



Infection Prevention, Outbreaks, and the Role of Public Health

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SHARPPS Program
North Carolina Division of Public Health
Fall 2025

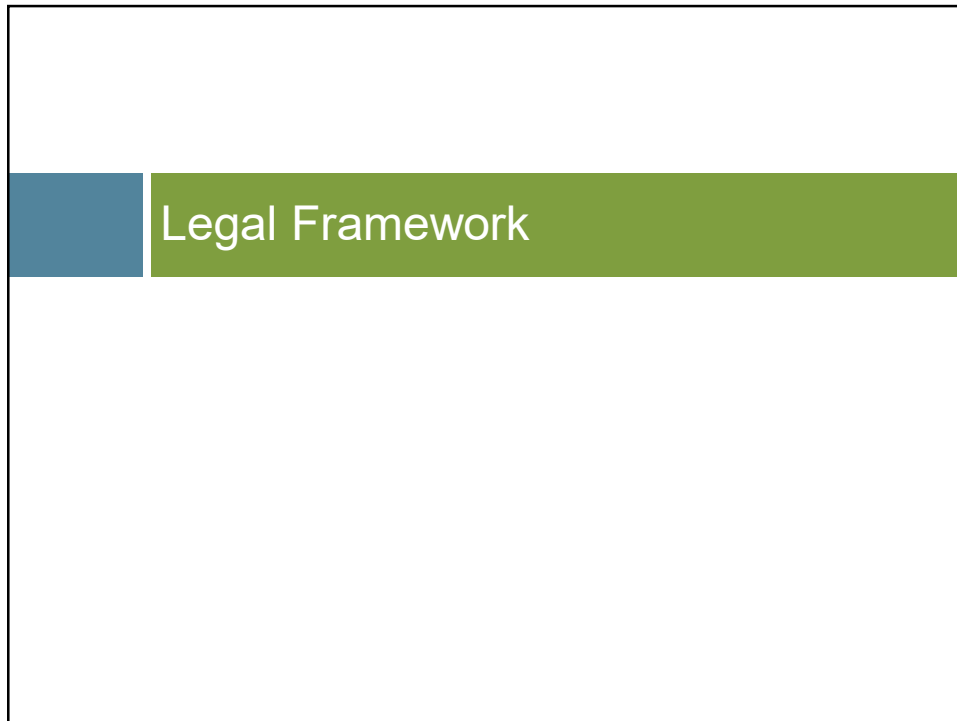
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Objectives

- 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 an outbreak response in a long-term care setting



2



3

A presentation slide with a white background and a black border. The left side features a large green rectangle with the text "Public Health: Legal Framework" in white, italicized font. The right side contains two colored boxes: a purple one at the top and a yellow one below it. The purple box is titled "Public Health Laws and Rules:" and contains a bulleted list of "General Statutes" and "NC Administrative Code rules". The yellow box is titled "Health Director's Authority (State & Local)" and contains a bulleted list of "Surveillance", "Investigation", and "Control Measures". The NC logo is in the bottom right corner.

*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

NC

4

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...



5

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**



6

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



7

Public Health Law

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



8

Role of Public Health

9

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.



10

NC SHARPPS Program

SHARPPS= Surveillance for Healthcare-Associated Infections and Resistant Pathogens Patient Safety

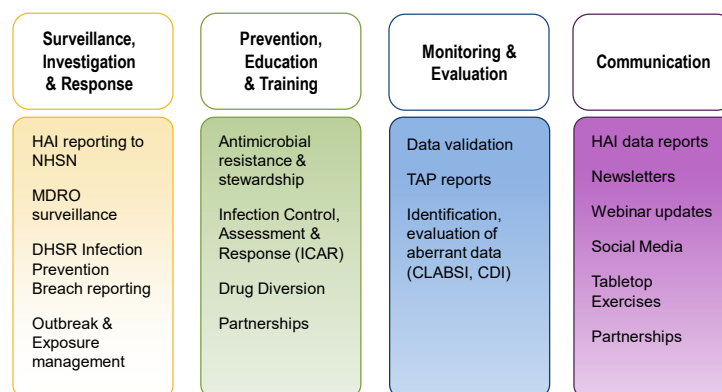
Mission

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



11

SHARPPS Program Activities



12

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

13

Who Should Be Called?

- Your supervisor/manager
- Local health department

Other Resources

- North Carolina Division of Public Health 24/7 epidemiologist on call: 919-733-3419
 - SHARPPS Program: nchai@dhhs.nc.gov
 - Infection Prevention Program: infectionprevention@dhhs.nc.gov
- North Carolina Statewide Program for Infection Control and Epidemiology (NC SPICE)
- Local hospital infection preventionist

14

What Happens After Public Health Is Called?

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



15

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)



16

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



17

Examples of Responses

- Multidrug Resistant Acinetobacter (CRAB) in a nursing home
- Acute Hepatitis B among shared glucometer patients
- Potential *C. auris* transmission in dialysis facility
- Post-op endocarditis among patients receiving same surgical device
- Legionellosis associated with healthcare facilities
- National responses:
 - Non-tuberculosis mycobacterium (NTM) and heater-cooler units
 - Resistant *Pseudomonas* and artificial tears
 - Botulism-like illness following cosmetic surgery

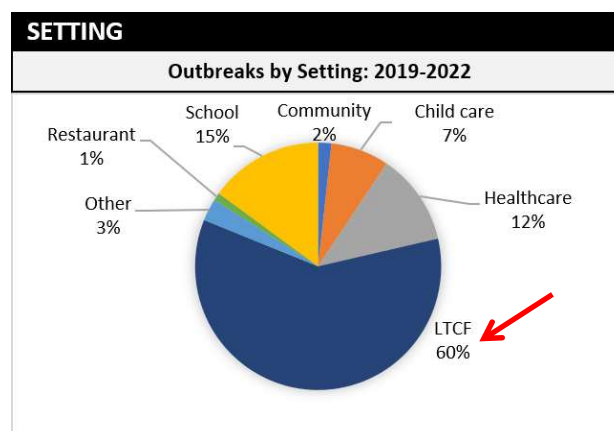


18

Outbreak Summary

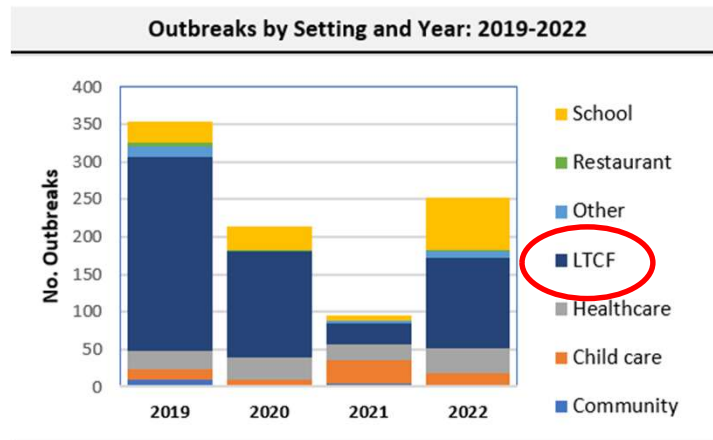
19

2019-2022 Outbreak Summary



20

2019-2022 Outbreak Summary



21

Safe Injection Practices



22

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/>



23

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



24

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



25

HBV Outbreak in Assisted Living Facility

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



26

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)



27

Infection Control Observations

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



28

Recommendations to Facility

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



29

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

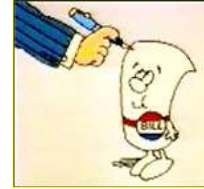
WARNING: SPREAD OF HEPATITIS B THROUGH UNSAFE DIABETES CARE



30

“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



31

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>



32

Surveyors must report to State

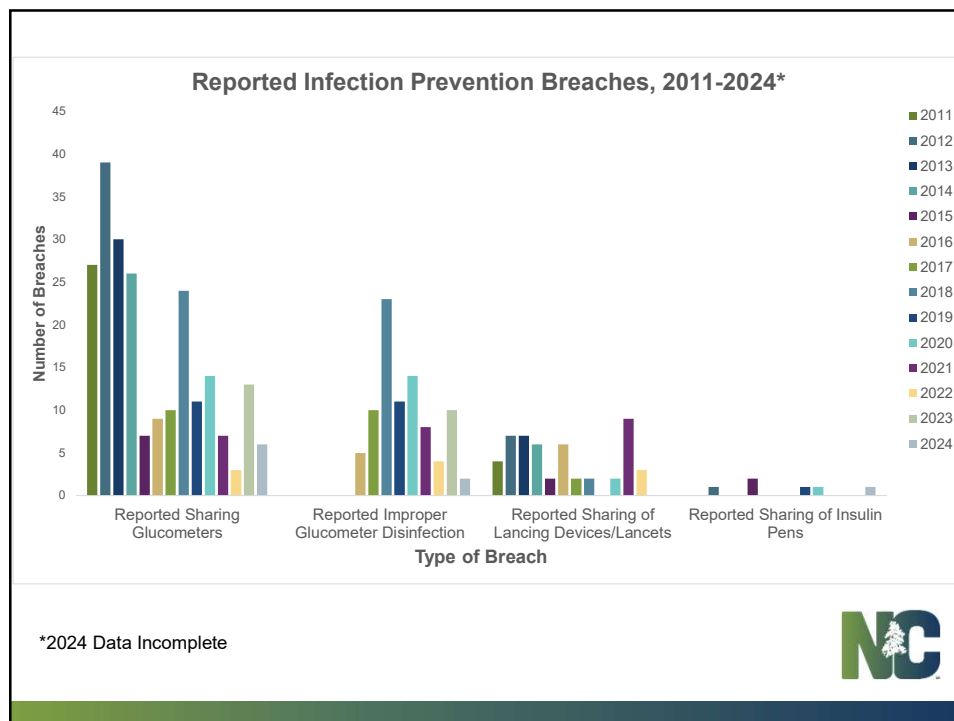
Breaches to Be Referred

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.



33



34

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
SNF	2024	HBV	1
Total			27

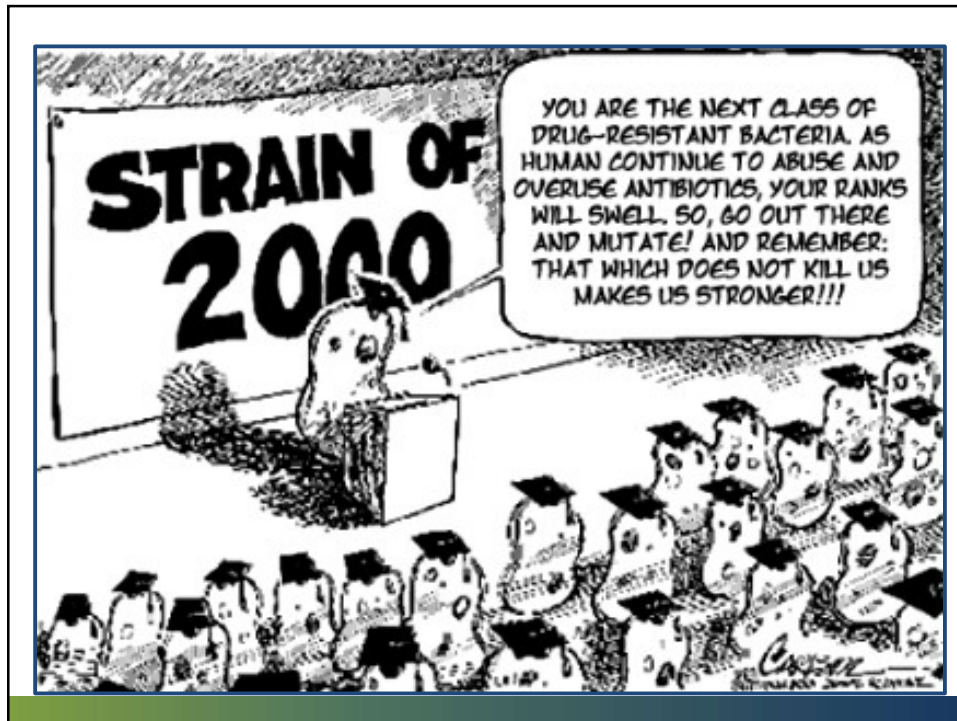


35

Multidrug-Resistant Organisms (MDROs)



36



37

Multidrug-resistant Organisms (MDROs)

WHAT YOU NEED TO KNOW ABOUT MULTIDRUG-RESISTANT ORGANISMS (MDROs)

What Are MDROs?
Multidrug-resistant organisms are germs like bacteria or other microorganisms that have developed resistance to multiple antibiotics or antifungals normally used to treat them.

Each year in the U.S., **at least 2.8 million people are infected** with antibiotic-resistant bacteria, and **at least 35,000 people die** as a result.

How Does Antibiotic Resistance Occur?

1

Lots of bacteria. A few of them are resistant to antibiotics.

2

Antibiotics kill bacteria causing the illness, as well as good bacteria protecting the body from infection.

3

The resistant bacteria now have favorable conditions to grow and take over.

4

Bacteria can even transfer their drug-resistance to other bacteria, causing more problems.

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

38

19

Significance of MDROs

- Affects vulnerable patient populations
- Are easily transmitted in and between healthcare / congregate care settings
- Difficult to treat
 - Require more toxic antimicrobials to treat
- Improper treatment
 - Some organisms may produce another enzyme that makes it easier to transmit resistance
- Cause increase in:
 - Mortality
 - Healthcare costs
 - Length of stays
- Estimates of economic costs vary, up to 20 BILLION dollars in direct healthcare costs

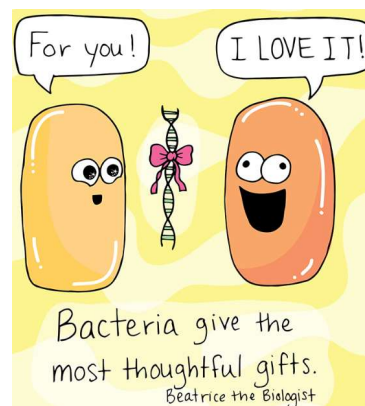


39

Significance of Carbapenemase-producing Organisms (CPO)

TB1

- Carbapenemase-producing organisms
 - Mobile genetic elements, such as plasmids
 - Highly resistant
- **Urgent public health threat**
- Over 9,000 healthcare-associated infections each year
- Up to 50% mortality



40

Slide 40

TB1 Update slide content for CPO specific info
Breeyear, Taylor L, 2024-09-17T19:16:36.630

Candida auris



Highly
drug-resistant



Patients can
become colonized
and develop
invasive infections



Spreads in healthcare
settings

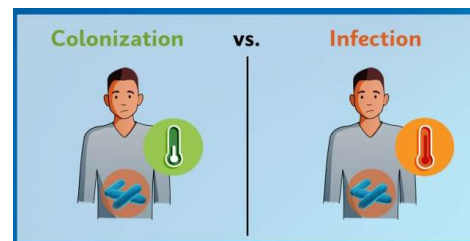


41

41

MDRO Colonization

- Colonization means that a person is carrying a MDRO but does not have symptoms of an infection.
- Colonized people play a large role in the spread of MDROs to other people in healthcare settings (require infection control action).



42

42

Targeted MDRO Specific Infection Prevention Measures ^{TB1}

- Laboratory Notification
- Private room
 - Indefinite contact precautions for colonized and infected patients.
 - Enhanced barrier precautions in long-term care
 - For *C. auris*, with approval by DPH.
 - If necessary, cohort infected residents.
- Adherence to hand hygiene and transmission-based precautions.
- Clean with [List P](#) disinfectant for *C. auris*.
- Conduct screening.
- Educate staff about organism and reasons for precautions.
 - Including non-clinical staff like EVS
- Review infection prevention policies and procedures.
- Communicate diagnosis with other facilities on transfer or discharge.
- Antimicrobial Stewardship

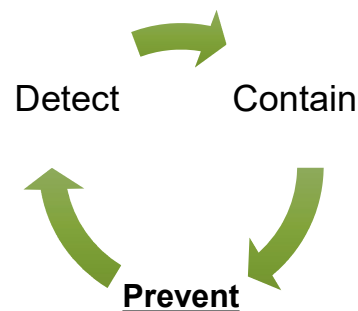


43

^{TB1}

DPH Response to MDROs

- Detect
 - *C. auris* and CPO: 1 case=outbreak
 - Nationally notifiable
 - Antimicrobial Resistance Laboratory Network (ARLN)
- Contain
 - Ensure rapid response & containment
 - Prevent transmission through:
 - Point-prevalence survey (PPS)
 - Infection control assessment and response (ICAR)
- Prevent
 - Stewardship efforts
 - Antimicrobial resistance workgroup
 - Education
 - Collaborative effort (DPH, LHD, RIPS, SPICE)



44

Slide 43

TB1 See comment on Major Findings slide
Breeyear, Taylor L, 2024-09-17T19:35:24.716

Slide 44

TB1 See comment on Major Findings slide. Talk more about screening collaboration with DPH
Breeyear, Taylor L, 2024-09-17T19:35:51.669

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



45

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>



46

Sections

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

Transferring Facility Name: _____ INTERFACILITY TRANSFER FORM
 Transferring Facility Address: _____
 Transferring Facility Phone: _____ Fax: _____
 Transferred to: _____ Reason for transfer: _____
 Transfer date/time: _____ Attending physician: _____ Phone: _____

Patient/resident demographics and vital signs (date/time taken) _____
 Last Name: _____ First Name: _____ DOB: _____ MRN: _____
 BP: _____ P: _____ R: _____ T(F): _____ O₂ SAT: _____ HT(In): _____ WT(lb): _____ Diabetic? _____ Glucose: _____
 Language: _____ English _____ Other: _____ Mental status: _____ Alert _____ Oriented _____ Other: _____
 Allergies: _____ None _____ Yes _____ Pain Level (0-10): _____ Site: _____
 At risk alerts: _____ None _____ Falls _____ Aspiration _____ Pressure ulcers _____ Seizures _____ Elopement _____ Other: _____
 Advanced directives: _____ DNR _____ DNI _____ Advance Care Directive _____ Proxy Contact _____

Current isolation / conditions / required PPE (Check, if indicated)
☐ No ☐ Yes, specify _____
☐ Contact ☐ Droplet ☐ Airborne
 PPE, specify _____

Organisms / infections: _____ None _____ Yes, specify type/date _____
 Multi-drug resistant organisms (MDROs)
 Methicillin-resistant Staphylococcus aureus (MRSA) _____
 Vancomycin-resistant Enterococci (VRE) _____
 Acinetobacter not susceptible to carbapenems _____
 Enterobacteriaceae resistant to carbapenems (i.e. CRE) _____
 Extended-spectrum beta-lactamase producer (ESBL) _____
 Clostridium difficile (C. diff) _____
 Other: _____
 (e.g. Group A Streptococcus (GAS), lice, scabies, disseminated shingles, norovirus, flu, TB, etc.)

Current / recent (last 7 days) symptoms _____ None _____ Yes, specify _____
☐ Rash/sore _____ Concerning rash (e.g. vesicular) _____ Cough/uncontrolled respiratory symptoms _____
☐ Vomiting _____ Acute diarrhea or incontinent of stool _____ Other: _____

Sensory status and activities of daily living

Vision	Hearing	Speech	Ambulate	Transfer	Toileting	Meals	Hygiene	Dressing
☐ Good	☐ Good	☐ Good	☐ Self	☐ Self	☐ Self	☐ Self	☐ Self	☐ Self
☐ Poor	☐ Poor	☐ Difficult	☐ Assist	☐ Assist	☐ Assist	☐ Assist	☐ Assist	☐ Assist
☐ Blind	☐ Deaf	☐ Aphasia	☐ Not able	☐ Not able	☐ Incontinent	☐ Tube	☐ Not able	☐ Not able
Sfy: _____	Sfy: _____	Sfy: _____	Sfy: _____	Sfy: _____	Sfy: _____	Date: _____	Date: _____	Date: _____

Current devices / recent (last 90 days) procedures: _____ None _____ Yes, specify _____
☐ Tracheostomy tube _____ Hemodialysis catheter _____ Procedure, specify type _____ and date _____
☐ Gastrostomy tube _____ Urinary catheter (date inserted) _____ Central line/PICC (date inserted) _____

Current medications: _____ None _____ Yes, refer to attached MAR

Vaccination / test history: _____ None _____ Yes, specify _____

Vaccine/test	Influenza (seasonal)	Pneumococcal	Zoster	Td	Tdap	Tuberculin skin test
Date administered	☐ Yes	☐ Yes	☐ Yes	☐ Yes	☐ Yes	☐ Yes
Self-report vaccine/test receipt?	☐ No	☐ No	☐ No	☐ No	☐ No	☐ No
						Result: ☐ Pos ☐ Neg

Personal items sent with patient/resident
☐ None ☐ Specify (e.g. glasses, etc.): _____

Contact information
 Relative/Guardian/POA
 Name: _____ Relationship: _____ Phone: _____ Notified? ☐ Yes ☐ No
 Transferring facility representative completing form
 Name/Title (print): _____ Signature: _____ Phone: _____

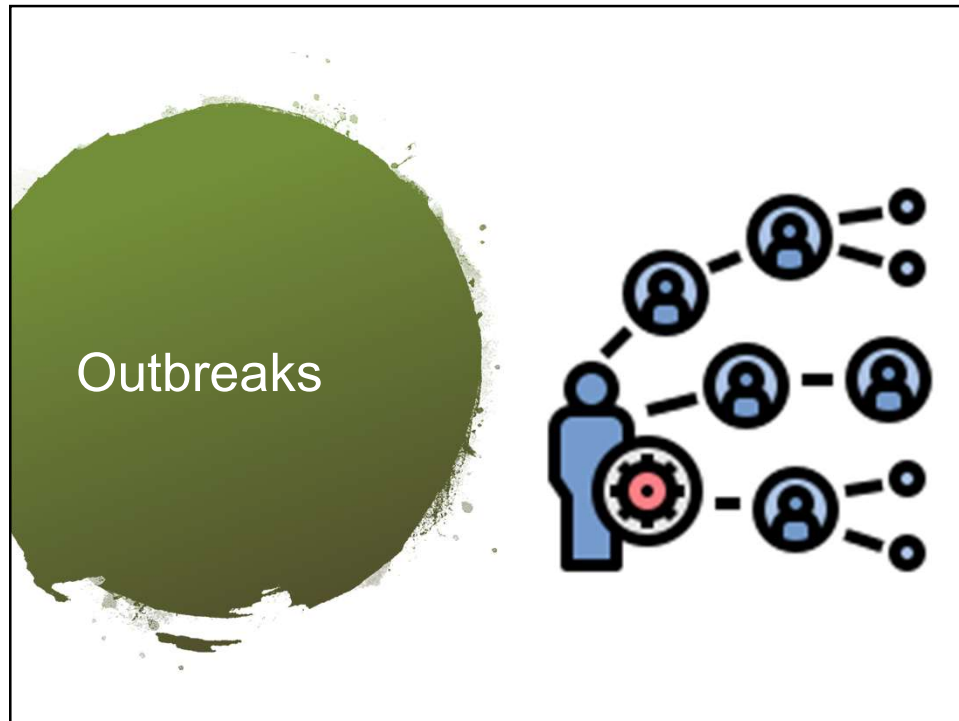
NC DPH - last updated 11/21/17
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47

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



48



49

DPH Hepatitis B Investigation

- Notification to DPH by local health department – New HBV case in LTCF resident
 - Patient admitted to hospital for a fall but also had new onset jaundice
 - Patient residing in facility for over a year, no other healthcare encounters identified
- Infection Prevention Site Visit
 - Recommendation to obtain individual glucometers for each resident – facility elected not to pursue initially
 - Also recommended increasing HH dispensers and relocate to more assessable locations



50

50

DPH Hepatitis B Investigation

- Screening of all individuals that still resided in facility receiving glucose monitoring during 21-week period prior to onset of index case
 - 23 total tested, one chronic and two probable acute cases
- Individual glucometers obtained
- Further testing showed total of index acute patient, one chronic case, one false + acute and a cleared case
- Investigation/Establishment of epi links
 - Glucometer checks
 - Room placement and shared spaces
 - In-house services (podiatry, dental services, salon, wound care, injections, phlebotomy)
 - Outside services (common providers or admissions)



51

51

DPH Hepatitis B Investigation

- Second Infection Prevention Site Visit
 - Observed new facility protocols for individual glucometers
 - Facility had increase HH dispensers
 - Nail clippers were obtained for individual residents
- Genotyping results
 - Evidence that the cases were related

[*CDC MMWR Notes from the Field*](#) Hepatitis B Virus Transmission Associated with Assisted Blood Glucose Monitoring in a Skilled Nursing Facility — North Carolina, 2024 *Published August 2025*



52

52

Group A Streptococcus

LTC residents at higher risk of invasive disease

- Older age and comorbidities, breaks in skin, indwelling devices
- **Wound care**
 - Careful attention to IP practices essential to prevent transmission

Response to LTC **invasive GAS** (iGAS) case

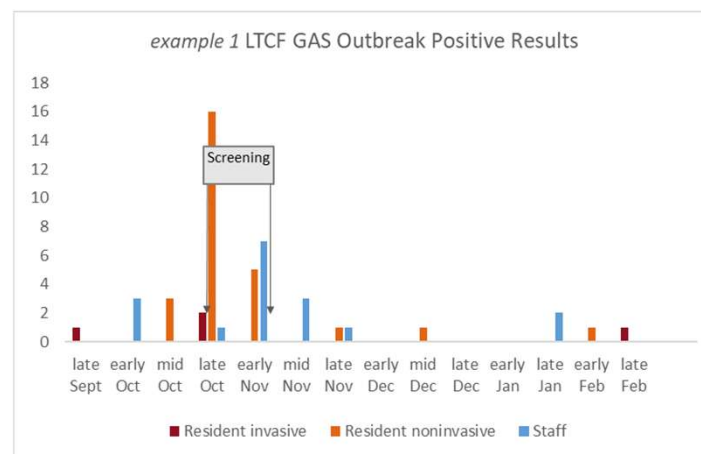
- LHD and public health will provide guidance on response steps
 - Identify additional symptomatic cases
 - Identify potential asymptomatic carriers
 - Assess and re-emphasize infection prevention practices



53

53

Group A Streptococcus



- Key response and control measures-
 - Screened by culture residents (throats and wounds) and epi-linked staff
 - Site visits
 - Emphasized education on IP and wound care practices
 - Invasive cases and several non-invasives had wound care as a risk factor



54

54

Group A Streptococcus

example 2 LTCF GAS Outbreak



Spring- 1st invasive resident case



Summer- 2nd invasive resident case = **Outbreak**

- Screening identified significant number of residents with throat colonization



Fall- two more invasive cases



Winter- 5th invasive case

- Sequencing confirmed relatedness despite length of time between cases
- Invasive cases had **wound care as shared risk factor**



55

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56

56

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.



57



Regional Infection Prevention Support Team

Infection prevention saves lives

Our mission is to increase infection prevention knowledge to mitigate and prevent health threats like respiratory illnesses and all other infectious diseases in the long-term care setting.

The RIPS Program offers*:

- Infection prevention and control assistance that is supportive and consultative rather than regulatory
- Staff training/education around infection prevention measures using practical, hands-on techniques
- Site visits to assess facilities' infection control programs accompanied by written recommendations to improve policies and practices
- Assistance with outbreak management and response
- In-person infection prevention education

*All services by RIPS are provided at no cost.

Education Modules*:

- Chain of Infection
- Standard Precautions: Hand Hygiene
- Standard Precautions: PPE
- Transmission-based Precautions
- Standard Precautions: Environmental Cleaning
- Employee Health
- Storage of Supplies
- Wound Care

58

58



Resources

- NC Division of Public Health, SHARPPS Program
 - <http://epi.publichealth.nc.gov/cd/diseases/hai.html>
- Safe Injection Practices
 - CDC Preventing Unsafe Injection Practices: <https://www.cdc.gov/injection-safety/hcp/infection-control/index.html>
 - CDC Project Firstline: <https://www.cdc.gov/project-firstline/index.html>
- MDROs
 - CDC Strategies for Prevention and Response to MDROs
<https://www.cdc.gov/healthcare-associated-infections/php/preventing-mdros/index.html>
 - NC DPH MDRO Toolkit for Long-Term Care Facilities
<https://epi.dph.ncdhhs.gov/cd/docs/MDROToolkit.pdf>
- Antimicrobial Stewardship
 - <http://epi.publichealth.nc.gov/cd/antibiotics/campaign.html>
- Group A Strep in LTC (CDC resources)
 - <https://www.cdc.gov/group-a-strep/php/ltof-toolkit/increased-risk.html>
 - <https://www.cdc.gov/group-a-strep/php/ltof-toolkit/transmission.html>



59

Thank you!

infectionprevention@dhhs.nc.gov

24/7 Epidemiologist On-Call:
919-733-3419



60

60