North Carolina SPICE
Statewide Program for Infection Control & Epidemiology

ONE IS A PROBLEM, TWO IS AN OUTBREAK:

DETECTING AND RESPONDING TO OUTBREAKS IN LONG-TERM CARE FACILITIES

May 17, 2018

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One is a Problem, Two is an Outbreak: Detecting and Responding to Outbreaks in LTCFs

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Centers for Disease Control and Prevention / NC Division of Public Health

Objectives

- Describe legal framework for communicable disease surveillance, investigation, and response
- Review historical outbreak surveillance data
- Discuss when to call Public Health
- Describe specific organisms / outbreaks in long-term care settings
- Discuss Public Health role during investigations

Legal Framework

Public Health: Legal Framework

- Public Health Laws and Rules:
  - General Statutes
  - NC Administrative Code rules

- Health Director's Authority (State & Local)
  - Surveillance
  - Investigation
  - Control Measures

Public Health Law

General Statutes §130A-144: Investigation and Control Measures

(a) The local health director shall investigate… cases of communicable diseases and communicable conditions reported to the local health director

(b) Physicians, persons in charge of medical facilities or laboratories, and other persons shall… permit a local health director or the State Health Director to examine, review, and obtain a copy of medical or other records…

(d) The attending physician shall give control measures… to a patient with a communicable disease or communicable condition and to patients reasonably suspected of being infected or exposed to such a disease or condition.

(e) The local health director shall ensure that control measures… 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.

(f) All persons shall comply with control measures, including submission to examinations and tests…

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Public Health Law

10A NCAC 41A .0103: Duties of local health director: report communicable diseases

(a) Upon receipt of a report of a communicable disease or condition… the local health director shall:

> (1) immediately investigate the circumstances… [to] include the collection and submission for laboratory examination of specimens necessary to assist in the diagnosis and indicate the duration of control measures;
>
> (2) determine what control measures have been given and ensure that proper control measures… have been given and are being complied with;

(c) Whenever an outbreak of a disease or condition occurs which is not required to be reported… but which represents a significant threat to the public health, the local health director shall give appropriate control measures… and inform the Division of Public Health

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Public Health Law

10A NCAC 41A .0101: Reportable diseases and conditions

- 74 reportable diseases and conditions
  - Timeline of reporting varies between immediately and within 7 days
- Laboratory reporting requirements

Outbreak Response

When Should Public Health Be Called?

- Reportable diseases (10A NCAC 41A .0101)
  - http://epi.publichealth.nc.gov/cd/docs/dhhs_2124.pdf
  - ~70 reportable conditions at any point

- When **any** disease is above normal baseline (i.e. an “outbreak”)

When Is It An Outbreak?

- Anything above what is normally seen for any given time period
- If you aren't sure, call Public Health!
- In a facility setting, an outbreak is generally defined as two or more individuals with the same illness
  - **Caveat to this rule:**
    - One case of certain diseases = Outbreak
    - Disease not normally seen (Avian Flu, SARS, Ebola)

10 Steps of an Outbreak Investigation

1. Identify investigation team and resources
2. Establish existence of an outbreak
3. Verify the diagnosis
4. Construct case definition
5. Case finding: Find cases systematically / develop line list
6. Perform descriptive epidemiology / develop hypotheses
7. Evaluate hypotheses / perform additional studies (as necessary)
8. Implement control measures
9. Communicate findings
10. Maintain surveillance

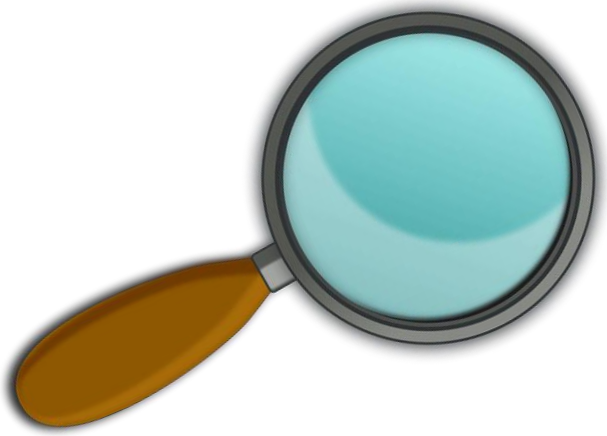
Who Should Be Called?

- Your supervisor/manager
- Local health department
- North Carolina Division of Public Health 24/7 epidemiologist on call: 919-733-3419
- North Carolina Statewide Program for Infection Control and Epidemiology (NC SPICE): spice@unc.edu, 919-966-3242
- Local hospital infection preventionist

Role of Public Health

What Happens After Public Health Is Called?

- Data review
- Clinical investigation:
  - Case finding – looking for others who are or who have been ill
  - Interviews, specimen collection, testing
- Environmental investigation
- Control measures
- Assist with patient/family/public information if needed



Surveillance for Healthcare Associated and Resistant Pathogens Patient Safety (SHARPPS) Program

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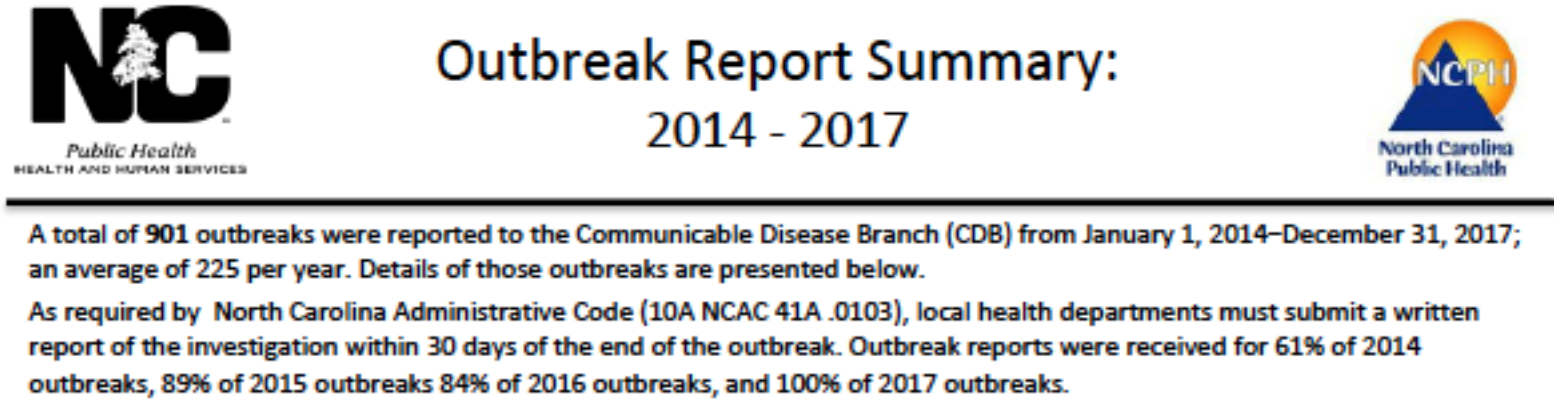
Outbreak Summary

2014-2017 Outbreak Summary



Public Health
HEALTH AND HUMAN SERVICES

Outbreak Report Summary:
2014 - 2017

North Carolina Public Health

A total of **901** outbreaks were reported to the Communicable Disease Branch (CDB) from January 1, 2014–December 31, 2017; an average of 225 per year. Details of those outbreaks are presented below.

As required by North Carolina Administrative Code (10A NCAC 41A .0103), local health departments must submit a written report of the investigation within 30 days of the end of the outbreak. Outbreak reports were received for 61% of 2014 outbreaks, 89% of 2015 outbreaks 84% of 2016 outbreaks, and 100% of 2017 outbreaks.

- January 1, 2014 – December 31, 2017
  - 901 Outbreaks
  - 225 Average/year

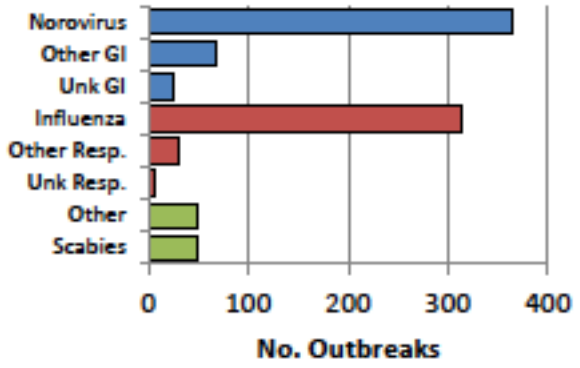
2014-2017 Outbreak Summary

TYPE AND ETIOLOGY

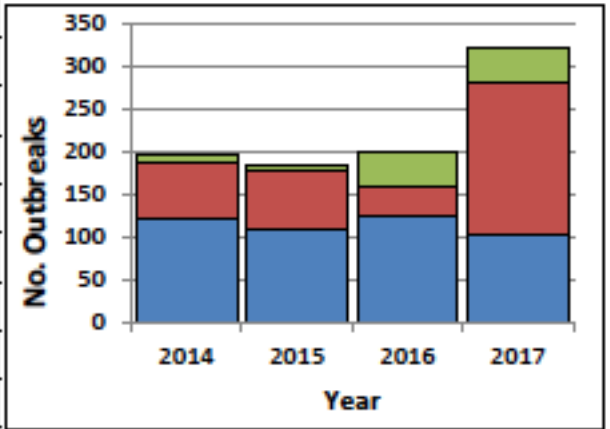
Type	Etiology	2014	2015	2016	2017	Total	%
Gastrointestinal (GI) Causes							
51%	Norovirus	104	78	95	88	365	80%
	Salmonella	5	4	2	4	15	3%
	Shigella	7	11	11	4	33	7%
	Other GI	3	11	3	3	20	4%
	Unknown	3	4	14	4	25	5%
	Total	122	108	125	103	458	
Respiratory Causes							
38%	Influenza	57	66	25	165	313	90%
	Pertussis*	1	1	2	8	12	3%
	Legionella	5	0	2	3	10	3%
	Other Respiratory	0	2	3	2	7	2%
	Unknown	2	0	3	0	5	1%
	Total	65	69	35	178	347	
Other Causes							
11%	Other	6	6	19	17	48	50%
	Scabies	4	2	20	22	48	50%
	Total	10	8	39	39	96	
Total Outbreaks		197	185	199	320	901	

Pertussis was at epidemic levels in 2014, therefore individual outbreaks were not reported.

Outbreaks by Type and Etiology: 2014-2017



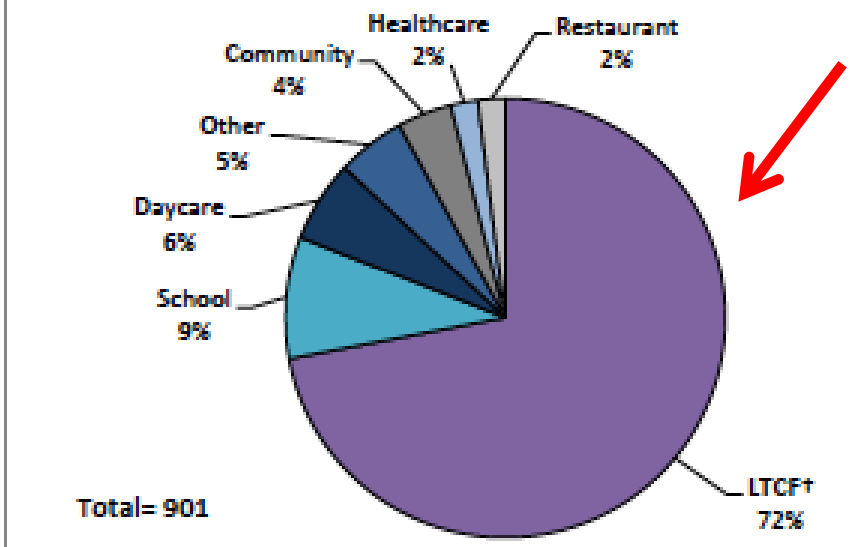
Outbreaks by Type and Year: 2014-2017



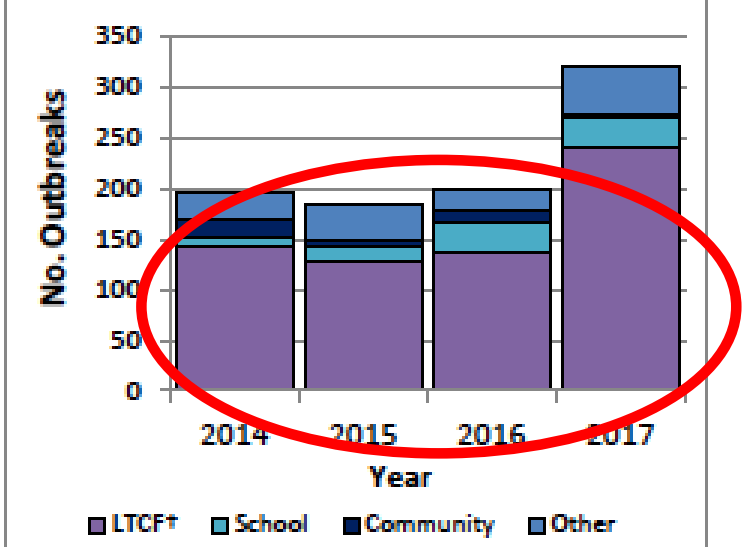
2014-2017 Outbreak Summary

SETTING

Outbreaks by Setting: 2014-2017



Outbreaks by Setting and Year: 2014-2017



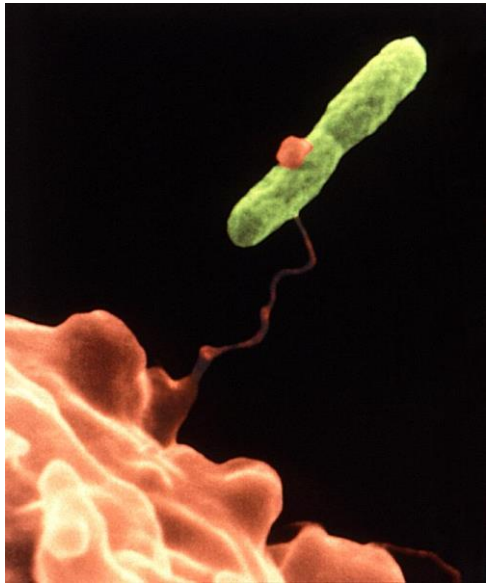
†Long-term care facility (LTCF) includes nursing homes, adult care homes, and assisted living facilities

NC Communicable Disease Branch - http://epi.publichealth.nc.gov/cd

*2014-2017: 72% of outbreaks occurred in LTC settings

*2017 alone: 239 outbreaks occurred in LTC settings

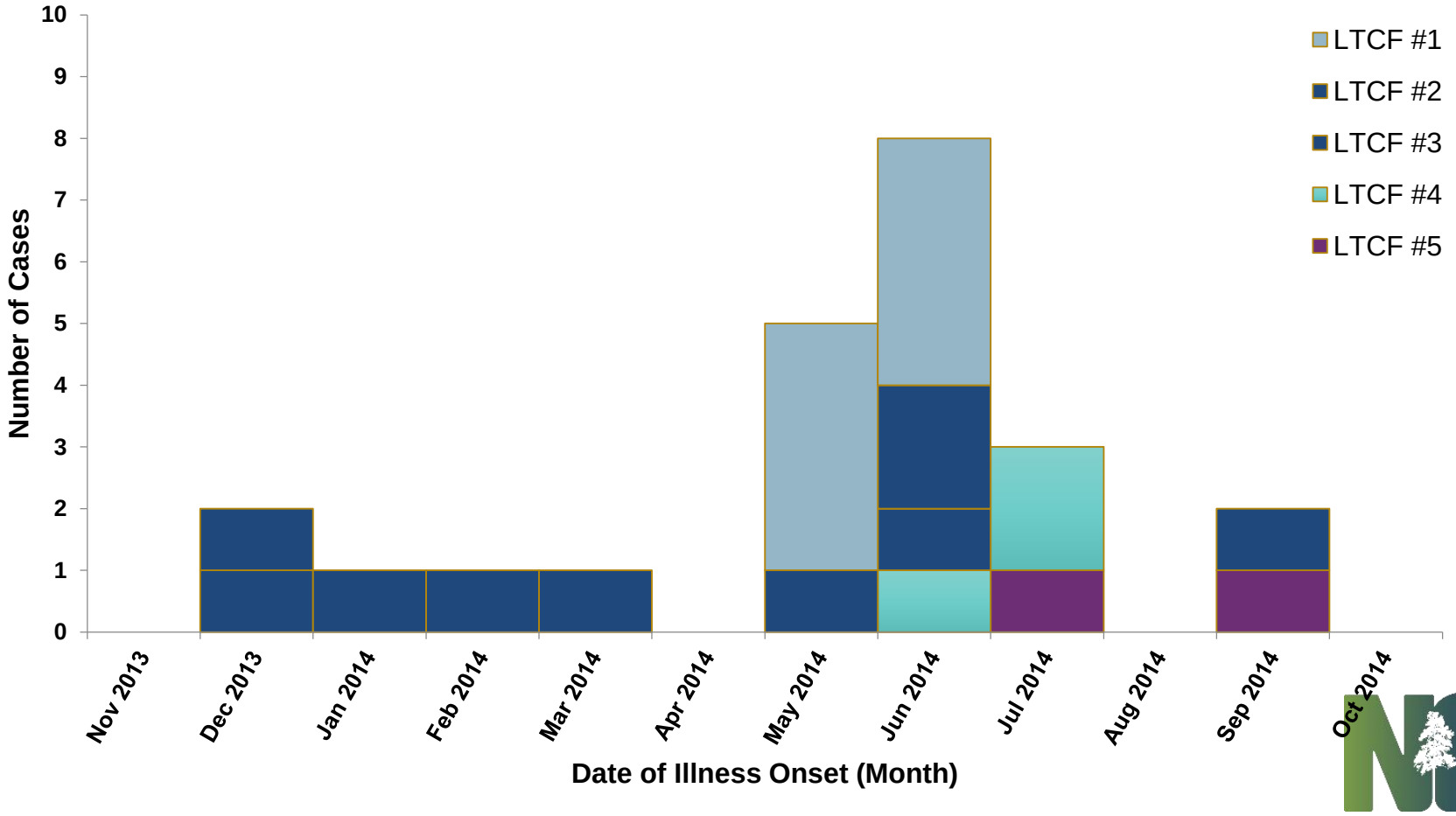
Legionella



Legionnaires' Disease: 2014

- June−October, 2014
- 5 outbreaks of Legionnaires' Disease
  - Long-term care facilities (LTCFs)

Legionnaires' Disease Outbreaks at Multiple LTCFs, North Carolina, December 2013–September 2014 (N = 23)



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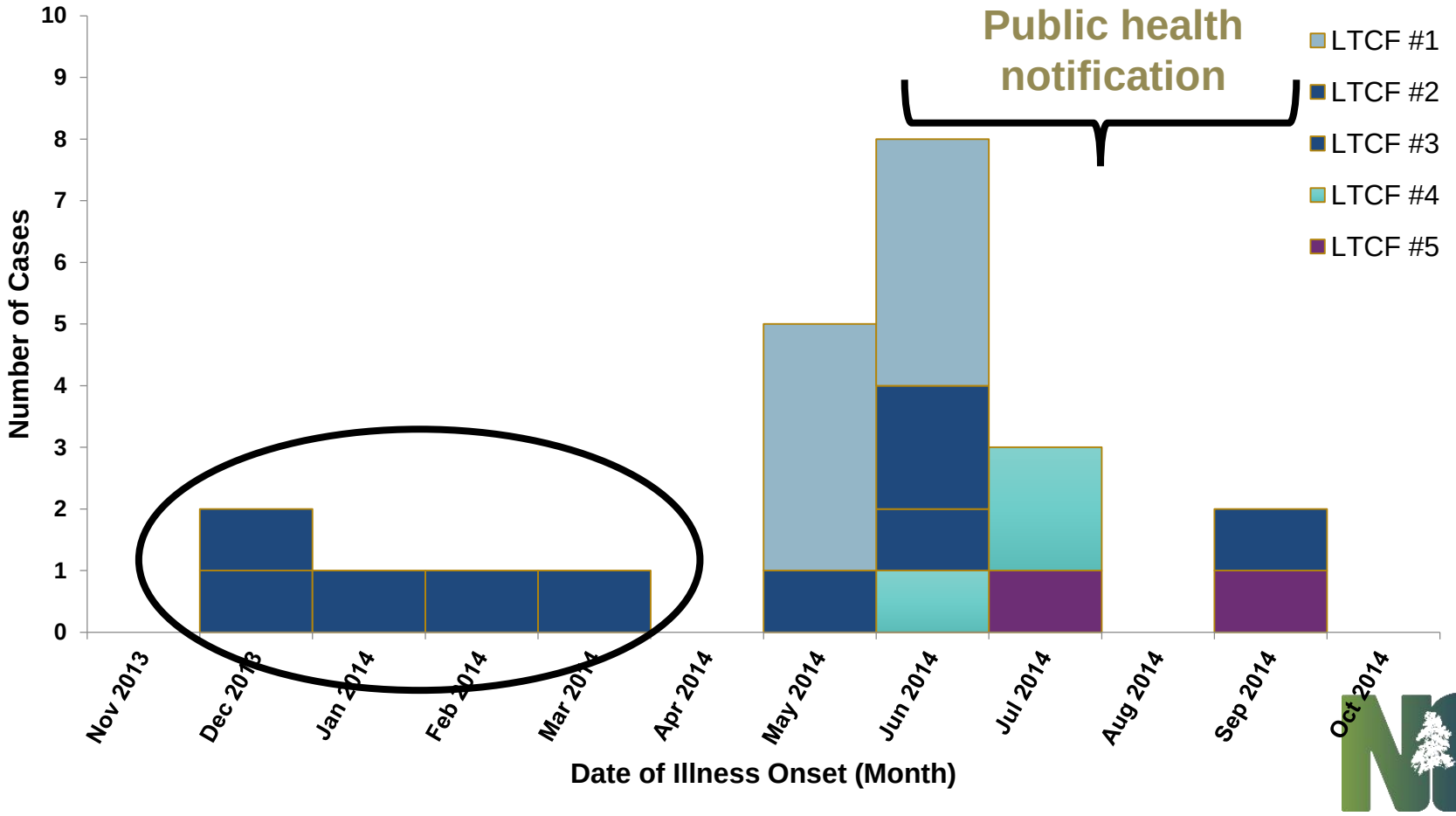


Environmental Assessments

- Hot water heater temperatures
  - Range 108–204ºF, median 133ºF
- Cooling towers
- Water stagnation
  - Unoccupied wings
  - Plumbing deadlegs
- Lacked
  - Routine water system maintenance plan
  - *Legionella* prevention plan

Control Measures

- Restrict tap water use
- Install 0.2 micron point-of-use filters
- Conduct water system
  - Superheating (160ºF)
  - Hyperchlorination
- Maintain hot water heater temperatures ≥140 ºF
- Consult with an expert consultant
- Continue surveillance for cases
- Communicate with residents, patients, families, visitors, staff

Faucet with 0.2 micron filter

Prevention

- Provider awareness
- Use and cleaning of respiratory therapy equipment
- Development and implementation of water management programs

What is a Water Management Plan?

- Policies and practices that
  - Reduce potential for *Legionella* bacteria (and other waterborne pathogens) to proliferate in building water systems
  - Reduce potential exposure to water containing *Legionella* bacteria (and other waterborne pathogens) in the air
- A multi-step continuous process

Legionella

NC Division of Public Health,
Communicable Disease Branch

January 2018
Volume 3, Issue 1

SHARPPS Newsletter

Surveillance for Healthcare-Associated and Resistant Pathogens Patient Safety (SHARPPS) Program

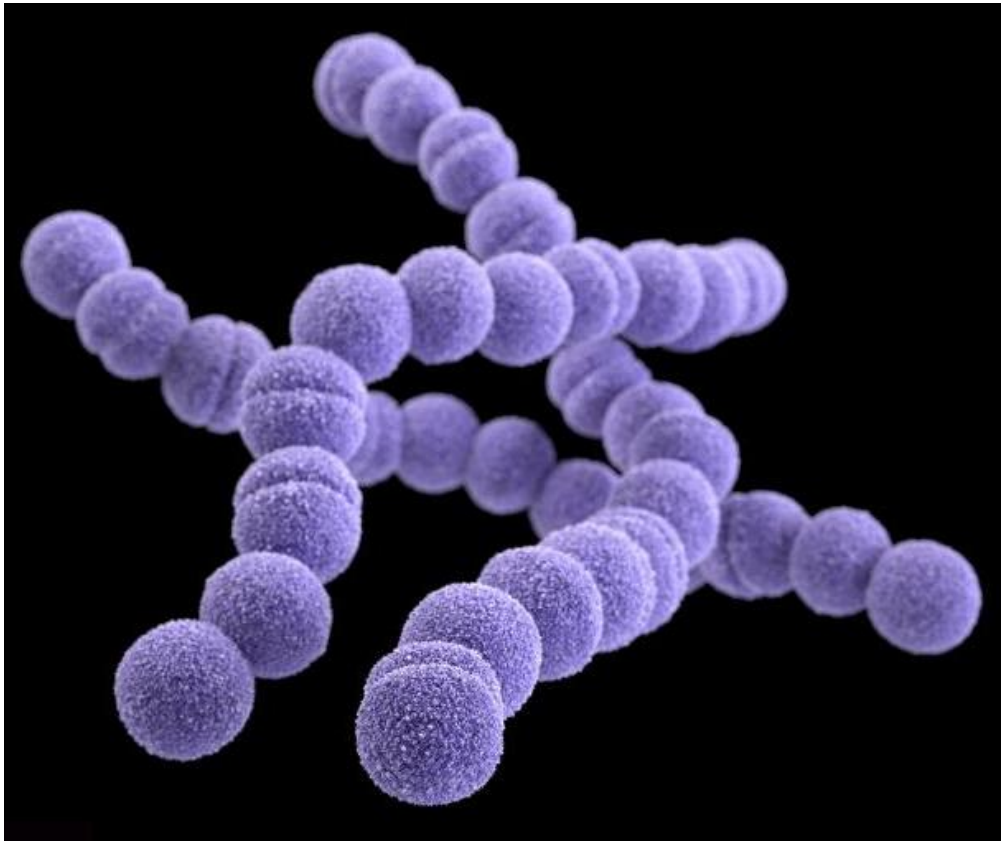
SPECIAL EDITION: AN OVERVIEW OF *LEGIONELLA*

What is *Legionella*, and Why is it Important for Public Health?

Legionellosis is a disease caused by *Legionella* bacteria. The bacteria can cause a pneumonia called Legionnaires' disease, as well as a less serious infection called Pontiac fever that has symptoms similar to a mild case of the flu. This disease has been nationally notifiable since 1976, after an outbreak at a 1976 American Legion convention in Philadelphia, from which the disease gets its name.

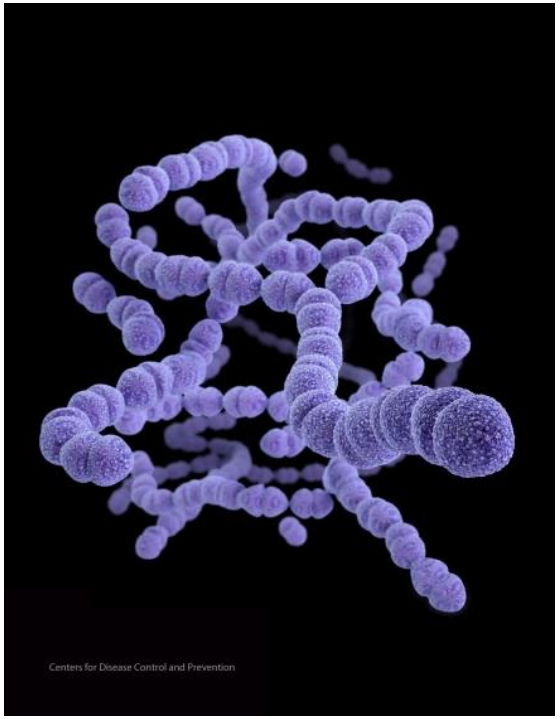
Legionella bacteria are found naturally in freshwater. The bacteria can also grow and multiply in human-made water systems such as: plumbing systems, cooling towers (air-conditioning units for large buildings), hot tubs, decorative fountains, water features, and hot water tanks. When the bacteria grow in these systems, it becomes a health concern. Legionnaires' disease and Pontiac fever only occur in people who breathe in contaminated water droplets (i.e. mists, showering, splashing) from affected water systems. The disease is not spread person to person, and you cannot become infected by drinking affected water. Those who are aged 50 years and older, current or former smokers, and those with certain underlying conditions such as chronic lung disease (i.e. chronic obstructive pulmonary disease or emphysema), weak immune systems, cancer, diabetes, kidney failure, or liver failure are at increased risk.

Group A Streptococcus



Group A Strep (GAS)

- Gram-positive bacteria
- Commonly found in the throat and on the skin
- Illness varies depending on site of infection



LTCF Mortality Risks

- Between 1,100 and 1,600 people *die* as a result of invasive GAS disease annually in the US

- LTCF residents 1.5 times more likely to die from invasive GAS infections than the average population

- 10-15% of LTCF residents who acquire a GAS infection will die.

GAS Outbreak: 2017

- January 2017,
  - 2 Facilities in County X, North Carolina
  - ‘Sister’ facilities, owned by the same company

Public Health Response

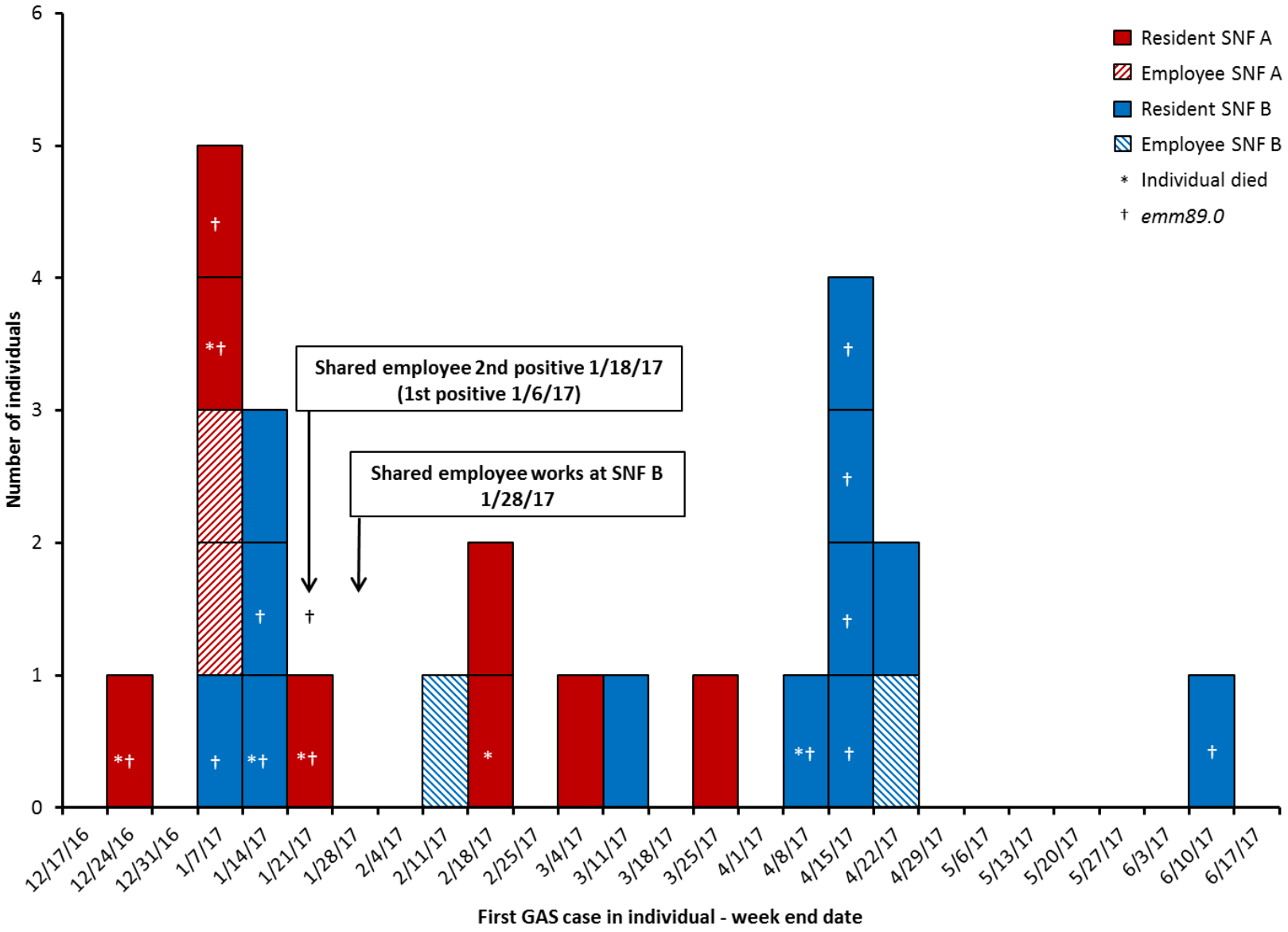
- Retrospective chart review
- Survey healthcare workers for GAS symptoms
- Culture close contacts
- 4 months active surveillance
- Site visit to assess infection control

Site Visit Findings: Infection Risk Factors

- Increased staff contact linked to illness
  - Significant nursing needs
  - Non-intact skin/wound care
  - Immobility/bed baths

- Link to inadequate infection control
  - Poor hand hygiene
  - Staff working while sick

GAS at 2 LTCFs, December 2016 – June 2017, N=24



Summary

- 24 Cases
  - **Facility A:** 10 cases (eight residents, 2 employees)
  - **Facility B:** 14 cases (12 residents, 2 employees)

- 6 residents died (case fatality rate=25%)

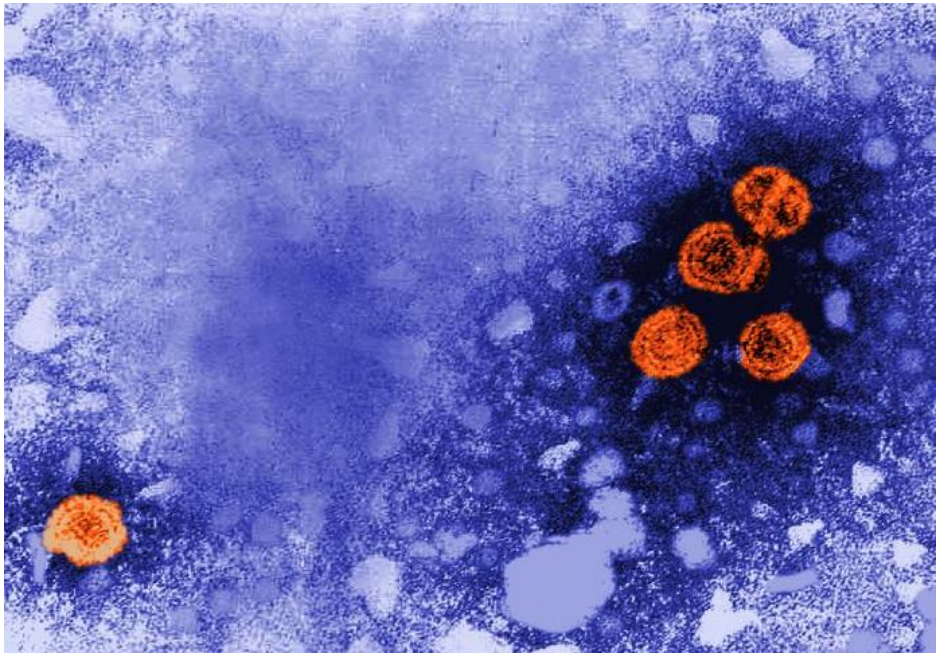
- Epi, laboratory, site assessments:
  - Substantial infection prevention gaps
  - Support conclusion that these are related outbreaks
  - Shared employee link between facilities, but not source

Prevention

- Strict attention to hand hygiene
- Keeping staff out while ill (i.e. sore throats)

Are key to preventing the spread of this condition

Hepatitis



Viral Hepatitis

Hepatitis B

- Vaccine-preventable infection
- 850,000 – 2.2 million persons with chronic infection in the US
- 19,200 estimated new infections in 2014
- Transmitted via blood and body fluids
- Prolonged survival (>7 days) in environment, on medical equipment

Hepatitis C

- Most common chronic bloodborne infection in US
  - 2.7 – 3.9 million with chronic infection nationwide
  - Highest prevalence among persons born 1945–1964 (“baby boomers”)
- 30,500 estimated new infections in 2014
- Transmitted through percutaneous exposure

- “…growing reservoir of infected individuals who can serve as a source of transmission to others if safe injection practices and other basic infection control precautions are not followed”

Perz et al, Hepatology 2012.‘Accepted Article’, doi: 10.1002/hep.25688

Outbreak: Tuesday, October 12, 2010

- County health department notified by infection preventionist at local hospital
- 4 cases of acute hepatitis
- Residents of the same assisted living facility

Investigation Methods

- Evaluated infection control practices
  - Observations
  - Interviews
- Searched for additional cases
  - Serologic testing of all residents
  - Hospital records, surveillance databases
- Epidemiologic study
  - Potential healthcare exposures, risk factors

HBV Outbreak in Assisted Living Facility

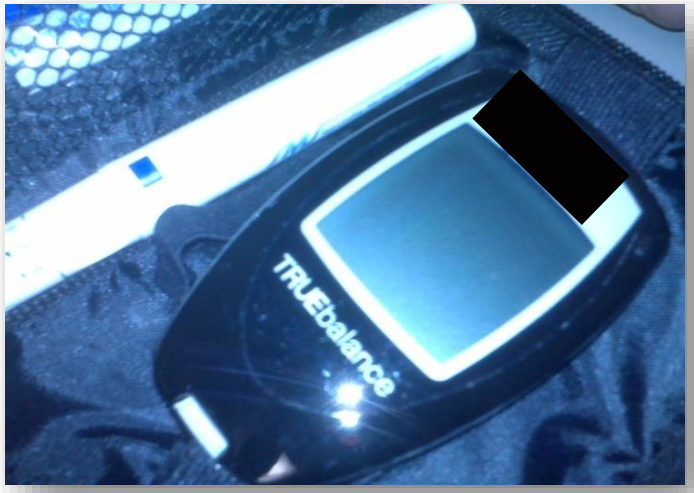
Cases identified	**8**
Mean age	**70.6 years**
Hospitalized	**8 (100%)**
Died	**6 (75%)**

Health Care Exposures

Exposure	Attack rate (%)	
	Exposed	Not exposed
Assisted BGM	8/15 (53)	0/25 (0)
Injected medication	4/16 (25)	4/22 (18)
Phlebotomy	4/25 (16)	4/15 (27)
Blood transfusion	0/1 (0)	8/38 (21)
Catheter device	0/3 (0)	8/37 (22)
Wound care	1/8 (13)	6/28 (21)

Infection Control Observations

- Glucose meters:
  - Used for more than one resident
  - Not disinfected between uses
- Adjustable lancing devices:
  - Used for more than one resident

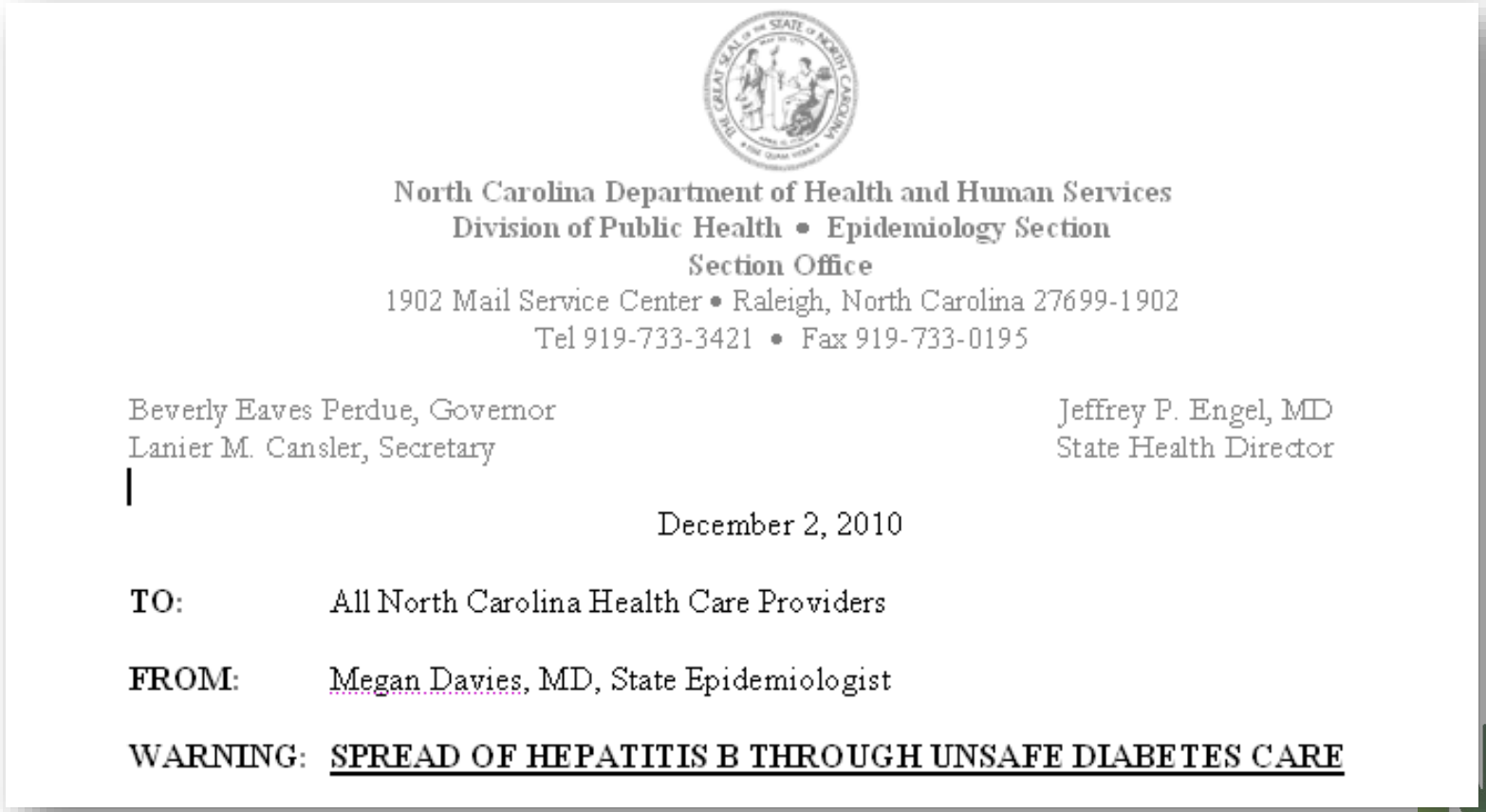


Recommendations to Facility

- Use single-use disposable lancets
- Purchase and use individual glucose meters for each resident
- Vaccinate all susceptible residents

Direct Communication to Providers

- Sent to all licensed facilities and providers statewide



North Carolina Department of Health and Human Services
Division of Public Health • Epidemiology Section
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Tel 919-733-3421 • Fax 919-733-0195

Beverly Eaves Perdue, Governor
Lanier M. Cansler, Secretary

Jeffrey P. Engel, MD
State Health Director

December 2, 2010

TO: All North Carolina Health Care Providers

FROM: Megan Davies, MD, State Epidemiologist

WARNING: **SPREAD OF HEPATITIS B THROUGH UNSAFE DIABETES CARE**

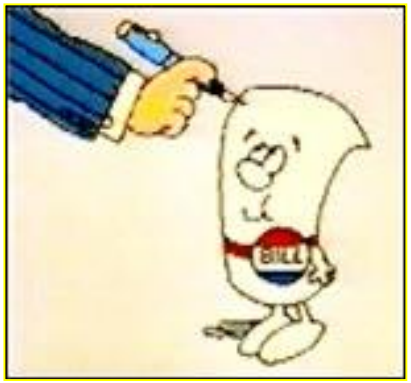
Safe Injection Practices

Safe Injection Practices

- Measures taken to perform injections in a safe manner for patients and providers
- Prevent transmission of infectious diseases from:
  - Patient to provider
  - Provider to patient
  - Patient to patient
- Bloodborne pathogens
  - Hepatitis B (HBV)
  - Hepatitis C (HCV)
  - Human Immunodeficiency Virus (HIV)

http://www.cdc.gov/injectionsafety/

“Act to Protect Adult Care Home Residents”



- Signed into law May 31st, 2011

- Requires:
  - Stronger infection prevention policies
  - Inspection and monitoring of infection prevention activities
  - Reporting of suspected outbreaks
  - Increased training and competency evaluation for medication aides, adult care home supervisors

Reporting Required by CMS

Center for Clinical Standards and Quality/Survey & Certification Group

Ref: S&C: 14-36-All

DATE: **May 30, 2014**

TO: State Survey Agency Directors

FROM: Director
Survey and Certification Group

SUBJECT: Infection Control Breaches Which Warrant Referral to Public Health Authorities

Memorandum Summary

- ***Infection Control Breaches Warranting Referral to Public Health Authorities:*** If State Survey Agencies (SAs) or Accrediting Organizations (AOs) identify any of the breaches of generally accepted infection control standards listed in this memorandum, they should refer them to appropriate State authorities for public health assessment and management.

- ***Identification of Public Health Contact:*** SAs should consult with their State's Healthcare Associated Infections (HAI) Prevention Coordinator or State Epidemiologist on the preferred referral process. Since AOs operate in multiple States, they do not have to confer with State public health officials to set up referral processes, but are expected to refer identified breaches to the appropriate State public health contact identified at: http://www.cdc.gov/HAI/state-based/index.html

Surveyors Must Report to State

Breaches to Be Referred

When one or more of the following infection control breaches is identified during any survey of a Medicare- and/or Medicaid-certified provider/supplier, the SA or AO should make the appropriate State public health authority aware of the deficient practice:

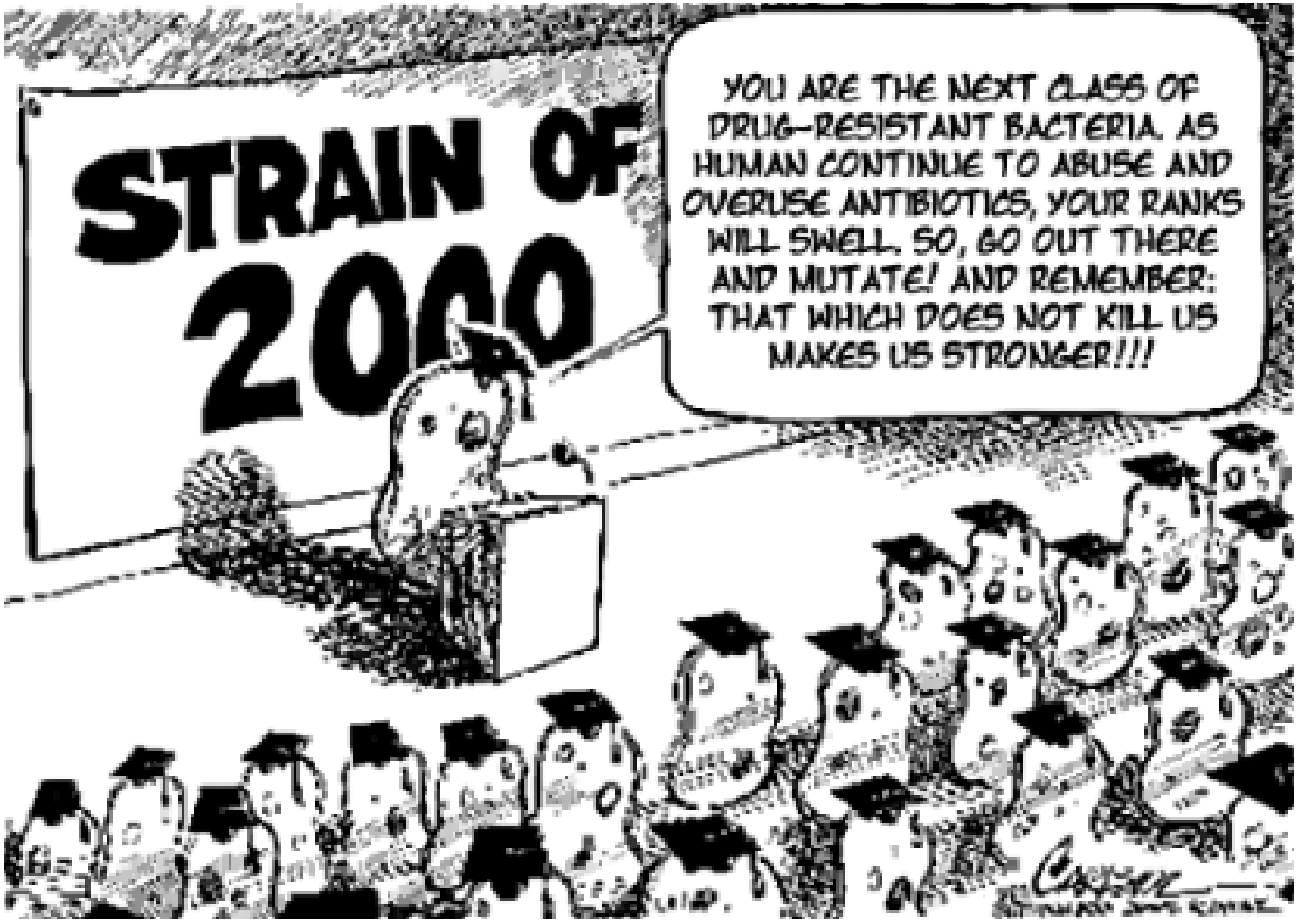
- Using the same needle for more than one individual;
- Using the same (pre-filled/manufactured/insulin or any other) syringe, pen or injection device for more than one individual;
- Re-using a needle or syringe which has already been used to administer medication to an individual to subsequently enter a medication container (e.g., vial, bag), and then using contents from that medication container for another individual;
- Using the same lancing/fingerstick device for more than one individual, even if the lancet is changed.

Public Health Role in Safe Injection Practices

- Raise awareness of safe injection practices and eradicate outbreaks resulting from unsafe injection practices
  - Collaborative efforts
  - Forging new partnerships
  - Safe injection education for licensed professionals

- Investigate outbreaks of disease related to unsafe injection practices

Multidrug-Resistant Organisms (MDROs)



Multidrug-resistant Organisms (MDROs)

- Resistant to multiple types of antibiotics
- Can cause infection in any part of the body
- Intra- and inter-facility spread
- Vulnerable patients at risk for infection
- Infections are difficult to treat and can be associated with high mortality rates

- Cause ~2 million infections in United States annually
  - 23,000 deaths

Multidrug-Resistant Organisms

- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Vancomycin Intermediate/Resistant Staphylococcus aureus (VISA/VRSA)
- Vancomycin-resistant *Enterococcoccus* (VRE)
- Extended-spectrum Beta-Lactamases (ESBL)
- Carbapenem-resistant *Enterobacteriaceae* (CRE)

Multidrug-Resistant Organism Threats

URGENT

- Carbapenem Resistant Enterobacteriaceae
- Clostridium Difficile
- Drug-resistant Neisseria Gonorrhoeae

SERIOUS

- Multidrug Resistant Acinetobacter
- Drug Resistant Campylobacter
- Fluconazole Resistant Candida
- Extended Spectrum Enterobacteriacea (ESBL)
- Vancomycin Resistant Enterococcus (VRE)
- Multidrug Resistant Pseudomonas Aeruginosa
- Drug resistant Non-Typhoidal Salmonella
- Drug Resistant Salmonella Serotype Typhi
- Drug Resistant Shighella
- Methicillin Resistant Staph Aureus
- Drug Resistant Strep Pneumoniae
- Drug Resistant Tuberculosis

CONCERNING

- Vancomycin Resistant Staphylococcus Aureus
- Erythromycin Resistant Group A Streptococcus
- Clindamycin Resistant Group B Streptococcus

Multidrug-Resistant Organism Threats

URGENT

- Carbapenem Resistant Enterobacteriaceae
- Clostridium Difficile
- Drug-resistant Neisseria Gonorrhoeae

SERIOUS

- Multidrug Resistant Acinetobacter
- Drug Resistant Campylobacter
- Fluconazole Resistant Candida
- Extended Spectrum Enterobacteriacea (ESBL)
- Vancomycin Resistant Enterococcus (VRE)
- Multidrug Resistant Pseudomonas Aeruginosa
- Drug resistant Non-Typhoidal Salmonella
- Drug Resistant Salmonella Serotype Typhi
- Drug Resistant Shighella
- Methicillin Resistant Staph Aureus
- Drug Resistant Strep Pneumoniae
- Drug Resistant Tuberculosis

CONCERNING

- Vancomycin Resistant Staphylococcus Aureus
- Erythromycin Resistant Group A Streptococcus
- Clindamycin Resistant Group B Streptococcus

Extended-Spectrum Beta-Lactamases (ESBLs)

- Enzyme → can be produced by Gram-negative bacteria
- Resistant
- Endemic
- Spread via direct and indirect contact

Public Health Significance

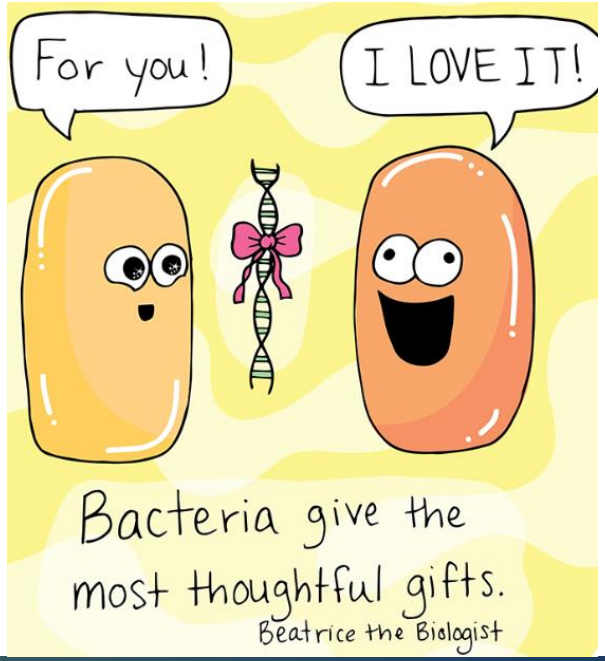
- Affects vulnerable patient populations
- Difficult to treat
- **Improper treatment → organisms may produce another enzyme called carbapenemase**

Carbapenem-Resistant Enterobacteriaceae (CRE)

- Resistant to nearly all antibiotics
- Carbapenemase producing CRE (CP CRE)
  - Klebsiella pneumoniae carbapenemase (KPC),
  - New Delhi metallo-β-lactamase (NDM),
  - Verona integron encoded metallo-β-lactamase (VIM),
  - Imipenemase metallo-β-lactamase (IMP)
  - Oxacillinase-48 (OXA-48)

Public Health Significance

- Highly resistant
- Mobile resistance elements
- >9,000 healthcare-associated infections each year
- Up to 50% mortality



Investigation

- Notified by LHD on April 21, 2017 (a Friday!)
  - Increase in the number infections caused by a specific MDRO among patients admitted to local hospital between October 16, 2016 and April 13, 2017

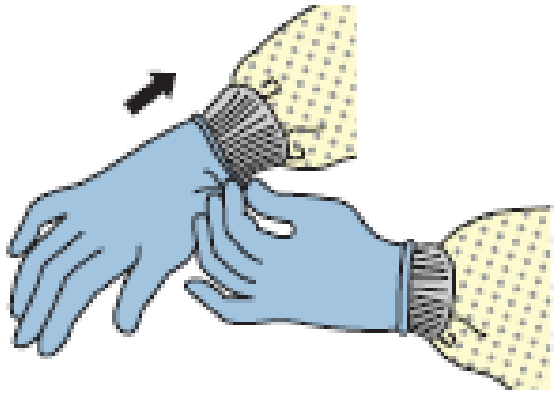
- Majority of cases were residents of three long-term care facilities (LTCFs)

- Coordinated an investigation to:
  - **Assess infection prevention practices among these LTCFs,**
  - **Prevent further intra- and inter- facility spread of disease**

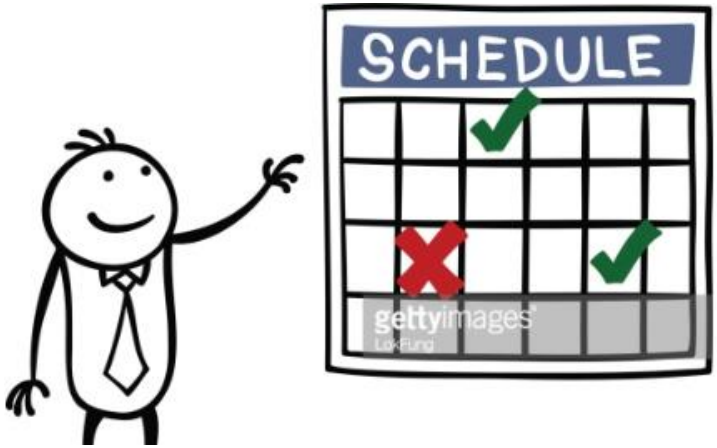
Investigation, cont.

- 4 cases were discussed on Friday but > 40 positive labs were waiting for us on Monday morning!

Initial Control Measures



Gown and gloves



Prevent opportunities for transmission

Hand hygiene

Site Visit Findings

- **Hand hygiene:** inconsistent ✘
- **Wound care:** reusing scissors, interruptions in flow from clean to dirty ✘
- **OT/PT:** contact precautions not adequately maintained, lack of dedicated equipment ✘
- **Contact precautions:** implemented to varying degrees ✘
- **Lack of inter-facility notification** ✘
- **Outdated policies** ✘

Control Measures

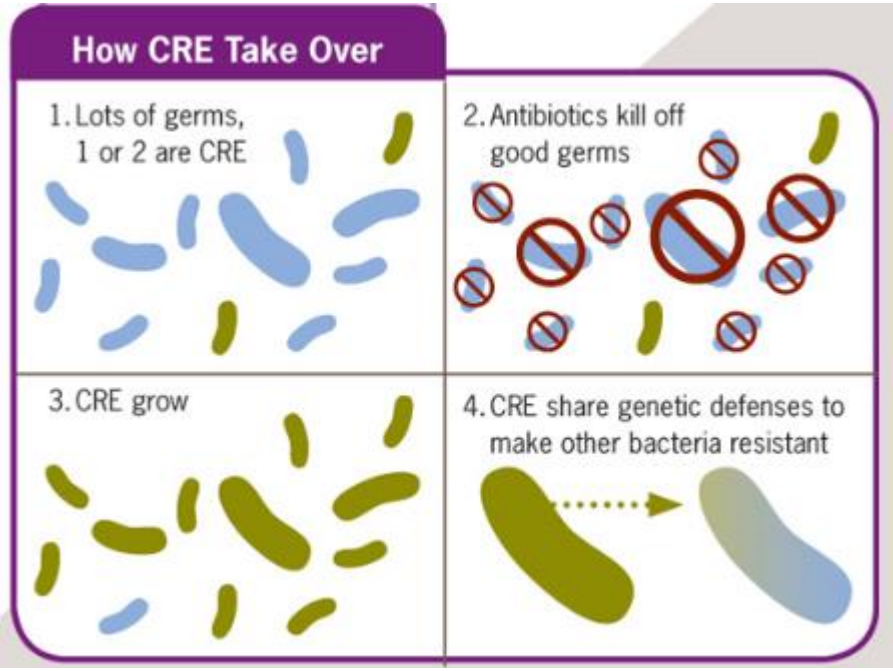
1. Staff Education
2. Laboratory notification
3. Cohort infected residents
4. Contact precautions for colonized and infected individuals at higher risk for transmission
5. Hand Hygiene
6. Environmental cleaning
7. Communicate MDRO status to transferring and receiving facilities
8. Review infection prevention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

CRE alert

Site Visit: Control Measures

1. Staff Education

- In service education on Infection prevention
- NC administrative code 10A NCAC 41A .0206



Site Visit: Control Measures

3. Cohort infected residents

Consider: physical location, ancillary services/care, environmental cleaning, equipment

Site Visit: Control Measures

4. Contact precautions

- Colonized and infected individuals at higher risk for transmission

Site Visit: Control Measures

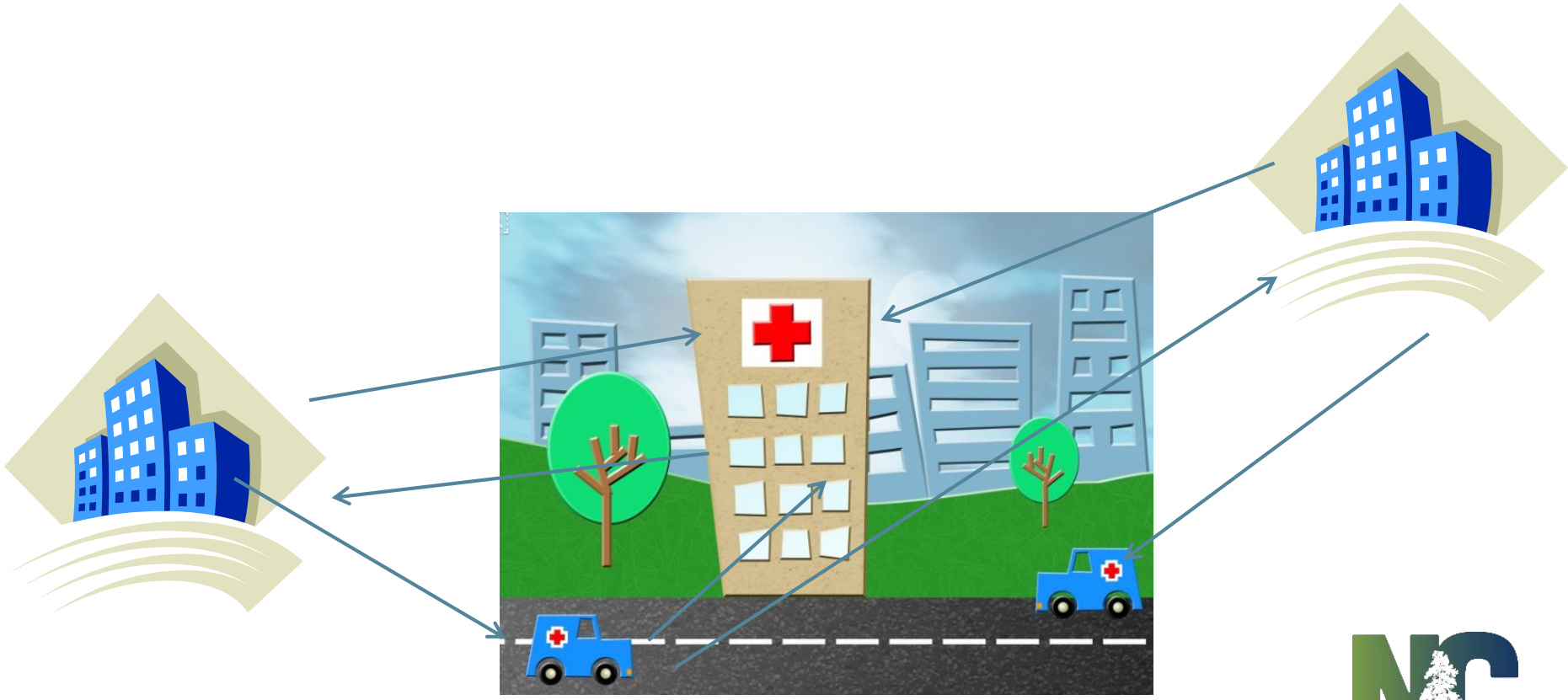
5. Hand Hygiene

Site Visit: Control Measures

6. Environmental cleaning

Site Visit: Control Measures

7. Communicate CRE status to transferring and receiving facilities



Communication between Healthcare Facilities

- Useful
  - Patient status/needs
  - Care plan

- Required by CMS
  - Reform of Requirements for Long-Term Care Facilities
  - (proposed) Revisions to Requirements for Discharge Planning for Hospitals, Critical Access Hospitals, and Home Health Agencies

- Beneficial re: MDROs
  - Protects patients / residents
  - Contains healthcare costs
  - Prevents the spread of MDROs

NC DPH Interfacility Transfer Form

Benefits

- Standardized format for interfacility communication of patient MDRO status during transfer
- Information needed/desired during transfer all in one place
- Complies with Reform of Requirements for Long-term Care Facilities (CMS)
- http://epi.publichealth.nc.gov/cd/hai/docs/InterfacilityTransferInstructionsandForm.pdf

Site Visit: Control Measures

8. Review infection prevention policies and procedures
    - Review annually
    - Assess staff competency with specific attention to the following:
        - Hand Hygiene
        - Donning and doffing of PPE
        - Contact Precautions
    - Enroll the staff member in charge of infection prevention in training required by NCAC Rule .0206

MDRO Cases by Week of Culture, County A, October 22, 2016–November 30, 2017 (n=83*)

*excluding repeat cultures (same patient/same organism)

Early detection and aggressive implementation of control measures are key to prevention and control

Why Involve Public Health?

- Investigations require communicable disease / infection prevention expertise and experience
- Uniquely qualified to assess patient risk
- Complex problem
- Threats to public's health
- IT'S OUR JOB!

Public Health
Prevent. Promote. Protect.

Resources

- NC Division of Public Health, SHARPPS Program
  - http://epi.publichealth.nc.gov/cd/diseases/hai.html
- Exposure Investigations
  - NC ADMINISTRATIVE CODE, TITLE 10A, SUBCHAPTER 41A
  - https://www.cdc.gov/niosh/topics/bbp/guidelines.html
- MDROs
  - Management of Multidrug Resistant Organisms in Healthcare Settings, 2006 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
  - NC DPH MDRO Toolkit for Long-Term Care Factilities http://epi.publichealth.nc.gov/cd/docs/MDROToolkit_r2.pdf
- Safe Injection Practices
  - http://www.oneandonlycampaign.org/
  - http://www.oneandonlycampaign.org/partner/north-carolina
  - http://www.cdc.gov/injectionsafety/drugdiversion/index.html
- Antimicrobial Stewardship
  - http://epi.publichealth.nc.gov/cd/antibiotics/campaign.html
- Centers for Disease Control and Prevention
  - Legionella: https://www.cdc.gov/legionella/
  - GAS: https://www.cdc.gov/groupastrep/

Thank you!

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Please either…

- ***Un-mute your line***
- ***Type in the chat box***

THANK YOU FOR YOUR TIME AND SUPPORTING RESIDENT SAFETY!

ADDITIONAL RESOURCES

- Statewide Program for Infection Control & Epidemiology (SPICE)
  - https://spice.unc.edu/
- Infection Management & Antibiotic Stewardship (UNC)
  - https://nursinghomeinfections.unc.edu/
- Centers for Disease Control & Prevention (CDC)
  - https://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
- Agency for Healthcare Research & Quality (AHRQ)
  - https://www.ahrq.gov/nhguide/index.html
- Minnesota Department of Health (MDH)
  - http://www.health.state.mn.us/divs/idepc/dtopics/antibioticresistance/asp/ltc/index.html