Infection Prevention, Outbreaks, and the Role of Public Health

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North Carolina Division of Public Health

Fall 2023

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Objectives

- Describe legal framework for disease surveillance, investigation, and response
- Review outbreak surveillance data and trends over time
- Discuss when to call Public Health
- Discuss role of Public Health in infection prevention and outbreak response
- Describe two outbreaks in long-term care settings

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Legal Framework

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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

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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**

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

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Public Health Law

- **10A NCAC 41A .0106**
  - Infection Prevention – Reporting of Healthcare Associated Infections
- **10A NCAC 41A .0206**
  - Infection Prevention – Health Care Settings; 1992
- **10A NCAC 41A .0201**
  - General Control Measures
- **10A NCAC 41A .0202 - .0205**
  - Control Measures for HIV, Hepatitis B, STDs, TB

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Role of Public Health

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NC Division of Public Health

Mission

North Carolina Public Health works to promote and contribute to the highest possible level of health for the people of North Carolina.

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NC SHARPPS Program

Mission

To work in partnerships to prevent, detect, and respond to events and outbreaks of healthcare-associated and antimicrobial resistant infections in North Carolina.

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SHARPPS Program Activities

Surveillance, Investigation & Response	Prevention, Education & Training	Monitoring & Evaluation	Communication
HAI reporting to NHSN MDRO surveillance DHSR Infection Prevention Breach reporting Outbreak & Exposure management	Antimicrobial resistance & stewardship Infection Control, Assessment & Response (ICAR) Drug Diversion Partnerships	Data validation TAP reports Identification, evaluation of aberrant data (CLABSI, CDI)	HAI data reports Newsletters Webinar updates Social Media Tabletop Exercises Partnerships

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When Should Public Health Be Called?

- Reportable diseases / conditions (10A NCAC 41A .0101)
  - https://epi.dph.ncdhhs.gov/cd/report.html (Form 2124)
- When **any** disease is above normal baseline (i.e., an "outbreak")
- Report suspected infection prevention breach

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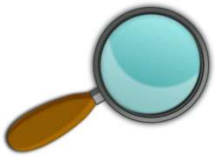
What Happens After Public Health Is Called?

- Data review
- Clinical investigation
- Environmental investigation
- Control measures
- Communication
  - Resident/staff/family/public
- Laboratory Support



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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, MERS, Ebola)

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Who Should Be Called?

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

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Outbreak Assistance

We can assist with:

- Determining if it is an outbreak
- Guidance, tools and onsite support
- Facilitating and coordinate calls with partners
- Written recommendations

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Outbreak Summary

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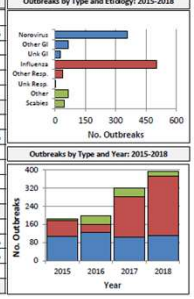
2015-2018 Outbreak Summary

TYPE AND ETIOLOGY

Type	Etiology	2015	2016	2017	2018	Total	%
Gastrointestinal (GI) Causes							
41%	Norovirus	78	95	88	97	358	80%
	Salmonella	4	2	4	5	15	3%
	Shigella	11	11	4	1	27	6%
	Other GI	11	3	3	6	23	5%
	Unknown	4	14	4	2	24	5%
	Total	108	125	103	111	447	
Respiratory Causes							
49%	Influenza	66	25	165	246	502	93%
	Pertussis	1	2	8	7	18	3%
	Legionella	0	2	3	0	5	1%
	Other Respiratory	2	3	2	7	14	3%
	Unknown	0	3	0	0	3	1%
	Total	69	35	178	260	542	
Other Causes							
10%	Other	6	19	22	16	63	58%
	Scabies	2	20	17	7	46	42%
	Total	8	39	39	23	109	
Total Outbreaks		185	199	320	394	1098	



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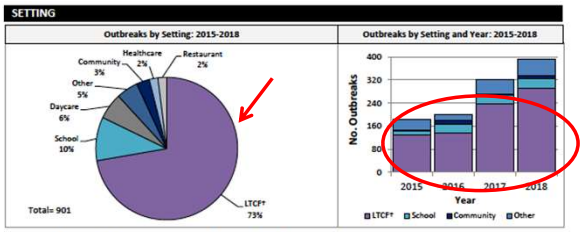
2015-2018 Outbreak Summary

SETTING



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

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2019-2022 Outbreak Summary

Year	# Outbreaks	# Outbreak cases
2019	347	>9,000
2020*	214	>2,800
2021*	88	>1,200
2022*	241	>5,400

*Excluding COVID-19 outbreaks

Decrease in number of outbreaks during COVID is primarily due to fewer influenza and norovirus outbreaks in LTCFs

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Safe Injection Practices

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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
- Pathogens
  - Bloodborne – Hepatitis B (HBV), Hepatitis C (HCV), Human Immunodeficiency Virus (HIV)
  - Bacterial, fungal

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

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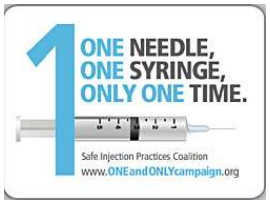
Public Health Role in Safe Injection Practices

- Raise awareness about safe injection practices
- Prevent disease transmission from unsafe injection practices



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North Carolina Hepatitis Outbreaks, Non-Hospital Settings

Setting	Year	Type	No. Incident Infections
Cardiology	2008	HCV	5
ALF	2010	HBV	8
SNF	2010	HBV	6
SNF	2010	HBV	6
Dialysis	2013	HBV	1
Total			**26**

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Drug Diversion

- When prescription medicines are obtained or used illegally
- CDC has formally labeled it an "epidemic"
- 1983–2018
  - 7 HCV outbreaks linked to drug diversion by infected health care providers
    - 6 hospitals and 1 ambulatory surgery center
    - >156 new infections linked to these outbreaks
  - 6 bacterial outbreaks
    - 74 infections

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

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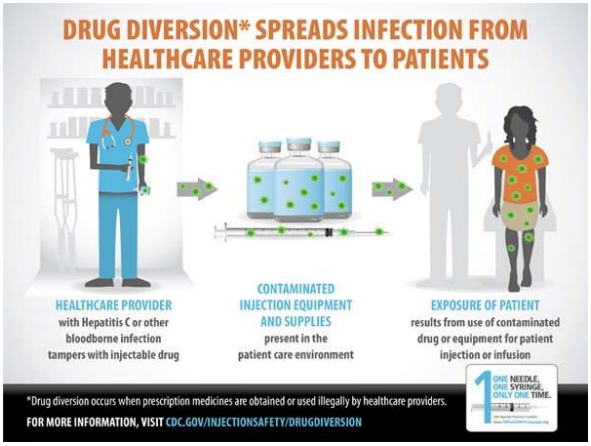

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Multidrug-Resistant Organisms (MDROs)

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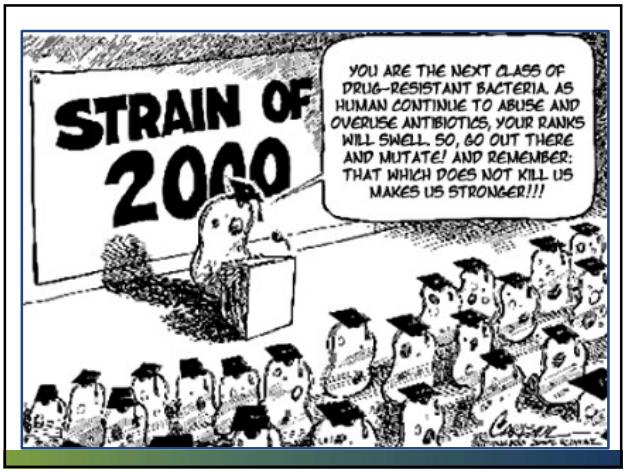

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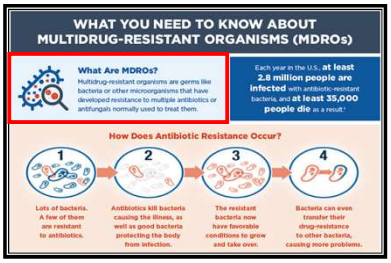
Multidrug-resistant Organisms (MDROs)



https://epi.dph.ncdhhs.gov/cd/diseases/hai.html

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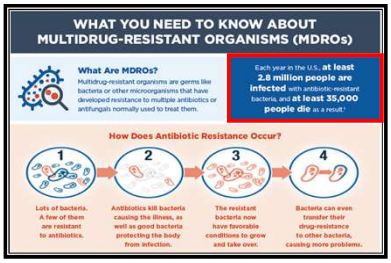
Multidrug-resistant Organisms (MDROs)



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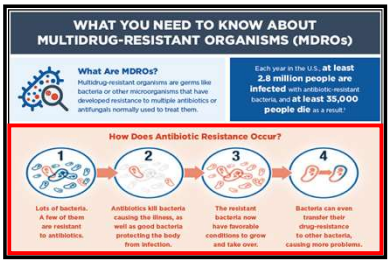
Multidrug-resistant Organisms (MDROs)



https://epi.dph.ncdhhs.gov/cd/diseases/hai.html

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Significance of MDROs

- MDROs are pathogens that are resistant to one or more classes of antimicrobial treatment
- Affect vulnerable patient populations
- Are easily transmitted in and between healthcare/congregate care settings
- Difficult to treat and may require more toxic antibiotics
- Improper treatment → some organisms may produce another enzyme that makes it easier to transmit resistance
- Increase in mortality, healthcare costs, length of stays
- Estimates of economic costs vary, up to $20 BILLION in direct healthcare costs

https://www.cdc.gov/antibiotic-use/community/about/antibiotic-resistance-faqs.html

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Carbapenem-Resistant Enterobacterales (CRE)

- First recognized in US in 2001
- Enterobacterales = gut bacteria
  - *Klebsiella spp.*
  - *E. Coli*
  - *Enterobacter* spp.
- Resistant to nearly all antibiotics

- Many ways to be resistant
  - 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)

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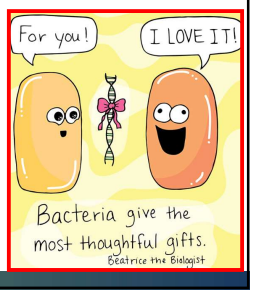
Significance of Carbapenemase producing CRE

- "Urgent public health threat" – CDC
- Highly resistant
- Mobile resistance elements
- >9,000 healthcare-associated infections each year
- Up to 50% mortality



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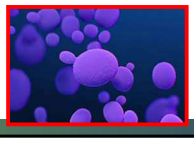
Candida auris

- Multidrug-resistant fungus that spreads easily in healthcare settings
  - 90% are resistant to at least one antifungal
  - 30% are resistant to at least two antifungals
- Cases are spiking in the US, increasing from 323 in 2018 to 2,377 in 2022
- The first case of *C. auris* acquired in NC was identified in February 2023, 20 cases to date
- Vulnerable patients with lots of healthcare exposures are at the highest risk



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Outbreaks

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#1: (Un)Safe Injection Practices

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Tuesday, October 12

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

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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

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HBV Outbreak in Assisted Living Facility

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

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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)

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Infection Control Observations

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


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Recommendations to Facility

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

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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
Section Office
1902 Mail Service Center • Raleigh, North Carolina 27699-1902
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

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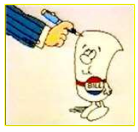
"Act to Protect Adult Care Home Residents"

- 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



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CMS Required Reporting

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

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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.

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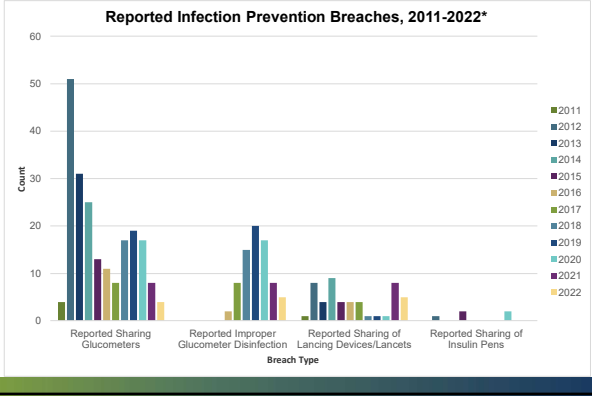
Infection Prevention Breaches



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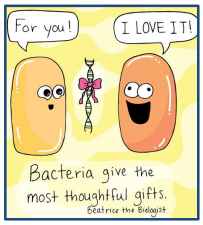
#2: Multidrug Resistant Organisms



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Investigation

- Notified by LHD on April 21, 2017 (a Friday!)
  - Increase in the number infections caused by ESBL-producing organisms 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 and prevent further intra- and inter- facility spread of disease**

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

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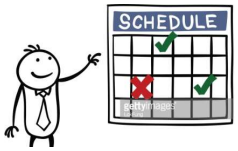
Initial control measures

Gown and gloves



Prevent opportunities for transmission

Hand hygiene

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Site Visit

Investigate to stop transmission & prevent future outbreaks

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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** ✖

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Control Measures

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

CRE alert

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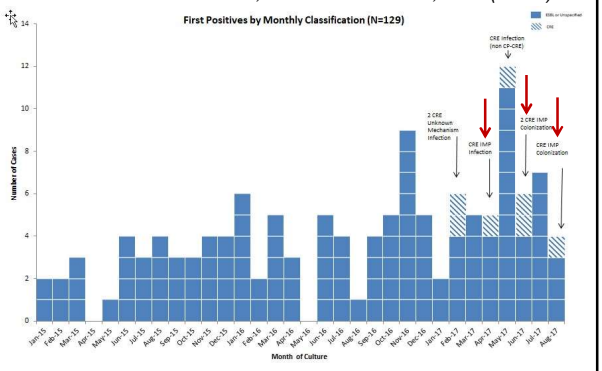
New onset ESBL and CRE cases among local hospital ED visits and admissions October 22, 2016–November 30, 2017 (n=83)*



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Communication between Healthcare Facilities

- Useful
  - Patient status/needs
  - Care plan
- Beneficial
  - Protects patients/residents
  - Controls healthcare costs
  - Prevents spread of MDROs
- Required by CMS
  - Reform of Requirements for Long-Term Care Facilities
  - Revisions to Requirements for Discharge Planning for Hospitals, Critical Access Hospitals, and Home Health Agencies (final rule: September 30, 2019)

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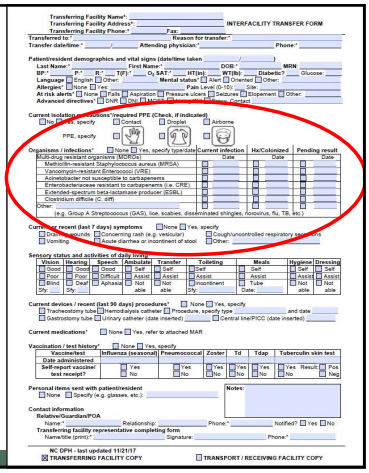
Sections

- Facility Information
- Demographics
- Current status
- Medications
- Vaccination/test hx.
- Personal items
- Contact information



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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 CMS requirements for interfacility communication
- http://epi.publichealth.nc.gov/cd/hai/docs/InterfacilityTransferInstructionsandForm.pdf

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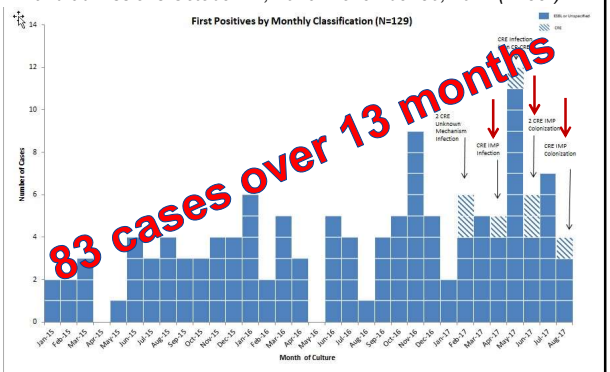

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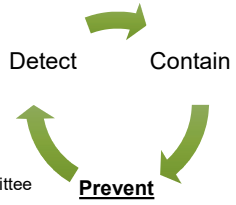
Responding to MDROs

- Detect MDROs
  - Increased awareness and testing
  - ARLN
  - CSTE position statement
- Ensure rapid response & containment
  - Prevent transmission
  - Inter-facility communication
- Stewardship efforts
  - Antimicrobial resistance subcommittee
  - Get Smart Campaign
- Education
  - Collaborative effort (SPICE, DPH, LHD)



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

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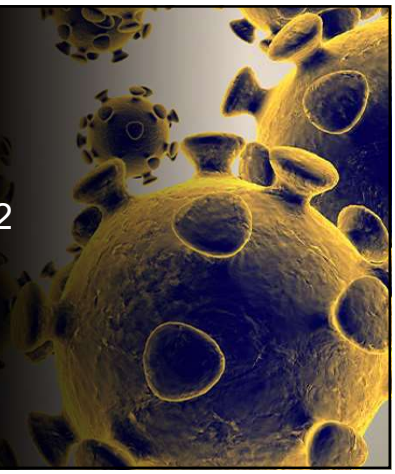
Emerging Infections: SARS-CoV-2 (COVID-19)



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Tis the (respiratory virus) season!

- Encourage vaccine uptake in staff and residents
- Provide face masks, tissues and hands-free trash can, hand sanitizer throughout facility
- Post signs with respiratory hygiene/cough etiquette reminders
- Ensure staff do not work while sick

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Tis the (respiratory virus) season!

CDC has recently compiled guidance and a toolkit to help prevent and slow the spread of flu, RSV, and COVID-19:

- Preventing Transmission of Viral Respiratory Pathogens in Healthcare Settings
- Viral Respiratory Pathogens Toolkit for Nursing Homes

Reporting reminders:

- CMS certified skilled nursing facilities required to report COVID cases through December 2024
- All LTCFs should continue to report outbreaks—including COVID, flu, and RSV—to their local health department

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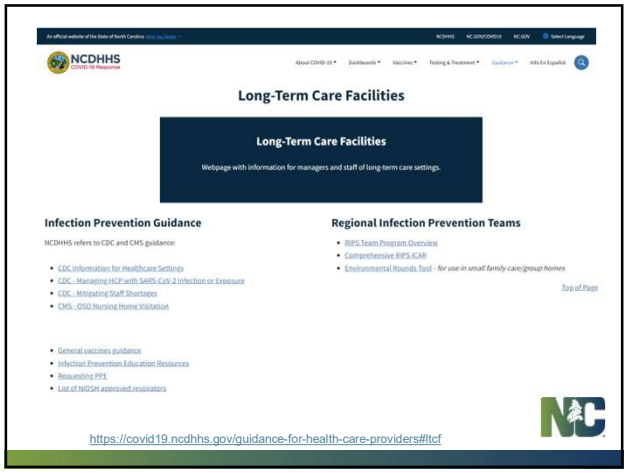

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Why Involve Public Health?

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

Public Health
Prevent. Promote. Protect.

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Regional Infection Prevention Support Team

Infection prevention saves lives

Infection prevention support, education, and training to protect the highly vulnerable residents of NC's long-term care facilities

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Regional Infection Prevention Support (RIPS) Teams

- Work collaboratively with facilities to ensure they are providing the highest quality care
  - Not regulatory or punitive
  - Support all types of long-term care facilities, including family care homes and mental/behavioral health
- Provide:
  - Staff training/education on infection prevention policies and practices
  - Support for COVID and other communicable conditions
  - Site assessments
  - Consultation
  - Outbreak management and response

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RIPS Team Results

- To date, the RIPS teams have:
  - Contacted over 4,000 long-term care facilities
  - Completed over 5,600 on-site visits
  - Conducted over 2,800 in-depth infection control assessments
- On these visits, the teams:
  - Teach staff about infection prevention using practical, hands-on techniques
  - Provide customized infection prevention recommendations
  - Assist with vaccine implementation and N-95 fit testing
  - Build partnerships between public health and long-term care

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Resources

- NC Division of Public Health, SHARPPS Program
  - http://epi.publichealth.nc.gov/cd/diseases/hai.html
- Safe Injection Practices
  - https://www.cdc.gov/injectionsafety/one-and-only.html
  - http://www.cdc.gov/injectionsafety/drugdiversion/index.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/infectioncontrol/pdf/guidelines/mdro-guidelines.pdf
  - NC DPH CRE information for Long-Term Care Facilities https://epi.dph.ncdhhs.gov/cd/cre/SummaryOfRecommendations_Jan2019.pdf
    NC DPH MDRO Toolkit for Long-Term Care Facilities https://epi.dph.ncdhhs.gov/cd/docs/MDROToolkit_080819.pdf
- Antimicrobial Stewardship
  - http://epi.publichealth.nc.gov/cd/antibiotics/campaign.html

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Thank you!

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