” because things can move very quickly
- You may not know which intervention was the most effective
- Sometimes cause of outbreak cannot be identified
Document the Outbreak Investigation

Word to the wise...

• Start a file folder immediately
• Make notes of
  o What you did each day
  o Who was notified
  o Include dates and times
• Keep a timeline
• Your documentation will be needed
• Keep everything!
JOINT SITE INVESTIGATION

Community Health Services

LAC Health Facilities Inspection Division

LAC Environmental Health

Local Agencies, e.g. DWP
Legionellosis

• Etiology:
  – Gram-negative aerobic bacilli, majority *Legionella pneumophila* serogroup 1

• Epidemiology:
  – Found naturally in the environment, esp. warm water
  – Risk factor include: older age, smoking, immunocompromised conditions
  – Inhalation of aerosolized water contaminated with *Legionella*, not person-to-person
Title 22: Temperature of hot water must be:

48.9°C (120°F)

40.5°C (105°F)
Case Scenario of Legionella Outbreak

Background

• Dec 2014- ACDC received a Confidential Morbidity Report (CMR) of a single case of Legionella pneumonia (C1) from hospital A who resides at SNF X.

• ACDC Hospital Outreach Unit (HOU) public health nurse (PHN) reviewed medical records received from SNF X and hospital A.
  – conducted 6 months of retrospective review
  – on-going 2 month prospective surveillance for residents with nosocomial pneumonia
Legionella Outbreak – Background (2)

• 13 days later- 2nd resident (C2) of SNF X was hospitalized with pneumonia at hospital B and positive for *Legionella pneumophila* serogroup 1 by urine antigen

• Jan 2015- 3rd case (C3) was identified by the facility and reported to ACDC during the prospective surveillance period
Case Definition & Case Characterization

Case Definition

• Definite HA case: Patient was at the facility continuously for $\geq 10$ days before symptom onset and positive legionella test

• Possible HA case: Patient was at the facility for 1-9 nights prior to symptom onset and positive legionella test

• **2 definite HA cases**
  – Residing at **SNF X** for many months before the onset of their illness

• **1 possible HA case**
  – Recent admission from **hospital A** and undergoing dialysis 3x a week at **Hospital A** while she stayed at the facility.
Site Investigation

• Jan 2015- **ACDC conducted a joint site investigation** with Department of Public Health (DPH) Environmental Health (EH) to gather additional information and conduct environmental sampling
  – policies, procedures and logs were obtained from the facility and reviewed by ACDC staff
• Feb 2015- a second site visit was conducted by DPH EH staff to inspect the Heating Ventilation and Air Conditioning (HVAC) units
  – Preliminary findings: no evidence that the HVAC system could be the source of dissemination of contaminated air.
Case Room Review

- ACDC reviewed the room locations for all cases during the duration of their time at the facility
  - double occupancy rooms
- C1- Rm 121A next to a utility room in which a dead leg in the plumbing system was found and a positive culture was obtained
- C2- Rm 104B since admission
- C3- Rm 208B for few days, and then moved to 226A during incubation period, ambulatory and most likely used both showers, proximal to the room locations
Control Measures and interim recommendations

• Notify all new and current residents and employees will of the investigation

• Discontinued use of showers to minimize water aerosol exposure to residents pending water and swab test results- sponge baths for residents is allowed

• Recommended routine ice machine cleaning and maintenance. Continue to consume ice and potable water at this time
Control Measures and interim recommendations (2)

- Close water features
- Pending the water and swab test results from the LAC Public Health Laboratory
- Notify the ACDC physician or PHN immediately upon diagnosis of new nosocomial cases at the facility.
  – tested for Legionella (Urine Legionella Antigen, respiratory culture for legionella)
## Environmental Sampling & Results

<table>
<thead>
<tr>
<th>EH Sample #</th>
<th>ACDC Sample #</th>
<th>Sample Type</th>
<th>Time Collected</th>
<th>Location (Room #)</th>
<th>Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1S</td>
<td>Swab</td>
<td>10:48am</td>
<td>Kitchen, Ice machine</td>
<td></td>
<td><em>Legionella Anisa</em></td>
</tr>
<tr>
<td>2</td>
<td>1B</td>
<td>Water</td>
<td>1055am</td>
<td>Shower 3a, left</td>
<td>Pre-flush, left shower</td>
<td><em>No Legionella species isolated</em></td>
</tr>
<tr>
<td>3</td>
<td>2B</td>
<td>Water</td>
<td>1104am</td>
<td>Shower 3b, right</td>
<td>Post-flush, right shower</td>
<td><em>No Legionella species isolated</em></td>
</tr>
<tr>
<td>4</td>
<td>2S</td>
<td>Swab</td>
<td>1048am</td>
<td>Shower 3a, left</td>
<td>Pipe</td>
<td><em>No Legionella species isolated</em></td>
</tr>
<tr>
<td>5</td>
<td>3S</td>
<td>Swab</td>
<td>1116am</td>
<td>Shower 1A</td>
<td>Pipe</td>
<td><em>No Legionella species isolated</em></td>
</tr>
<tr>
<td>6</td>
<td>3B</td>
<td><strong>Water</strong></td>
<td>1118am</td>
<td><strong>Shower 1A</strong></td>
<td><strong>Post-flush</strong></td>
<td><em>Legionella pneumophila serogroup 1, CFU=250 CFU/L</em></td>
</tr>
<tr>
<td>7</td>
<td>4B</td>
<td>Water</td>
<td>1126am</td>
<td>Room 121</td>
<td>Sink, cold pre-flush</td>
<td><em>No Legionella species isolated</em></td>
</tr>
<tr>
<td>8</td>
<td>5B</td>
<td>Water</td>
<td>1129am</td>
<td>Shower 1B</td>
<td>Pre-flush, not tested</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Interim Follow-up

- Hire consultant company to implement a permanent water maintenance plan
CONCLUSION

• ACDC completed follow up of active prospective surveillance on Mar 2015
• No additional HA Legionella cases have been reported
MDRO OUTBREAK
Klebsiella pneumoniae Characteristics

• Gram negative bacteria
• Found in normal flora of mouth, skin and intestines
• Cause up to 14% of primary bacteremia due to gram negative sepsis
• 4th leading cause of hospital acquired pneumonia
• Easily accumulates mechanisms of resistance
• Leads to multi- or pan-drug resistance
Mechanisms of Carbapenem Resistance

• Amp C beta lactamases
• ESBL with porin mutation
• Carbapenemases
  – *K. pneumoniae* carbapenemase (KPC)
    • Most common
    • Bla_{kpc} gene on plasmids
  – Verona-integron encoded metallo-beta-lactamase (VIM)
  – New Delhi metallo-beta lactamase (NDM)
• Carbapenems treat severe infections of ESBL gram-negative pathogens
• Resistance to carbapenems evolved in *Enterobacteriaceae*
• CRKP has become the most common species of carbapenem-resistant *Enterobacteriaceae*
• CRKP has rapidly emerged as a new threat in public health esp. as a healthcare associated pathogen
• Los Angeles County has high rates of CRE
CRKP Investigation at SNF

• Call from hospital IP
  – Noted 5 patients from same SNF CRKP culture positive on admission within a 4 week period
  – 4 of these patients were on a vent
Investigation cont.

• Visit made by ACD and HFID
  – Positive patients were located within a few rooms of one unit
  – Some lapses in infection control practices observed
• Isolates from 3 patients available for PFGE
  – Two patients closely related; third patient unrelated
• Recommendations made to SNF and hospital to discuss better communication of MDRO status at patient transfer
Findings

• Poor communication between hospital and SNF
  – Communication is key when transferring patients
  – Patient status important in order to implement appropriate precautions in a timely manner
• Questions for SNFs:
  – Does your facility track CRE positive patients?
    • do you have a background rate or count of these infections?
  – Does your facility have policies/procedures for contact precautions for residents who have MDROs?
  – Do you monitor hand hygiene among healthcare staff?
Resources and References

- APIC Text
- APIC colleagues
- Control of Communicable Disease in Man
- Local public health officer
- LAC Liaison Public Health Nurse
- www.cdc.gov
- http://www.cdph.ca.gov/programs/hai/Pages/default.aspx
- www.outbreak-database.com
Thank you!

• Outbreak Reporting to Public Health Morbidity Unit
  – Phone: (888) 397-3993
  – Fax: (888) 397-3778

• Acute Communicable Disease Control – for Infection Control Consultation
  – Phone: (213) 240-7941
  – Business Hours: Monday - Friday 8 AM – 5 PM