Infection Prevention, Outbreaks, and the Role of Public Health

Jennifer MacFarquhar, MPH, BSN, RN, CIC
Career Epidemiology Field Officer
Centers for Disease Control and Prevention
North Carolina Division of Public Health

Fall 2020

Objectives

- Describe legal framework for disease surveillance, investigation, and response
- Review historical outbreak surveillance data
- 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

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…

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**

Public Health Law

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

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

http://reports.oah.state.nc.us/ncac/title%2010a%20-%20health%20and%20human%20services/chapter%2041%20-%20epidemiology%20health/subchapter%20a/10a%20ncac%2041a%20.0101.html

Public Health Law

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

Outbreak Response

When Should Public Health Be Called?

- Reportable diseases / conditions (10A NCAC 41A .0101)
  - http://epi.publichealth.nc.gov/cd/docs/dhhs_2124.pdf
- When **any** disease is above normal baseline (i.e., an "outbreak")
- Report suspected infection prevention breach

When Is It An Outbreak?

When Is It An Outbreak?

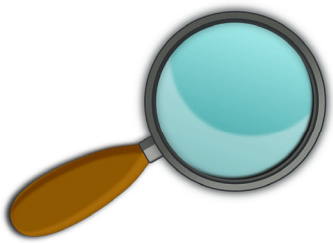
- Anything above what is normally seen for any given time period
- If you aren't sure, call Public Health!
- In a facility setting, an outbreak is generally defined as **two or more** individuals with the same illness
  - **Caveat to this rule:**
    - One case of certain diseases = Outbreak
    - Disease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

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?



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
- Communication
  - Assist with patient/family/public information if needed

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

Jennifer MacFarquhar
Program Director

Coming Soon!
Medical Director

Brittany Richo
Program Manager

Meg Sredl
Epidemiologist

Deborah Dolan
Health Educator

Savannah Carrico
Epidemiologist

Coming Soon!
Epidemiologist

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.

SHARPPS Program Activities

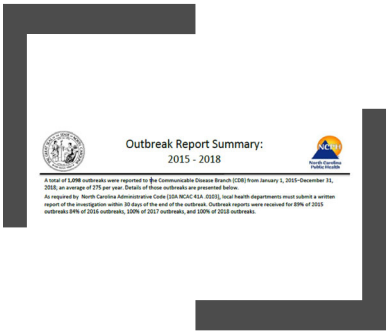
Surveillance, Investigation & Response	Prevention, Education & Training	Monitoring & Evaluation	Communication
HAI reporting to NHSN	Campaign: Be Antibiotics Aware	Data validation	HAI data reports
CRE surveillance	Injection Safety	TAP reports	Newsletters
DHSR Infection Prevention Breach reporting	Drug Diversion	Identification, evaluation of aberrant data (CLABSI, CDI)	Monthly webinar updates
Outbreak & Exposure management	Antimicrobial resistance & stewardship		Social Media
	Infection Control, Assessment & Response (ICAR)		Tabletop Exercises
	Partnerships		Partners

SHARPPS Program Activities

Surveillance, Investigation & Response	Prevention, Education & Training	Monitoring & Evaluation	Communication
HAI reporting to NHSN	Campaign: Be Antibiotics Aware	Data validation	HAI data reports
CRE surveillance	Injection Safety	TAP reports	Newsletters
DHSR Infection Prevention Breach reporting	Drug Diversion	Identification, evaluation of aberrant data (CLABSI, CDI)	Monthly webinar updates
Outbreak & Exposure management	Antimicrobial resistance & stewardship		Social Media
	Infection Control, Assessment & Response (ICAR)		Tabletop Exercises
	Partnerships		Partners

Outbreak Summary

2015-2018 Outbreak Summary

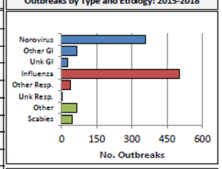

Outbreak Report Summary:
2015 - 2018

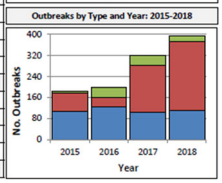
- January 1, 2015 – December 31, 2018
  - 1,098 Outbreaks
  - 275 Average/year

2015-2018 Outbreak Summary

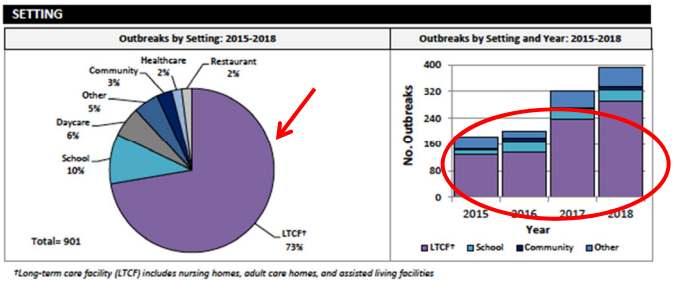
TYPE AND ETIOLOGY

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	





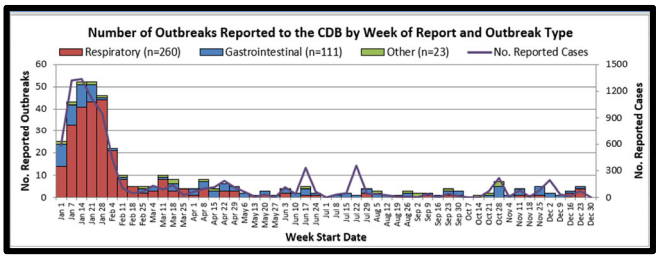
2015-2018 Outbreak Summary



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

2019 Outbreak Summary

- 347 outbreaks reported
  - 9,028 outbreak-associated cases identified



*Data are preliminary

Safe Injection Practices

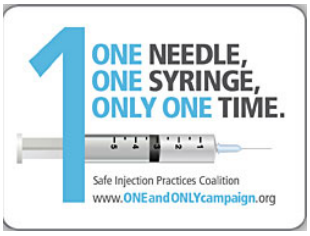
Safe Injection Practices

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

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

Public Health Role in Safe Injection Practices

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



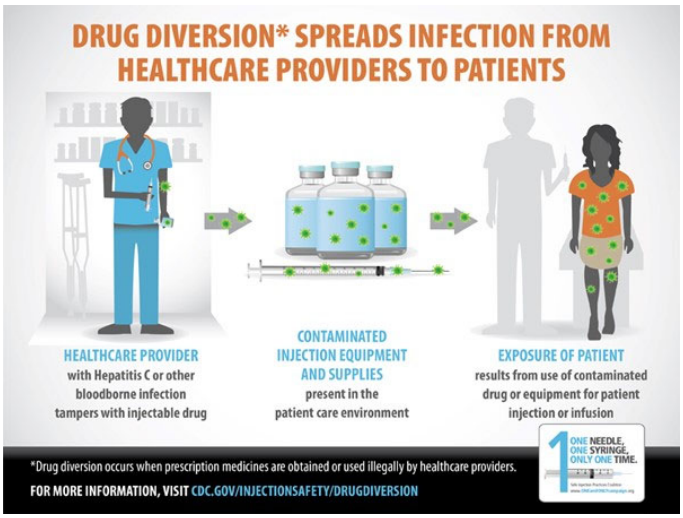
North Carolina Hepatitis Outbreaks, Non-Hospital Settings

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**

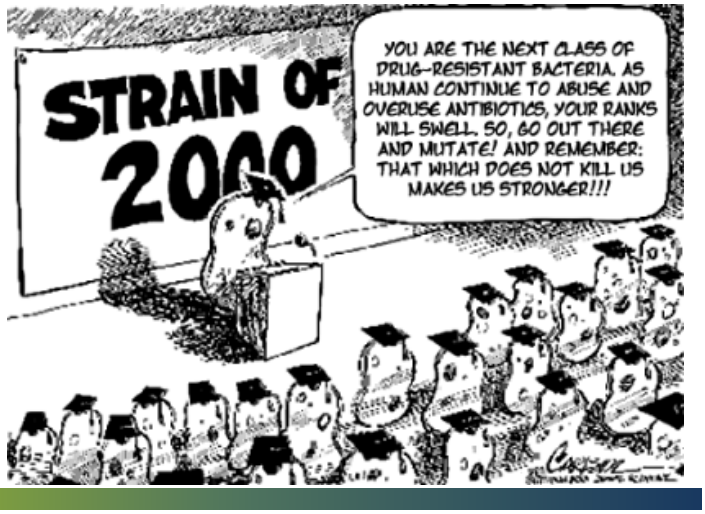
Drug Diversion

- 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/



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

- Examples: MRSA, VRE, CRE

Public Health Significance

- Spread facilitated by interfacility transfer of patients
- Affects vulnerable patient populations
- Difficult to treat
- Improper treatment → some organisms may produce another enzyme that makes it easier to transmit resistance

Cause ~2.8 million infections in United States annually

35,000 deaths

Outbreaks

#1: (Un)Safe Injection Practices

Tuesday, October 12, 2010

- County health department notified by infection preventionist at local hospital
- 4 cases of acute Hepatitis B
- 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

	Attack rate (%)	
Exposure	**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
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

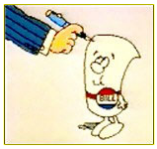
TO: All North Carolina Health Care Providers

FROM: Megan Davies, MD, State Epidemiologist

WARNING: SPREAD OF HEPATITIS B THROUGH UNSAFE DIABETES CARE

"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

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

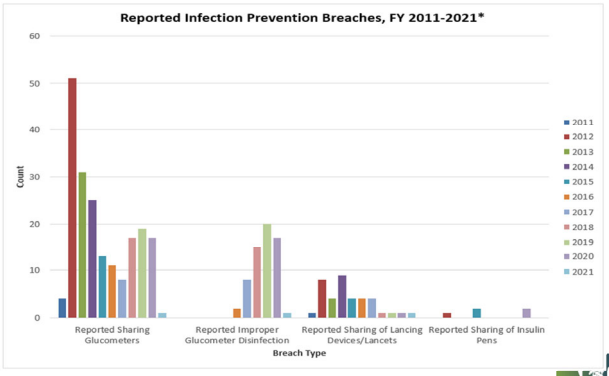
Surveyors must report to State

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.

Infection Prevention Breaches



*2021 Data Incomplete

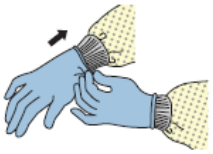
#2: Multidrug Resistant Organisms

Friday, April 21, 2017

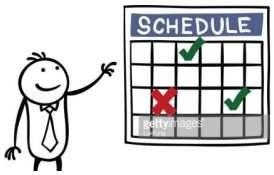
- Notified by LHD on April 21, 2017 (a Friday!)
  - Increase in number infections caused by a specific MDRO among patients admitted to local hospital between October 16, 2016 and April 13, 2017
- Most cases were residents of 3 long-term care facilities (LTCFs)
- Coordinated an investigation to:
  - **Assess infection prevention practices among these LTCFs, and**
  - **Prevent further intra- and inter- facility spread of disease**

- 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 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

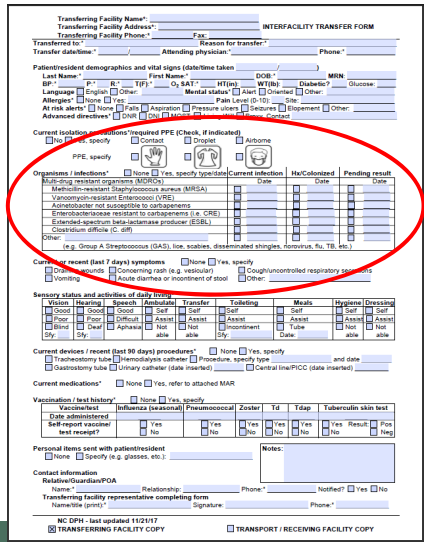
CRE alert

Communication between Healthcare Facilities

- Useful
  - Patient status/needs
  - Care plan
- Beneficial re: MDROs
  - 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)

Sections

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



Highlight – Current Isolation/PPE, MDROs

Current isolation precautions*/required PPE (Check, if indicated)

☐ No ☐ Yes, specify ☐ Contact ☐ Droplet ☐ Airborne

PPE, specify

Organisms / infections* ☐ None ☐ Yes, specify type/date	Current infection Date	Hx/Colonized Date	Pending result 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.)

NC DPH Interfacility Transfer Form

Benefits

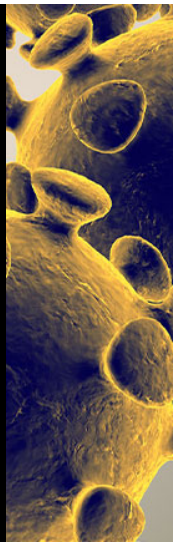
- Standardized format for interfacility communication of patient MDRO status during transfer
- Information needed/desired during transfer all in one place
- Complies with CMS requirements for interfacility communication
- http://epi.publichealth.nc.gov/cd/hai/docs/InterfacilityTransferInstructionsandForm.pdf

MDRO cases among local hospital ED visits and admissions, 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

Emerging Infections: Coronavirus Disease (COVID-19)



NC Public Health Actions

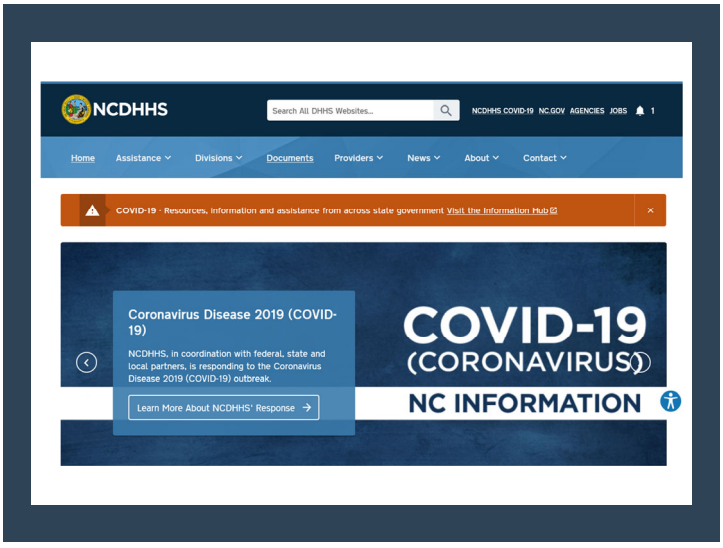
- **Identify, investigate ill individuals, conduct contact tracing**
- **Develop, disseminate guidance**
- **Rule change to require reporting**
- **Develop and implement control measures, including self-monitoring with public health supervision, isolation, and quarantine**
- **Develop laboratory testing capacity**

NC DHHS is working with healthcare partners

- **Emergency Medical Services (EMS)**
- **Hospitals, clinics and urgent cares**
- **Healthcare providers**
- **Laboratories**

NC DHHS is working with local communities

- **Home care**
- **Congregate living settings**
- **Travelers**



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.

Resources

- NC Division of Public Health, SHARPPS Program
  - http://epi.publichealth.nc.gov/cd/diseases/hai.html
- Safe Injection Practices
  - http://www.oneandonlycampaign.org/
  - http://www.oneandonlycampaign.org/partner/north-carolina
  - 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/hicpac/mdro/mdro_toc.html
    https://www.cdc.gov/infectioncontrol/guidelines/mdro/index.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 Facilities
    https://epi.dph.ncdhhs.gov/cd/docs/MDROToolkit_080819.pdf
- Antimicrobial Stewardship
  - http://epi.publichealth.nc.gov/cd/antibiotics/campaign.html

Thank you!

NCHAI@DHHS.NC.GOV
919-733-3419 (24/7 Epidemiologist on Call)

Jennifer MacFarquhar, MPH, BSN, RN, CIC
CDC Career Epidemiology Field Officer
NC Division of Public Health
jennifer.macfarquhar@dhhs.nc.gov