



# Outbreaks and Infection Emergencies

Basics of Infection Prevention  
2-Day Mini-Course  
November 2017

L'Tanya English, RN, MPH  
Program Specialist PHN



## How Hospitals, Nursing Homes Keep Lethal "Superbug" Outbreaks Secret

Vague rules and patchy requirements often keep this information from the public



**A REUTERS INVESTIGATION**

By [Deborah J. Nelson](#), [David Rhode](#), [Benjamin Lesser](#), [Ryan McNeil](#)

December 23, 2016

## Los Angeles Times

A veil of secrecy shields hospitals where outbreaks occur

By Melody Peterson- April 18, 2015

## Emails suggest linens to be 'likely' source in deadly mold outbreak at Pittsburgh hospitals

By Lauren del Valle, **CNN** Updated 5:24 PM ET, Mon April 3, 2017

## Los Angeles Times

State to step up inspections at hospitals with high infection rates

By Melody Peterson- March 1, 2017



# Objectives

- Recognize unusual infections or disease occurrences that require action
- List steps to begin an outbreak investigation
- Discuss development of line lists and epi curves for investigating, confirming, and managing an outbreak
- Describe internal and external communication
- Describe outbreak reporting and collaboration between Public Health and hospitals



# LOCAL PUBLIC HEALTH



# LAC FACTS

- Covers 4300 square miles
- Over 10 million residents
- 99 acute care hospitals
- Over 350 sub-acute/long- term care facilities





# ACUTE COMMUNICABLE DISEASE CONTROL (ACDC) PROGRAM

## MISSION:

- To reduce communicable diseases (other than tuberculosis, sexually transmitted diseases and HIV) in Los Angeles County
- ACDC Units:
  - Healthcare Outreach Unit
  - Response & Control
  - Hepatitis, Antimicrobial Resistance, Influenza & Skilled Nursing Facilities
  - Food-borne Illness
  - Vector-borne Diseases



COUNTY OF LOS ANGELES  
**Public Health**





# REGULATIONS / REPORTING REQUIREMENTS







# CALIFORNIA HEALTH REGULATIONS

- California Code of Regulations (CCR)
  - Title 17
    - Public Health
      - ❖ **Reportable Diseases & Conditions, §2500**
  - Title 22, Social Security
    - GACH, Acute Psych, SNF, Intermediate Care, etc.
      - ❖ **Reporting, §70737**
- California Health & Safety Code



# What Is Reportable?

(Revised 10/18/16)

Please Post

County of Los Angeles • Department of Public Health

**REPORTABLE DISEASES AND CONDITIONS**  
Title 17, California Code of Regulations (CCR), § 2500

It is the duty of every health care provider, knowing of or in attendance on a case or suspected case of any disease or condition listed below, to report to the local health officer for the jurisdiction where the patient resides. "Health care provider" encompasses physicians (surgeons, osteopaths, oriental medicine practitioners), veterinarians, podiatrists, physician assistants, registered nurses (nurse practitioners, nurse midwives, school nurses), infection control professionals, medical examiners/forensic dentists, and obgyns, as well as any other person with knowledge of a case or suspected case.

**Note:** This list is specific to Los Angeles County and differs from state and federal reporting requirements.

For laboratory reporting: [www.publichealth.lacounty.gov/lab/index.htm](http://www.publichealth.lacounty.gov/lab/index.htm) For necessary reporting: [www.publichealth.lacounty.gov/ehd/index.htm](http://www.publichealth.lacounty.gov/ehd/index.htm)

**Urgency Reporting Requirements**

☒ = Report **immediately** by telephone    ⓪ = Report by telephone **within 1 working day**  
 ☒ = Report by electronic transmission (including FAX), telephone or mail within **1 working day** from identification  
 ⓪ = Report by electronic transmission (including FAX), telephone or mail within **7 calendar days** from identification

**REPORTABLE DISEASES**

<ul style="list-style-type: none"> <li>☒ Amebiasis</li> <li>☒ Anaplasmosis</li> <li>☒ Anthrax, human or animal +</li> <li>☒ Babesiosis</li> <li>☒ Botulism, infant, foodborne, or wound</li> <li>☒ Brucellosis, animal, except infections due to <i>Brucella canis</i> +</li> <li>☒ Brucellosis, human +</li> <li>☒ Campylobacteriosis</li> <li>☒ Chancroid</li> <li>☒ Chikungunya (Virus), only hospitalizations, deaths, and outbreaks (≥3 cases, or one case in a high-risk setting)</li> <li>☒ Chikungunya Virus Infection</li> <li>☒ <i>Chlamydia trachomatis</i> infection, including lymphogranuloma venereum (LGV) +</li> <li>☒ Cholera +</li> <li>☒ Ciguatera Fish Poisoning</li> <li>☒ Coxiellosis</li> <li>☒ Cranz-Jakob Disease (CJD) and other Transmissible Spongiform Encephalopathies (TSE)</li> <li>☒ Cryptosporidiosis</li> <li>☒ Cyclosporiasis</li> <li>☒ Cytococcosis or Tinea-like</li> <li>☒ Dengue Virus Infection</li> <li>☒ Diphtheria +</li> <li>☒ Dromedary (Armenian Shellfish) Poisoning</li> <li>☒ Echinococcosis</li> <li>☒ Encephalitis, specify etiology: viral, bacterial, fungal or parasitic</li> <li>☒ Escherichia coli, shiga toxin producing (STEC) including E. coli O157 +</li> <li>☒ Erysipeloid</li> <li>☒ Foodborne Disease</li> <li>☒ Foodborne Outbreak: 2 or more suspected cases from separate households with same assumed source</li> <li>☒ Giardiasis</li> <li>☒ Gonococcal Infection +</li> <li>☒ Hantavirus Infection, Invasive disease only, all serotypes, less than 5 years of age</li> </ul>	<ul style="list-style-type: none"> <li>☒ Hantavirus Infection</li> <li>☒ Hemolytic Uremic Syndrome</li> <li>☒ Hepatitis A, acute infection</li> <li>☒ Hepatitis B, specify acute or chronic</li> <li>☒ Hepatitis C, specify acute or chronic</li> <li>☒ Hepatitis D (Delta), specify acute or chronic</li> <li>☒ Hepatitis E, acute infection</li> <li>☒ Human Immunodeficiency Virus (HIV) infection, Stage 3 (AIDS) + (Q2641-30-2943-20)</li> <li>☒ Human Immunodeficiency Virus (HIV), acute infection + (Q2641-30-2943-20)</li> <li>☒ Influenza death, laboratory confirmed case only, all ages, A</li> <li>☒ Influenza, novel strains, human</li> <li>☒ Legionellosis</li> <li>☒ Leprosy (Hansen's Disease)</li> <li>☒ Leptospirosis</li> <li>☒ Listeriosis +</li> <li>☒ Lyme Disease</li> <li>☒ Malaria +</li> <li>☒ Measles (Rubella)</li> <li>☒ Meningitis, specify etiology: viral, bacterial, fungal, or parasitic</li> <li>☒ Meningococcal Infection</li> <li>☒ Mumps</li> <li>☒ Myxotis, acute flaccid A</li> <li>☒ Novel Virus Infection with pandemic potential</li> <li>☒ Paratyphoid Poisoning</li> <li>☒ Pertussis (Whooping Cough)</li> <li>☒ Plague, human or animal +</li> <li>☒ Poliovirus Infection</li> <li>☒ Psittacosis</li> <li>☒ Q Fever</li> <li>☒ Rabies, human or animal</li> <li>☒ Relapsing Fever</li> <li>☒ Respiratory Syncytial Virus, only deaths and less than 5 years only</li> <li>☒ Rickettsial Diseases (non-Rocky Mountain Spotted Fever), including Typhus and Typhus-like illnesses</li> </ul>	<ul style="list-style-type: none"> <li>☒ Rocky Mountain Spotted Fever</li> <li>☒ Rubella (German Measles)</li> <li>☒ Rubella Syndrome, Congenital</li> <li>☒ Sarcoidosis, other than Typhoid Fever +</li> <li>☒ Scabies, physical or crusted A</li> <li>☒ Scromboid Fish Poisoning</li> <li>☒ Shiga Toxin, detected in feces</li> <li>☒ Shigellosis</li> <li>☒ Shingles (Varicella)</li> <li>☒ Streptococcal Infection, outbreaks: any type</li> <li>☒ Streptococcal Infection, individual case in a food handler or dairy worker</li> <li>☒ Streptococcal Infection, Invasive Group A, including Streptococcal Toxic Shock Syndrome and Necrotizing Fasciitis; do <u>not</u> report individual cases of pharyngitis or scarlet fever, A</li> <li>☒ Streptococcus pneumoniae, invasive +</li> <li>☒ Syphilis</li> <li>☒ Tetanus</li> <li>☒ Trichinosis</li> <li>☒ Tuberculosis + +</li> <li>☒ Tularemia, animal</li> <li>☒ Tularemia, human +</li> <li>☒ Typhoid Fever, cases and carriers +</li> <li>☒ Unknown Infection +</li> <li>☒ Viral Hemorrhagic Fevers, human or animal (e.g., Crimean-Congo, Ebola, Lassa and Marburg viruses)</li> <li>☒ West Nile Virus (WNV) Infection</li> <li>☒ Yellow Fever</li> <li>☒ Yersiniosis</li> <li>☒ Zika Virus Infection</li> </ul>
--	--	---

**Reportable Non-Communicable Diseases or Conditions**

<ul style="list-style-type: none"> <li>☒ Alzheimer's Disease and Related Conditions (CCR § 2602, § 2606, § 2610)</li> <li>☒ Reportable to the Los Angeles County Department of Public Health</li> <li>☒ Botanical (plant) and maternal slides must be forwarded to Los Angeles County Public Health Laboratory for confirmation. Health care providers must fill out all such cases separately. Public Health Laboratory (PHL) 656-0381</li> <li>☒ For questions regarding the reporting of HIV/AIDS, STDs or TB, contact the respective program:</li> <li>☒ Division of HIV and STD Programs HIV reporting: (213) 951-8516    STD reporting: (213) 744-3106 <a href="http://www.publichealth.lacounty.gov/hiv/ReportCase.htm">www.publichealth.lacounty.gov/hiv/ReportCase.htm</a></li> </ul>	<ul style="list-style-type: none"> <li>☒ Diseases Characterized by Lapres of Core Outbreaks (CCR § 2606, § 2610)</li> <li>☒ Pesticide-Related Illnesses (Death and Sarcid Code § 100200)</li> </ul>
--	---

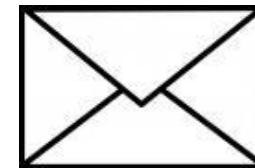
**TB Control Program**  
(213) 746-0600  
[www.publichealth.lacounty.gov/tb/healthgen.htm](http://www.publichealth.lacounty.gov/tb/healthgen.htm)

To report a case or outbreak of any disease, contact the Communicable Disease Reporting System  
Tel: (888) 367-3699 • Fax: (888) 937-3773  
[www.publichealth.lacounty.gov/acd/Cdrs.htm](http://www.publichealth.lacounty.gov/acd/Cdrs.htm)

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

# Urgency Reporting Requirements

- Report immediately by phone
  - **Meningococcal infection**
  - **Outbreaks of any disease**
- Report within 1 working day
  - Food-borne disease
- Report within 7 calendar days
  - Legionellosis





# Why Report?

- Required by law
- Determine extent of morbidity
- Evaluate risk of transmission
- Implement rapid interventions
  - Protect public/healthcare workers



## When Should You Report?

- Report **immediately** to Public Health when:
  - A new or emerging pathogen/disease is identified, e.g. Zika, Ebola
  - An unusual or rarely seen organism in the facility is identified, e.g. MDR CRE
  - Decision is made to conduct molecular testing
    - PFGE
    - Whole genome sequencing
  - Infection Prevention is conducting an investigation



# Unusual Infectious Disease Occurrences and Emergencies

- Infectious disease outbreaks and other healthcare emergencies must be reported to local public health *and* CDPH
- 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. meningococcal infections, botulism

\* Refer to California or LAC Reportable Diseases and Conditions list (see references)



## Examples of Unusual Occurrences in Hospitals

- Increase or cluster of healthcare-associated **infections**
- Increase in cases of a **reportable disease**
- **Water leak** damage to hospital kitchen, resulting in interruption in ability to provide food for patients
- **Fire** in pharmacy resulting in loss of medication stock
- **NICU** admits more neonates than hospital has license to care for leading to possible overcrowding
- **Food poisoning** that affects patients or staff

# Report Outbreaks/Unusual Diseases To:

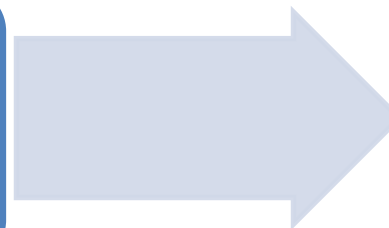
ACDC



**LPHN or  
Morbidity**

**and**

HFID/CDPH



**District Office  
by Location**





# OUTBREAK INVESTIGATION





## OUTBREAK OR CLUSTER?

- Outbreak
  - The occurrence of more cases of disease than expected in a given area (unit) or among a specific group of people over a particular period of time
  - Cases have a common cause or presumed to be related to one another in some way
- Cluster
  - An aggregation of cases in a given area over a particular period **without** regard to whether the number of cases is more than expected



# 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



# 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, CRE

Reports of a “cluster” of patients or employees with same symptoms during same time period

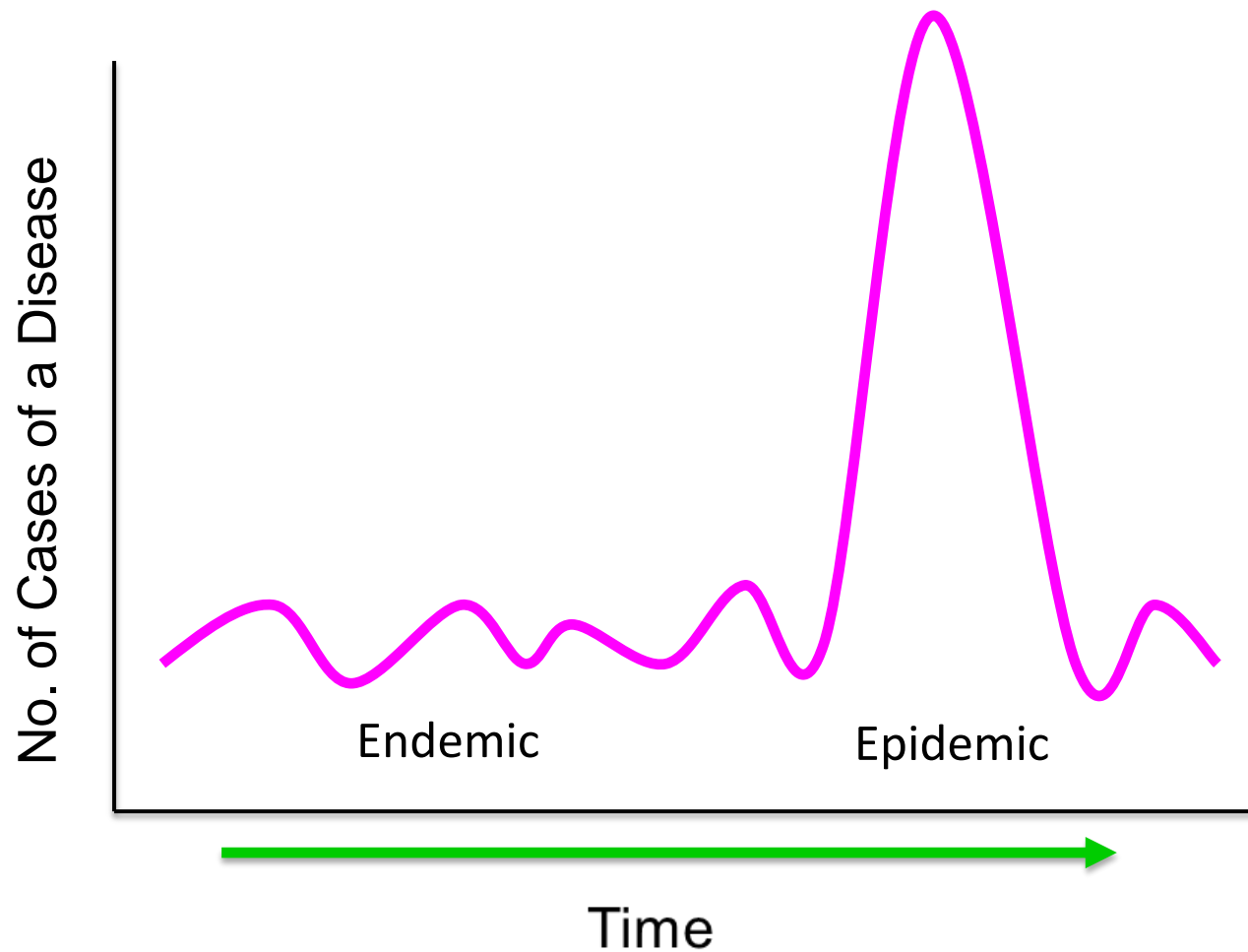
- Example: sudden onset of GI symptoms or diarrhea

## Sources for Identifying Potential Outbreaks

- Microbiology lab: Reviews culture reports for trends and unusual pathogens
- Local physicians: 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



# Endemic vs. Epidemic Infections





# 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**
- 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

## As 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., multi-dose medications, antiseptics, equipment, food) for possible culturing later.





# Document the Outbreak Investigation

**Word to the wise...** your documentation

will be needed:

- Start a file folder immediately
- Make notes of
  - What you did each day
  - Who was notified
  - Include dates and times
- Keep a timeline
- Keep everything!





## 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 (Acute Communicable Disease Control)\*
- **Contact:** California Department of Public Health, Licensing and Certification (Health Facilities Inspection Division)\*

\*LAC only



# Confirming an Outbreak

If you suspect an outbreak

- Don't panic
  - Suspected outbreak may be a “pseudo-outbreak”
    - May result from problems with collection methods, rumors, data inaccuracies
- Evaluate initial data or reports of disease
  - Look carefully at lab or clinical reports to confirm initial findings
  - Interview staff
  - Rule out misdiagnoses or lab errors



# Case Finding

- Look back in time for more cases
  - Microbiology lab may be able to help
- Characterize cases of disease by person, place and time – add info to your line list
  - Who got sick?
  - Where were they when they got sick?
  - When did they get sick?
- May need to collect specimens
  - Patient cultures
  - Environmental cultures
  - Staff/HCW cultures (Be wary of swabbing noses of employees/physicians)



# 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
  - Name and Medical Record Number
  - Age, Sex, Diagnosis
  - Unit or location
  - Date of Admission / Date of onset
  - Procedures
  - Symptoms
  - Positive cultures
- Use of an Excel spread sheet can be helpful
- Blank outbreak logs may be available from local public health



# Sample Line List

Name	MR#	Admit Date	Age	Sex	Unit /Room	Culture	Surgery	Surgeon Room
Smith	23456	3/1	49	F	313	MRSA	CABG	Doe / 6
Jones	54328	3/2	55	M	314	MRSA	Appy	Moore / 5
Brown	34567	3/2	61	F	315	MRSA	Chole	Stone / 4

Checkpoint: What do these patients have in common?



# Sample Line List for Foodborne Outbreak

Name	MR #	Unit/Room	Symptoms	Onset	Foods Eaten
Lopez	64654	414	N/V/D	3/3	Potato Salad Tuna Sandwich Iced Tea
Ball	45463	623	N/V/D	3/3	Potato Salad Meat Loaf Lemonade
Penn	76785	733	N/V/D	3/3	Potato Salad Ham Sandwich Pepsi
Newby	33435	544	N	3/3	Macaroni & Cheese Coffee





# Implement Outbreak Control Measures

## Based on working hypothesis

- Food outbreak?
  - Stop serving suspected food item
  - Ask dietary to save food (Testing may be useful)
- Suspect contaminated IV fluids?
  - Remove from use and save suspected lot numbers
  - Consider culturing
  - Notify manufacturer or distributor
- Pseudomonas cluster in NICU?
  - Review hand hygiene compliance
  - Observe equipment and cleaning protocol
  - Need to cohort/isolate patients, cohort staff?



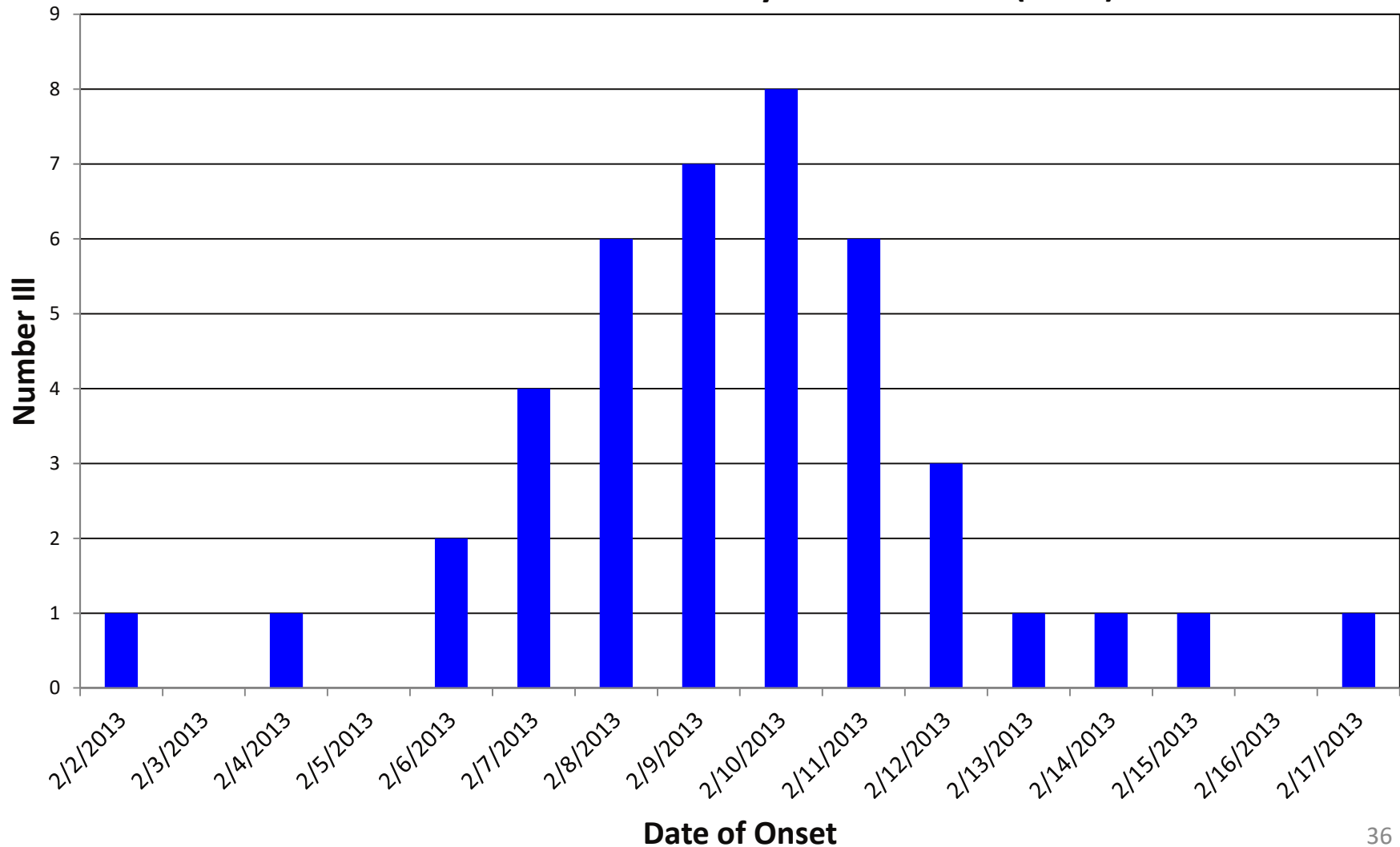
# Develop an Epidemic Curve

- Graph showing all cases of disease during the epidemic period
  - Cases plotted by illness onset date or time
- Helps to determine
  - whether problem is ongoing
  - if additional cases are forthcoming
  - 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)





## **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 LAC, CDPH and CDC
- Is patient safety compromised?



# Outbreak Investigation Considerations

- Investigation may not occur in a step-wise fashion
- Steps often done simultaneously
- Information constantly evolving, things can move very quickly
- Case definition may change
- You may not know which intervention was the most effective
- Sometimes cause of outbreak cannot be identified
- Does the public need to know?

# Outbreaks Happen

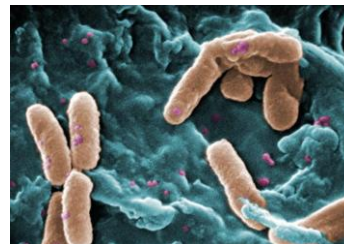
## Hepatitis C transmission in an outpatient clinic

- Question if improper injection practices are used
- Clean medication preparation area?



## Cluster of NICU pseudomonas infections

- Who cleans the respiratory therapy equipment?
- Any “common bags” of medication used?



## Patients with positive Legionella

- Can you rule out community onset?
- Did you have units out of service for some time so water lines are contaminated?





# ACDC INVESTIGATION PROCESS



## INITIAL INTAKE

- Date reported, reporter, and phone number
- Facility information
- Affected unit
- Organism
- Outbreak time period
- Number affected (cases), severity
- Number of deaths
- Control measures implemented
- Suspected mode of transmission





## INITIAL DATA REQUESTS

- Line list
- Case medical records
- Laboratory reports, including sensitivities
- Background data for organism
- Summary of control measures
- Floor plan of unit
- Case room location from admission to discharge
- Policies/Procedures



## ADDITIONAL DATA REQUESTS

- Staff list
  - Direct care staff
- Facility investigation report
- Pharmacy list
- Microbiology list
- Dietary list
- Consultant's report
  - E.g. air samples, water sample results



## RECOMMENDATIONS (1)

- Appropriate isolation/cohorting
- Handwashing enforcement
- Staff education
- Identify common procedures, multi-dose meds, reusable supplies
- Review relevant policy/procedures



## RECOMMENDATIONS (2)

- Environmental cultures
- Environmental cleaning
- Surveillance cultures
  - Patient
  - Staff
- Report additional cases
- Collect specimens
- Hire environmental consultant w/hospital expertise





# ACDC Surveillance

- May Include:
  - Daily/Weekly status update
    - Phone &/or email
    - Surveillance period varies
  - Conference call
  - Coordinate isolates to PHL for strain testing
  - Provide management recommendations
  - Site investigation
  - Case control study

## SITE INVESTIGATION

- Entrance/exit conference
- Outbreak Details
  - Chart review
  - Policy/procedure review
- Interview staff
- Tour facility
  - Observe procedures
- Environmental assessment
- Laboratory assistance





# When is it Over?

- When transmission no longer occurs
  - No additional cases are identified
  - All requested documents are received
- Routine investigation
  - Closure email
- Complex investigation
  - Closure letter
    - » Investigation summary
    - » Final recommendations



# CASE STUDY





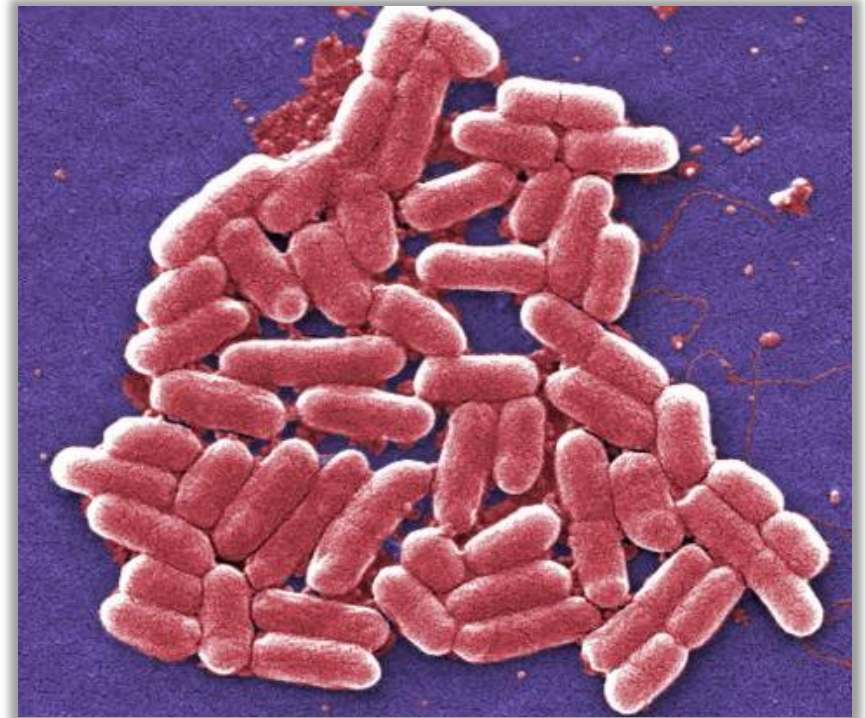
# Outbreak Call

- When: March 27, 2006
- Where: <100-Bed Acute Care Hospital
- Patients: Chronic respiratory illness  
Most ventilator-dependent
- Status: 8 culture positive patients  
4 more in subsequent week
- Organism: *Elizabethkingia meningoseptica*



## ***Elizabethkingia meningoseptica* (EM)**

- *Flavobacterium meningosepticum*,  
*Chryseobacterium meningosepticum*
- Rare human pathogen
- Gram-negative MDRO
- Waterborne transmission

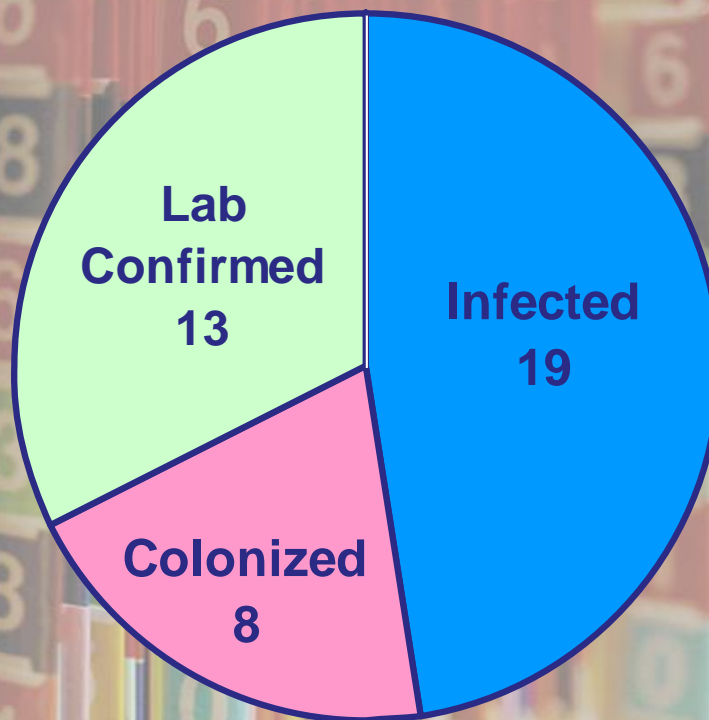


## Case Definition

A patient who was blood or sputum culture positive for EM, with or without symptoms, 48 hours post-admission from March 2005 through May 2006.



## Chart Review



**Total cases: 40**



# ACDC Initial Recommendations

- Contact precautions
- Cohort patients
- Hand hygiene
- Staff education



# Consultation

## Consultation:

- CDPH
- CDC
  - No EM outbreaks reported statewide or nationally
- LADWP
  - 10 water samples collected for analysis
  - All samples negative for EM



# Environmental Surveillance

- Cultures collected by ACDC:
  - 2 ICU sinks, 1 ICU soap dispenser
  - 5 patient room sinks
  - 2 tap water samples
  - 1 endotracheal tubing system
- All environmental cultures were negative for EM

# Hand Hygiene Compliance

- Nursing 63%
- Ancillary staff 62%
- Physicians 100%
- Isolation compliance 53%



- Improvements needed in:
  - wearing gowns in isolation rooms
  - removing masks upon leaving room
  - removing gloves and performing hand hygiene after leaving the room





# Review of Hospital Policy/Procedures

- Hand hygiene & handwashing
  - Hospital policy: 10 seconds
  - CDC guidelines: 15 seconds
- Infection control surveillance
- Contact precautions



## PHN Site Visit

- 5 PHN site visits
  - Unannounced
  - May 25, 2006 to June 26, 2006

### Observational Checklist

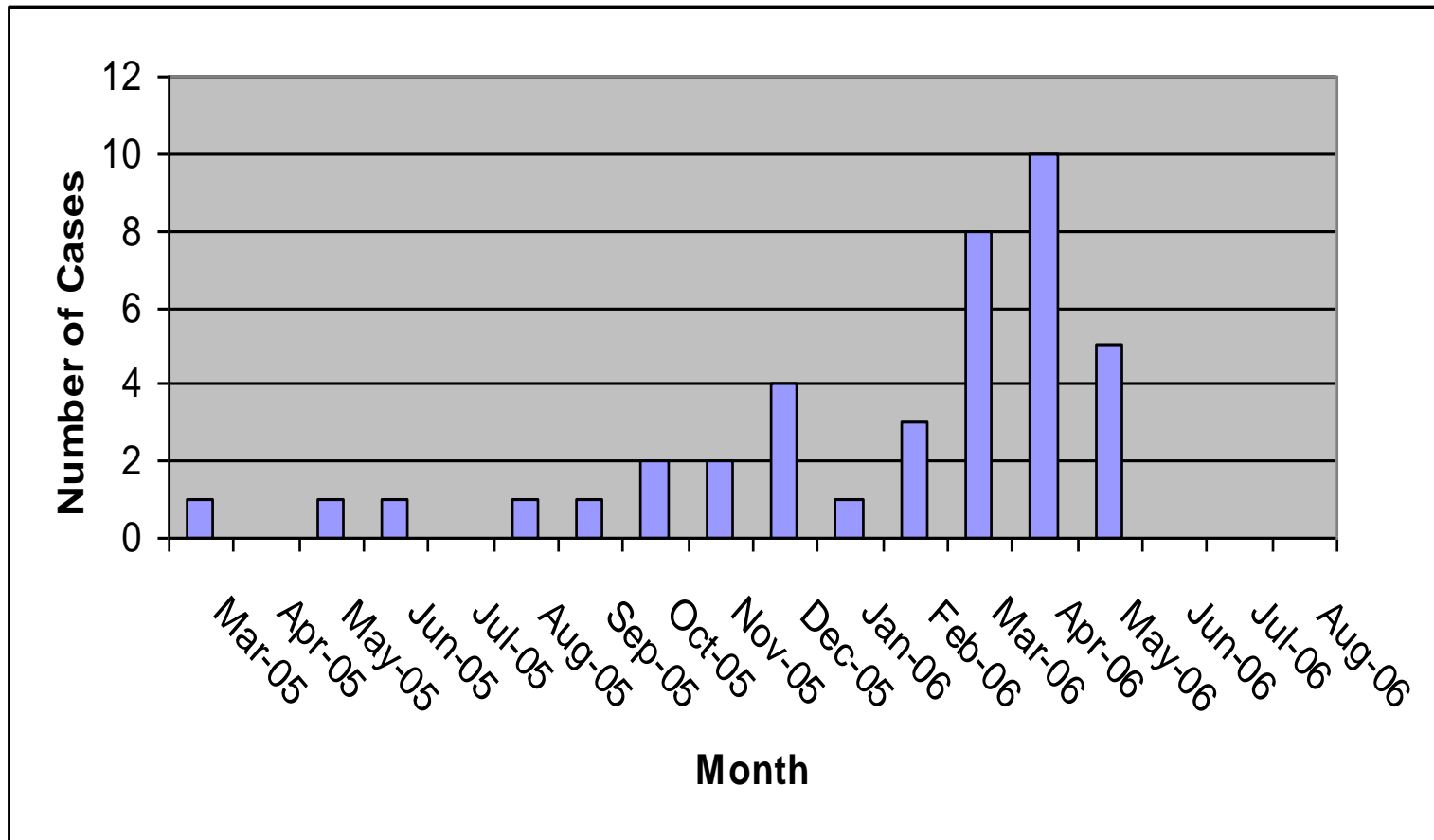
Hand hygiene compliance

Patient/Staff cohorting compliance

PPE compliance



# Outbreak Over: Cases Decreased to Zero





# Questions?

For more information, please  
contact your Liaison Public  
Health Nurse



# Thank you!

- Acute Communicable Disease Control – for Infection Control Consultation
  - Phone: (213) 240-7941
- Outbreak Reporting to Public Health Morbidity Unit
  - Phone: (888) 397-3993
  - Fax: (888) 397-3778
  - **Business Hours: Monday - Friday 8 AM – 5 PM**