



## Objectives

- Describe the importance of investigating sentinel cases and outbreaks in healthcare facilities.
- List the resources available to investigate sentinel cases and outbreaks of selected diseases in healthcare facilities.
- Discuss the special considerations of investigating sentinel cases and outbreaks in healthcare facilities.

## Disclosures

The presenters for this session have no financial conflicts of interest to disclose.

3

## Today's schedule

- What is a healthcare facility?
- Why are investigations in healthcare facilities different?
- What type of illnesses do we investigate?
- Special topics
  - Legionellosis
  - Group A Streptococcal infections
  - Potpurri
- Special considerations for facility investigations

4

## What is a healthcare facility?

5

## What is a healthcare facility?

- Long-term care
- Skilled-nursing
- Hospital
- Dental office
- Dialysis
- Outpatient

6

## Why are investigations in healthcare facilities different?

- Vulnerable population
  - Increased Incidence
  - Higher mortality
- Common source
- Communal living
- Can be initiated or propagated by activities, staff, or other characteristics of the facility

**We investigate to prevent, or stop, an outbreak**

## Legionellosis



## Legionellosis

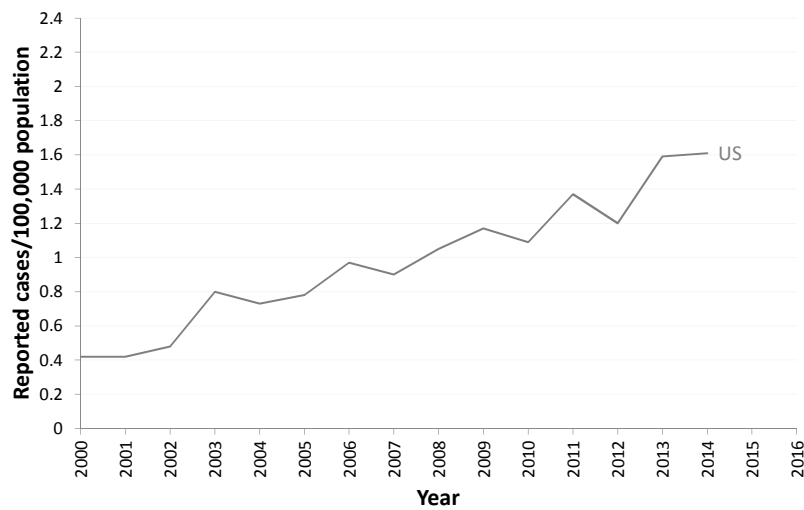
- Caused by inhalation *Legionella pneumophila*
- Transmission: Inhalation of aerosolized water
- Two manifestations

	Legionnaires' disease	Pontiac Fever
Incubation period	2–10 days	5–72 hours
Symptoms	Non-productive cough and <b>pneumonia</b>	Self-limited febrile illness; no pneumonia
Resolution	Typically requires antibiotics; ~15% case-fatality rate	Spontaneous recovery in 2–5 days

- Risk factors
  - >50 years old, smokers, compromised immune systems

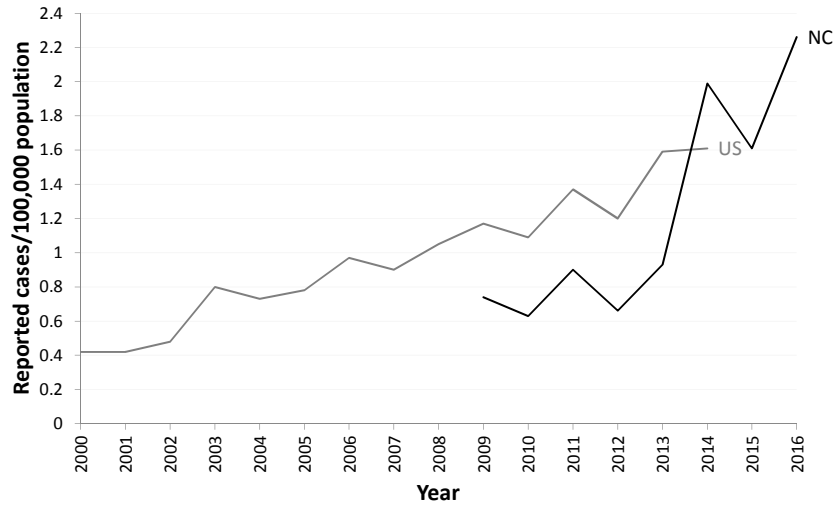
9

## Incidence of legionellosis has been increasing in the US



10

## Incidence of legionellosis has been increasing in the US and North Carolina



11

## NC DPH Legionellosis Investigation Steps



### 2012 North Carolina Division of Public Health Communicable Disease Manual

Public Health Management of Reportable Diseases and Conditions

NC Division of Public Health • Epidemiology Section  
 Communicable Disease Branch  
 1602 Mail Service Center  
 Raleigh NC 27669-1002  
 919 - 733 - 3419 (main number - 24 hours)  
 919 - 715 - 4999 (secure fax)

TABLE OF CONTENTS	
<a href="#">Diseases &amp; Conditions Reportable in North Carolina</a>	<a href="#">Other Diseases of Public Health Significance (CA-MRSA, Influenza, Norovirus)</a>
<a href="#">Reporting Forms</a>	<a href="#">NC Laws &amp; Rules</a>
<a href="#">Investigation Steps</a>	<a href="#">Agreement Addenda</a>
<a href="#">Case Definitions</a>	<a href="#">Conferences &amp; Training Opportunities</a>
<a href="#">Press Releases</a>	<a href="#">Communicable Disease Course</a>
<a href="#">Outbreak Investigations</a>	<a href="#">Technical Assistance &amp; Training Program</a>
<a href="#">Appendices</a>	<a href="#">Sample Policies/Procedures &amp; Standing Order Templates</a>
<a href="#">NC Electronic Disease Surveillance System (NC EDSS)</a>	<a href="#">Additional Communicable Disease Manuals (HIV, Rabies, STD, TB, Vaccines-Preventable)</a>

Page Last Updated November 21, 2016

12

## Legionellosis case definition

### Clinical description

Legionellosis is associated with two clinically and epidemiologically distinct illnesses: Legionnaires' disease, which is characterized by fever, myalgia, cough, and clinical or radiographic pneumonia; and Pontiac Fever, a milder illness without pneumonia.

### Laboratory criteria for diagnosis:

#### Suspect

- By seroconversion: fourfold or greater rise in antibody titer to specific species or serogroups of *Legionella* other than *L. pneumophila* serogroup 1 (e.g., *L. micdadei*, *L. pneumophila* serogroup 6).
- By seroconversion: fourfold or greater rise in antibody titer to multiple species of *Legionella* using pooled antigen and validated reagents.
- By the detection of specific *Legionella* antigen or staining of the organism in respiratory secretions, lung tissue, or pleural fluid by direct fluorescent antibody (DFA) staining, immunohistochemistry (IHC), or other similar method, using validated reagents.
- By detection of *Legionella* species by a validated nucleic acid assay.

#### Confirmed:

- By culture: isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluid.
- By detection of *Legionella pneumophila* serogroup 1 antigen in urine using validated reagents.
- By seroconversion: fourfold or greater rise in specific serum antibody titer to *Legionella pneumophila* serogroup 1 using validated reagents.

### Case classification

**Suspected:** a clinically compatible case that meets at least one of the presumptive (suspect) laboratory criteria.

- **Travel-associated:** a case that has a history of spending at least one night away from home, either in the same country of residence or abroad, in the ten days before onset of illness.

**Confirmed:** a clinically compatible case that meets at least one of the confirmatory laboratory criteria.

- **Travel-associated:** a case that has a history of spending at least one night away from home, either in the same country of residence or abroad, in the ten days before onset of illness.

13

## NC DPH Legionellosis Investigation Steps

### Diseases & Conditions Reportable in North Carolina

[A-E](#) [F-I](#) [J-R](#) [S-Z](#)

#### A - E

- **Anthrax**
  - [Disease Notes](#)
  - [LHD Disease Investigation Steps](#)
  - [Case Definition](#)
  - [Disease Report Form](#)
  - [Part 1](#)
  - [Part 2](#)
- **Botulism**
  - Botulism, foodborne
    - [Disease Notes](#)
    - [LHD Disease Investigation Steps](#)
    - [Case Definition](#)
    - [Disease Report Form](#)
    - [Part 1](#)
    - [Part 2](#)
  - Botulism, infant (intestinal)
    - [Disease Notes](#)
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    - [Case Definition](#)
    - [Disease Report Form](#)
    - [Part 1](#)
    - [Part 2](#)
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    - [Disease Notes](#)
    - [LHD Disease Investigation Steps](#)
    - [Case Definition](#)
    - [Disease Report Form](#)
    - [Part 1](#)
    - [Part 2](#)
  - Botulism, other
    - [Case Definition](#)
- **Brucellosis**
  - [Disease Notes](#)
  - [LHD Disease Investigation Steps](#)
  - [Case Definition](#)
  - [Disease Report Form](#)

#### J - R

- **Legionellosis**
  - [Disease Notes](#)
  - [LHD Disease Investigation Steps](#)
  - [Case Definition](#)
  - [Disease Report Form](#)
  - [Part 1](#)
  - [Part 2](#)
  - [Legionellosis Prevention and Response Toolkit](#)
  - [Sentinel Case Investigation](#)
  - [Outbreak Investigation](#)
- **Leprosy (Hansen's Disease)**
  - [Disease Notes](#)
  - [LHD Disease Investigation Steps](#)
  - [Case Definition](#)
  - [Disease Report Form](#)
  - [Part 1](#)
  - [Part 2](#)
- **Leptospirosis**
  - [Disease Notes](#)
  - [LHD Disease Investigation Steps](#)
  - [Case Definition](#)
  - [Disease Report Form](#)
  - [Part 1](#)
  - [Part 2](#)
- **Listeriosis**
  - [Disease Notes](#)
  - [LHD Disease Investigation Steps](#)
  - [Case Definition](#)
  - [Disease Report Form](#)
  - [Part 1](#)
  - [Part 2](#)
  - [Supplemental CDC Listeria Initiative Form](#)
- **Lyme Disease**
  - [Disease Notes](#)

14

## Investigation Steps



Lab

- Urine antigen
- Other



Clinical

- Symptom
- Onset date
- Radiographic evidence of pneumonia
- Previous hospitalizations



Risk

- Travel
- Water exposures
- Healthcare exposures

## NC DPH Legionellosis Investigation Steps

**Diseases & Conditions Reportable in North Carolina**

[A-E](#) [F-I](#) [J-R](#) [S-Z](#)

**A - E**

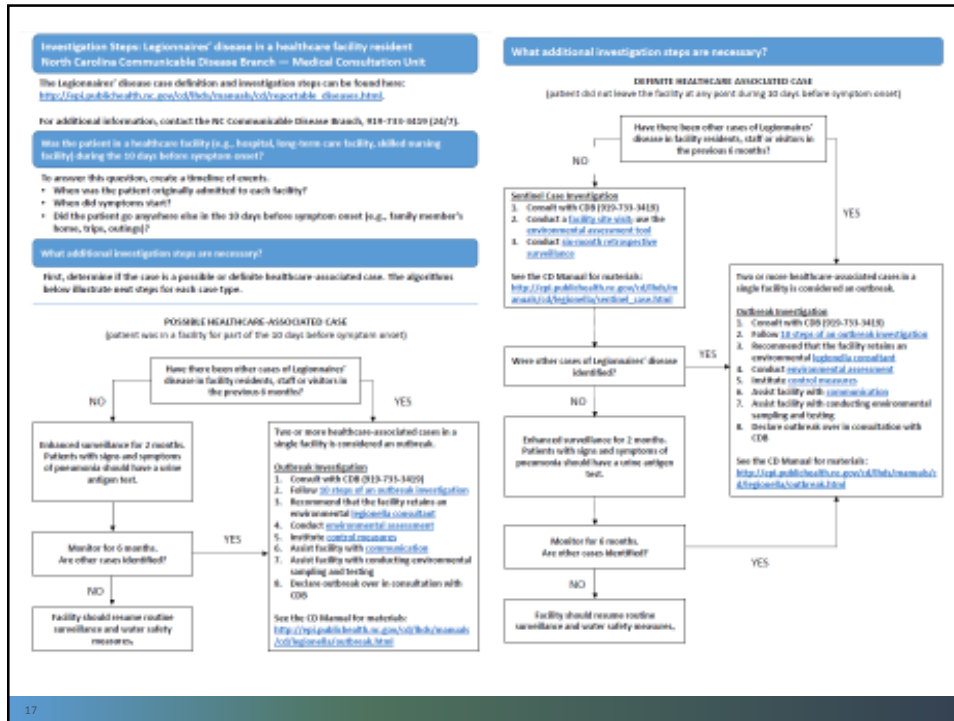
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**J - R**

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  - [Disease Notes](#)

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## The most important question...

Was the patient in the healthcare facility during the 10 days before symptom onset?

Create a timeline:

- When was the patient admitted to the facility?
- When did symptoms start?
- Where did the patient go during the 10-days before symptom onset?

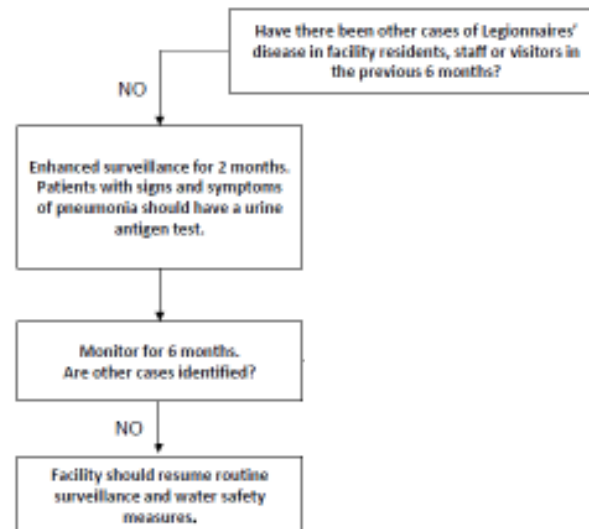
## Healthcare-associated legionellosis

- Definite healthcare-associated case
  - Confirmed case of legionellosis in a person who has spent  $\geq 10$  days **continuously** in a healthcare facility before illness onset
- Possible healthcare-associated case
  - Confirmed case of legionellosis in a person who has spent **part but not all** of the 10 days before illness onset in a healthcare facility

19

## Possible Healthcare-associated Case

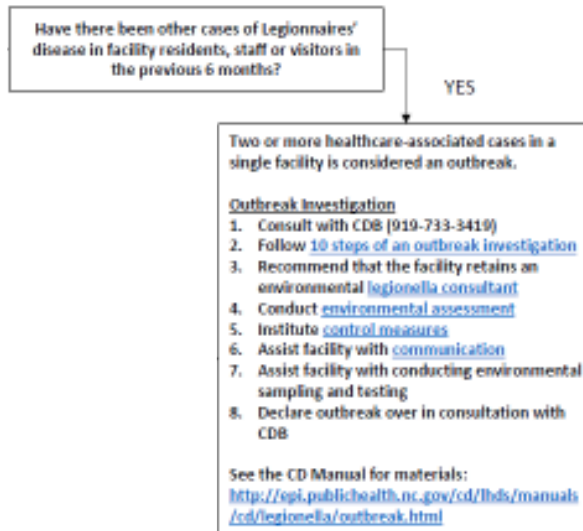
Patient was in the facility for part, but not all, of the 10 days



20

## Possible Healthcare-associated Case

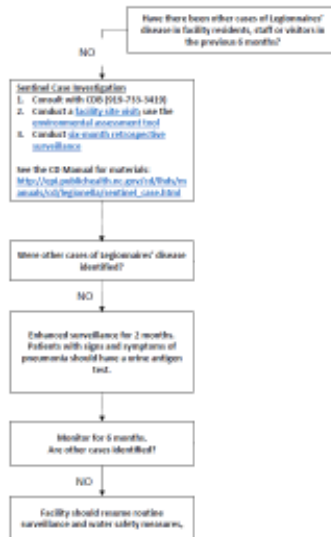
Patient was in the facility for part, but not all, of the 10 days



21

## Definite Healthcare-associated Case

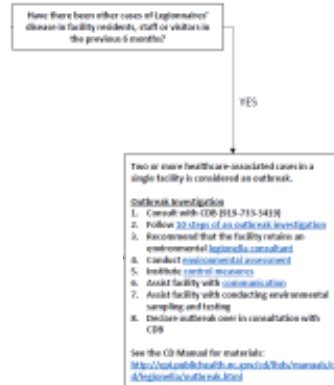
Patient did not leave the facility during the 10 days



22

## Definite Healthcare-associated Case

Patient did not leave the facility during the 10 days



23

## Outbreak Investigation

Two or more healthcare-associated cases in a single facility is considered an outbreak.

### Outbreak Investigation

1. Consult with CDB (919-733-3419)
2. Follow [10 steps of an outbreak investigation](#)
3. Recommend that the facility retains an environmental [legionella consultant](#)
4. Conduct [environmental assessment](#)
5. Institute [control measures](#)
6. Assist facility with [communication](#)
7. Assist facility with conducting environmental sampling and testing
8. Declare outbreak over in consultation with CDB

See the CD Manual for materials:

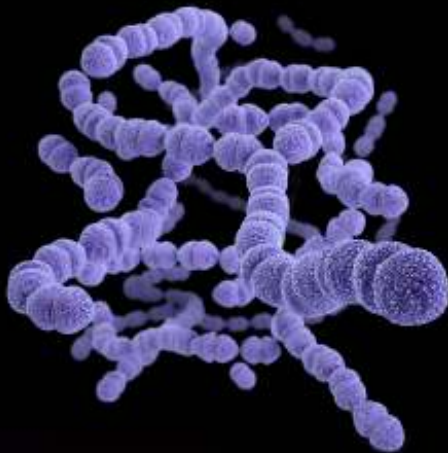
<http://epi.publichealth.nc.gov/cd/lhds/manuals/cd/legionella/outbreak.html>

## Resources

- NC Communicable Disease Manual:  
<http://epi.publichealth.nc.gov/cd/lhds/manuals/cd/toc.html>
- NC Division of Public Health – Legionellosis:  
<http://epi.publichealth.nc.gov/cd/diseases/legionellosis.html>
- Centers for Disease Control and Prevention – Legionellosis:  
<https://www.cdc.gov/legionella/>

25

## Group A Streptococcal (GAS) Infections



26

## GAS Case Definition

### Laboratory criteria for diagnosis

- Isolation of group A *Streptococcus* (*Streptococcus pyogenes*) by culture from a normally sterile site (e.g., blood or cerebrospinal fluid, or, less commonly, joint, pleural, or pericardial fluid)

### Case classification

Confirmed: a case that is laboratory confirmed

27

## Group A Streptococcus

### 4. Risk History -- Patient Name -- Streptococcal invasive infection, Group A

Enter Facility Information Here

The patient is (choose most appropriate answer)	Resident of HC	Engage details
Child Care / School / College		
Is the patient involved in child care or the parent/primary caregiver of a child in child care?	Yes	
Is patient a student? (Use Add New for each school)	Yes	Add New
Is patient a school WORKER / VOLUNTEER in HC school setting? (Use Add New for each school)	Yes	Add New
Behavioral Risk and Coaggregate Living		
During the period of interest did the patient live in any coaggregate living facilities (correctional facilities, barracks, shelters, communes, boarding school, camp, dormitory/tenement/etc.)?	zz_No	Add New
What setting was the patient most likely exposed?	02 Home	
Health Care Facility and Blood and Body Fluid Exposure Risk		
DURING THE PERIOD OF INTEREST		
During the timeframe displayed above, did the patient have any of the following health care exposures? (Add new for all that apply)	zz_No	Add New
Health care exposure of blood and body fluids rates		
Other Exposure Information		

28

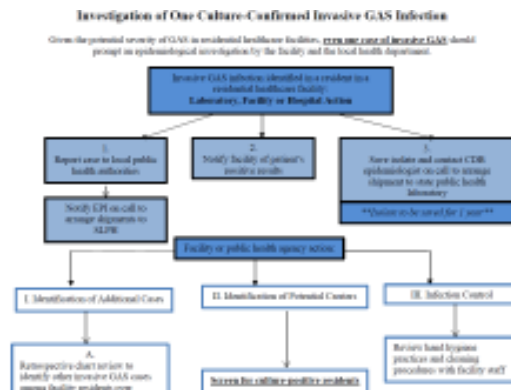
## GAS Investigation Steps

- Streptococcal infection, Group A, invasive
  - [Disease Notes](#)
  - [LHD Disease Investigation Steps](#)
  - [Case Definition](#)
  - Disease Report Form
    - [Part 1](#)
    - [Part 2](#)
- [Investigation of One Culture-Confirmed Invasive GAS Infection, Algorithm](#)
- [Steps to Take for Single Confirmed Invasive Group A Streptococcus Infection in a Residential Healthcare Facility](#)

29

## GAS Investigation Steps

- Retrospective chart review
- Survey health care workers and close contacts
- 4 months active surveillance
- Provide control measures



30

## Resources

- NC Communicable Disease Manual:  
<http://epi.publichealth.nc.gov/cd/lhds/manuals/cd/toc.html>
- NC Division of Public Health – GAS:  
<http://epi.publichealth.nc.gov/cd/diseases/streptococcus.html>
- Centers for Disease Control and Prevention – GAS:  
<https://www.cdc.gov/groupastrep/>

31



**An HAI potpourri**

32



## Clusters of non-reportable conditions

The local health director shall ensure that control measures prescribed by the Commission have been given to prevent the spread of all reportable communicable diseases or communicable conditions and any other communicable disease or communicable condition that represents a significant threat to the public health.

-130A-144. Investigation and control measures.

33

## Multi-drug Resistant Organisms in Long-term Care Facilities

- Clustering of patients colonized by, or infected with, the same organism with similar resistance profiles
  - Consider intra-facility transmission



34

## Multi-drug Resistant Organisms in Long Term Care Facilities

**Scenario:** A local hospital calls to inform you that they've had two cases of CRE transferred from the same long-term care facility this week

**What is public health's role?**

35

## Time out: What is Carbapenem-Resistant Enterobacteriaceae (CRE)?

- Resistant to nearly all antibiotics
- >9,000 healthcare-associated infections each year
- Most commonly occurs in people with healthcare exposures



36

## Multi-drug Resistant Organisms in Long Term Care Facilities

**Scenario:** A local hospital calls to inform you that they've had two cases of CRE transferred from the same long-term care facility this week

### What is public health's role?

- Evaluate public health risk
  - Review labs, dates of admission, other commonalities
  
- Prevent further spread
  - Infection control assessment
  - Inter-facility communication

37

## Site Visit: Control Measures

1. Staff Education
2. Laboratory notification
3. Cohort infected residents
4. Contact precautions for colonized and infected individuals at higher risk for transmission
5. Hand Hygiene
6. Antimicrobial Stewardship
7. Environmental cleaning
8. Communicate CRE status to transferring and receiving facilities

38

## Exposure Investigations

- Variety of healthcare settings
- Often no known cases
- Breaches in infection control
- Follow-up to assess potential risk from exposure



39

## Dental Clinic

**Scenario:** Receive a call that numerous patients were exposed to nonsterile critical and/or semi-critical devices

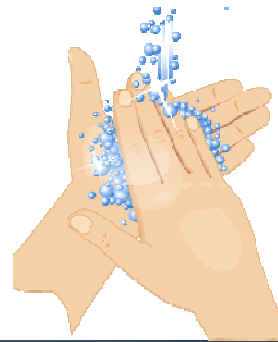
### **What is public health's role?**

- Assess the extent of possible exposure
- Evaluate public health risk
- Provide recommendations

40

## Dental Clinic: Site Visit

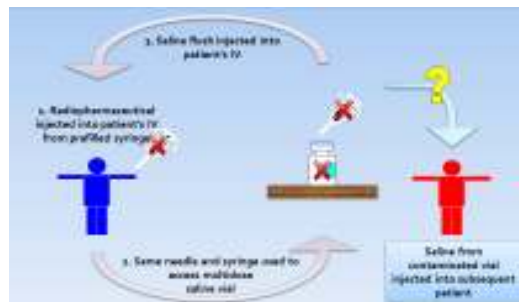
- Obtain a line list
- Observe
  - Hand Hygiene
  - Adherence to standard/contact/droplet precautions
  - Separation of clean and dirty
- Review Infection control policies
- Establish a timeframe for notification\*



41

## Other Examples of Exposure events:

- Unsafe injection practices
  - Sharing glucometers
  - Reusing needles or syringes
- Drug Diversion
- Recalled products



42

## National investigations:

- Case finding
  - Surveillance
  - Call for cases
- Coordinate lab testing
- Assist with investigation
- Implement control measures

### Safety Alerts:

#### *Burkholderia cepacia* Infections

- Saline Flush Outbreak
- Docusate Outbreak

#### *Candida auris*

- Global Emergence of Invasive Infections Caused by the Multidrug-Resistant Yeast *Candida auris*

#### *mcr-1* Gene

- First *mcr-1* Gene in *E. coli* Bacteria found in a Human in the US

#### Heater-Cooler Devices

- Contaminated Heater-Cooler Devices

<https://www.cdc.gov/hai/outbreaks/index.html>

43

## Lessons Learned

- Investigations can go on for several months
- Timely, regular communications with the facility helps ensure prompt public health action
- Regional approach for prevention

44

## Resources

- **MDROs**
  - Management of Multidrug Resistant Organisms in Healthcare Settings, 2006  
[https://www.cdc.gov/hicpac/mdro/mdro\\_toc.html](https://www.cdc.gov/hicpac/mdro/mdro_toc.html)
  - NC DPH CRE information for Long-Term Care Facilities  
<http://epi.publichealth.nc.gov/cd/hai/docs/CREinfoLTCfacilities.pdf>
- **Exposure Investigations**
  - NC ADMINISTRATIVE CODE, TITLE 10A, SUBCHAPTER 41A
  - <https://www.cdc.gov/niosh/topics/bbp/guidelines.html>
- **Injection Safety**
  - One and Only Campaign  
<http://www.oneandonlycampaign.org/partner/north-carolina>

45

## Special Considerations for Investigations in Healthcare Facilities



46

## Special considerations for facility investigations

- Facilities are patients' homes
- Disruption of routine and comforts
- Needs of the residents vs. stopping disease spread
- Limits of the staff
- Vulnerable population

47

Thank you for the work you do every day.

### Questions?

#### Contact us after CD Conference:

Jess Rinsky  
[Jess.rinsky@dhhs.nc.gov](mailto:Jess.rinsky@dhhs.nc.gov)  
919-546-1647

Heather Dubendris  
[Heather.dubendris@dhhs.nc.gov](mailto:Heather.dubendris@dhhs.nc.gov)  
919-546-1654



48