Objectives

1. Review basis for use of control measures as a public health response
2. Identify and describe two recent events in North Carolina in which quarantine was utilized
Control Measures in NC

- Communicable disease control measures established in law
  - NC Administrative Code
  - CDC guidelines incorporated by reference
- All persons required to comply

‘Reasonable and effective’

- Public health officials must consider the gravity of the public health risk, the mode of transmission, the potential outcomes of possible containment methods, and the least restrictive means of containment.

Pope et al. Protecting Civil Liberties During Quarantine and Isolation in Public Health Emergencies. Law Practice Today; April, 2011.
Considerations for Quarantine

- Public Health
- Ethical
- Political
- Economic
- Practical
- Other

Tips of the Trade

- Review the laws/rules
- Review the science/control measures
- Prepare partners in advance
- Scan the environment
- Develop a communications plan
- Consult with subject matter experts
Control Measures

- Individuals
  - Isolation/Exclusion
  - Medical tests or treatments
  - Vaccination
  - Post-exposure prophylaxis
  - Quarantine
Control Measures

- **Communities**
  - Social distancing
  - Cancellation of public events
  - School or day care closure

- **Environments**
  - Quarantine
  - Food recall
  - Restaurant closure

Continuum of Control Measures

- Passive monitoring
- Active monitoring without activity restriction
- Active monitoring with activity restriction
- Working quarantine
- Focused measures to increase social distance
- Community-wide measures to increase social distance
- Widespread community quarantine, including “Cordon Sanitaire”
Is Quarantine Justified?

- Is the public’s health endangered?
  - What is the gravity of that risk?
- Have all other reasonable means of controlling disease been exhausted?
- Do other less restrictive alternatives exist?

Will Quarantine be Effective?

- Disease Transmission
  - What is the mode of transmission?
  - Is it easily transmitted?
  - Is it transmitted in the early (presymptomatic) stage?
- Population: Is the population susceptible?
- Exposed Persons
  - Can they be rapidly identified?
  - Will they comply?
2013 Measles Outbreak

Measles

- Highly contagious viral illness
- Transmission by respiratory droplets or airborne
- Incubation period from exposure to:
  - Prodrome (respiratory symptoms): 10-12 days
  - Rash: ~14 days (range, 7 – 18 days)
- Infectious period: 4 days before to 4 days after rash onset
- Highly-effective vaccine available (MMR)
Measles Cases Reported in NC, 1987-2012

Eliminated in US
The Village

- Rural Hare Krishna community
- 25 resident families
- No specific religious belief discouraging immunization

Images: http://www.prabhupadavillage.com/

Measles Quarantine Guidance

- APHA –
  - “Quarantine: Usually impractical”
- CDC –
  - “…the spread of the disease can be limited with… quarantine of susceptible contacts…”
  - “…quarantine has helped to contain the spread of the disease to the surrounding community.”
  - “Imposing quarantine measures for outbreak control is both difficult and disruptive to schools and other institutions.”
Is Quarantine Justified?

- Is the public's health endangered?
  - What is the gravity of that risk?
- Have all other reasonable means of controlling disease been exhausted?
- Do other less restrictive alternatives exist?

Will Quarantine be Effective?

- Disease Transmission
  - What is the mode of transmission?
  - Is it easily transmitted?
  - Is it transmitted in the early (presymptomatic) stage?
- Is the population susceptible?
- Exposed Persons
  - Can they be rapidly identified?
  - Will they comply?
Control Strategies

Distribution of measures

- Quarantine Orders Issued
- Isolation and Quarantine Orders Issued
Written Orders Preferred

![Bar chart showing number of orders for Isolation and Quarantine, with a preference for written orders.]

Model Quarantine Order

MODEL MEASLES QUARANTINE ORDER (Suspected Exposure)

You may have been exposed to measles. Your exposure requires further public health investigation. Measles is a disease associated with fever, runny nose, watery red eyes and cough. After a few days, a rash appears on the head and spreads over the entire body. Measles is a highly contagious disease that may be passed from person to person mostly through the air by coughing and sneezing. It can also be transmitted through contact with secretions from the nose or mouth of an affected person. A person who is not vaccinated against measles or has not had measles earlier in his or her life and was exposed to measles may have measles as a result, and may transmit the infection to others even before having any symptoms. Although rare, serious respiratory or neurologic complications may happen and possibly result in death. Pregnant women exposed to measles may also experience complications. If measles spreads in the community, it could have severe public health consequences.

I, [name], Health Director of [County Health Department], pursuant to authority vested in me by North Carolina General Statutes (G.S.) 130A-145, issue this QUARANTINE ORDER to:

[Person’s name]

[DOB]

You are required to remain at [insert home address] until [insert date].

You have been properly informed and counseled by [R.N.], Communicable Disease Nurse with the [County Health Department] regarding the control measures for measles. Failure to comply with the control measures is a violation of G.S. 130A-145.
Model Quarantine Order

You are required to:

- Remain in your home until ____________________________.
- Avoid contact with any persons other than those in your household. Do not attend any gatherings or group meetings. You may not have any visitors to your home.
- Contact the health department immediately if you develop symptoms.
- Call a doctor or seek medical care if a rash develops.
- Before seeking medical care, call ahead and get instructions from the provider before arriving at the medical office, clinic or hospital.
- If a medical emergency arises and you need to call 911, inform the First Responders that you may have measles.

If you fail to comply with this QUARANTINE ORDER, you will be subject to prosecution for a misdemeanor offense pursuant to NC law (G.S. 130A-25) and punishable by up to (two (2) years imprisonment.

If you plan to move to a new address or leave the county, you are required to notify ______ County Health Department and obtain prior approval. You may contact the Health Department by calling ____________________.

The staff of this Health Department remains available to provide assistance and counseling to you concerning your possible exposure to measles and compliance with this QUARANTINE ORDER.

You may petition the Superior Court for review of the restriction of your freedom of movement contained in this QUARANTINE ORDER pursuant to G.S. 135A-145(d).

Model Voluntary Quarantine Order

SAMPLE RECOMMENDATIONS FOR VOLUNTARY QUARANTINE (Measles)

You may have been exposed to measles. Your exposure requires further public health investigation. Measles is a disease associated with fever, runny nose, watery red eyes and cough. After a few days, a rash appears on the head and spreads over the entire body. Measles is a highly contagious disease that may be passed from person to person easily through the air by coughing and sneezing. It can also be transmitted through contact with secretions from the nose or mouth of an affected person. A person who is not vaccinated against measles or has not had measles earlier in his or her life and was exposed to measles may have measles as a result, and may transmit the infection to others even before having any symptoms. Although rare, serious respiratory or neurologic complications may happen and possibly result in death. Pregnant women exposed to measles may also experience complications. If measles spreads in the community, it could have severe public health consequences.

Unvaccinated persons who have been exposed to a person with measles are strongly advised to stay at home for 21 days after the last exposure and limit contact with others to avoid spreading the illness.

It usually takes about 10-21 days to develop symptoms of measles after exposure to the virus.

You have agreed to remain at [insert home address] until [insert date] and comply with the following control measures to help prevent the spread of measles in the community.

If you plan to move to a new address or leave the county, you are asked to notify ______ County Health Department and prior to moving. You may contact the Health Department by calling ____________________.

The staff of this Health Department remains available to provide assistance and counseling to you concerning your possible exposure to measles and to these control measures.
Number of Measles Cases by Date of Rash Onset (n=23)

- Males: 14 (61%)
- Females: 9 (39%)
- Median age: 14 yrs
- Range: 1 yr - 59 yrs

Timeline of Quarantine, Illness and Isolation

- 3/26: Source Case Returns From India
- 4/13: Community Festival Exposure
- 4/23: Pediatric Practice Exposure
- 4/14: Public Health Notified

Number of Cases by Date of Rash Onset (n=23)

- Stokes County Cases (13)
- Orange County Cases (8)
- Out of State Case (1)
- Forsyth County Case (1)
Note

Epidemiologic risk factors and monitoring and movement guidance of persons with potential Ebola exposure are presented to illustrate the evolution of the guidance and does not reflect current guidance.

- Current CDC information can be found at:

- Current NC information can be found at: [http://www.ncdhhs.gov/ebola/](http://www.ncdhhs.gov/ebola/)
Ebola: Signs and Symptoms

- Initial: Fever, chills, myalgias, malaise, anorexia
- After 5 days: GI symptoms, such as nausea, vomiting, watery diarrhea, abdominal pain
- Hemorrhagic symptoms in 18% of cases
- Non-fatal cases typically improve 6–11 days after symptoms onset
- Fatality rates of 70% have been historically reported in rural Africa

Adapted from “CDC Slides for Healthcare Workers”

Ebola

- Human-to-human transmission:
  - Direct contact with blood or body fluids
  - Sharps injury with contaminated needle or other sharp
  - Direct contact with the corpse of a person who died of EVD
  - Indirect contact with blood or body fluids via a contaminated object
- Incubation Period: 8-10 days (range: 2-21 days)
- Infectious Period: onset of symptoms through as long as virus detectable
- Treatment: Supportive only
- Vaccine: None
August 1, 2014

- Communicable Disease Branch notified of return of missionaries from Ebola-affected areas
  - Healthcare workers from ETC where US HCWs became ill
  - Family member of lab-confirmed case
Risk Factors

Defined in 8/8 CDC Case Definition:
- Contact with blood or body fluids of a suspected or known case; OR
- Residence in – or travel to – an area where transmission is active; OR
- Direct handing of bats, rodents or primates from endemic area.

Is Quarantine Justified?

- Is the public's health endangered?
  - What is the gravity of that risk?
- Have all other reasonable means of controlling disease been exhausted?
- Do other less restrictive alternatives exist?
Will Quarantine be Effective?

- Disease Transmission
  - What is the mode of transmission?
  - Is it easily transmitted?
  - Is it transmitted in the early (presymptomatic) stage?
- Is the population susceptible?
- Exposed Persons
  - Can they be rapidly identified?
  - Will they comply?

8/7: Interim NC Quarantine Strategy

- Applied to: Health Care workers (HCWs) and other persons determined to have had contact with a confirmed case of Ebola

<table>
<thead>
<tr>
<th>RISK</th>
<th>NORTH CAROLINA</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTACT WITH A CONFIRMED CASE</td>
<td>PUBLIC HEALTH ACTION</td>
</tr>
<tr>
<td>Active monitoring twice daily by LHD</td>
<td>RESTRICTED PUBLIC ACTIVITY</td>
</tr>
<tr>
<td>Contact with a confirmed case</td>
<td>Yes (quarantined)</td>
</tr>
</tbody>
</table>
CDC Guidance for Monitoring and Movement of Persons with EVD Exposure (“M&M Guidance”)

- First version issued 8/8

<table>
<thead>
<tr>
<th>RISK LEVEL</th>
<th>CDC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PUBLIC HEALTH ACTION</td>
</tr>
<tr>
<td></td>
<td>MONITORING</td>
</tr>
</tbody>
</table>
| HIGH & LOW | • ... by public health authority  
|            | • twice-daily self monitoring | None | • No commercial conveyance  
|            | | | • Local public travel in consultation with LHD  
|            | | | • Timely access to care |
| NO KNOWN   | Self-monitor | None | None |

8/14: Interim Quarantine Strategy

- Applied to: Persons determined to have had contact with a suspected or confirmed case of Ebola

<table>
<thead>
<tr>
<th>RISK LEVEL</th>
<th>NORTH CAROLINA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PUBLIC HEALTH ACTION</td>
</tr>
<tr>
<td></td>
<td>MONITORING</td>
</tr>
<tr>
<td>HIGH</td>
<td>Active monitoring twice daily by LHD</td>
</tr>
<tr>
<td>LOW</td>
<td>Active monitoring twice daily by LHD</td>
</tr>
</tbody>
</table>
8/14: Program Alert 8 (M&M Guidance)

- **Applied to:** Persons determined to have been in affected country in past 21 days

### NORTH CAROLINA

<table>
<thead>
<tr>
<th>RISK LEVEL</th>
<th>PUBLIC HEALTH ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MONITORING</td>
</tr>
<tr>
<td>HIGH</td>
<td>Active monitoring twice daily by LHD</td>
</tr>
<tr>
<td>LOW</td>
<td>Active monitoring twice daily by LHD</td>
</tr>
<tr>
<td>NO KNOWN</td>
<td>Self-monitoring</td>
</tr>
</tbody>
</table>

8/22: CDC M&M Guidance

- **HCW caring for patients with PPE now ‘no known exposure’**
- “At this time, CDC is not recommending that asymptomatic contacts of EVD patients be quarantined, either in facilities or at home.”
8/25: NC M&M Guidance

<table>
<thead>
<tr>
<th>RISK LEVEL</th>
<th>PUBLIC HEALTH ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MONITORING</td>
</tr>
<tr>
<td></td>
<td>RESTRICTED PUBLIC ACTIVITY</td>
</tr>
<tr>
<td></td>
<td>RESTRICTED TRAVEL</td>
</tr>
<tr>
<td>HIGH &amp; LOW</td>
<td>Active monitoring twice daily by LHD</td>
</tr>
<tr>
<td>NO KNOWN</td>
<td>Self-monitoring</td>
</tr>
</tbody>
</table>

Ebola in the United States, 2014

- **U.S. Index Case**
  - September 30, 2014

- **Healthcare Worker 1**
  - October 10, 2014

- **Healthcare Worker 2**
  - October 15, 2014

- **Medical Aid Worker**
  - October 24, 2014

- **10/11: Enhanced entry screening**
### Interim Guidance for Monitoring and Movement of Persons with EVD Exposure

- CDC has created guidance for monitoring people exposed to Ebola virus but without symptoms

<table>
<thead>
<tr>
<th>RISK LEVEL</th>
<th>PUBLIC HEALTH ACTION</th>
<th>Monitoring</th>
<th>Restricted Public Activities</th>
<th>Restricted Travel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIGH risk</strong></td>
<td>Direct Active Monitoring</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>SOME risk</strong></td>
<td>Direct Active Monitoring</td>
<td>Case-by-case assessment</td>
<td>Case-by-case assessment</td>
<td></td>
</tr>
<tr>
<td><strong>LOW risk</strong></td>
<td>Active Monitoring for some; Direct Active Monitoring for others</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td><strong>NO risk</strong></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

As of 10/27/14

http://www.cdc.gov/phlp/publications/topic/ebola.html

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### Ebola Screening and Monitoring Policies for Asymptomatic Individuals

Policy as compared to CDC guidance:
- More restrictive
- Equal
- Less restrictive
- Unclear if more, equal, or less restrictive
- No policy found

http://www.cdc.gov/phlp/publications/topic/ebola.html
Control Measures Template

CONTROL MEASURES FOR PERSONS WITH POSSIBLE EXPOSURE TO EBOLA

You have or might have been exposed to Ebola, e.g. travel to an affected country or exposure to the bodily fluids of an infected person or exposure to exposed infected person. Ebola is a severe disease characterized by fever, severe headache, muscle pain, weakness, diarrhea, vomiting, and/or internal pain. Symptoms may appear anywhere from 2 to 21 days after exposure to the Ebola virus, although an incubation period of up to 45 days has been observed. Ebola is transmitted by direct contact with the blood or secretions of an infected person or exposure to contaminated objects that have been contaminated with infected secretions. If Ebola spreads in the community, it can have severe public health consequences.

RISK CLASSIFICATION

Based on the information provided, at this time your risk of exposure to Ebola has been assessed as:

- High risk
- Low risk
- Low but not zero risk

Because you may have had exposure to Ebola, public health control measures are being implemented. These measures include contact with the ____________________________ Health Department at least once daily to monitor for signs and symptoms of Ebola for 21 days after your last date in an affected country.

Control Measures Template

REQUIREMENTS

You must comply with these control measures through ________/_______/_______ (please indicate date of last possible exposure).

During this time, you are required to (please list any additional measures that apply):

- Isolate yourself from others immediately if any symptoms develop and call the ____________________________ County Health Department at [ ]

Monitor

- Record your temperature and symptoms every 12 hours using the form provided.
- Be available for an in-person visit _______ time(s) per day by the county health department as needed.
- Report your temperature and symptoms _______ time(s) per day to the county health department at _______ phone.
- Keep a log of visitors to your home and public venues you visit if permitted (e.g. office, home, etc.).

Movement

- Get approval from the local health department if you plan to move, travel, or leave the county.
- Get approval from the local health department before using public transportation (e.g., aircrafts, buses, subways, etc.).
- Do not take any forms of public transportation (e.g., aircrafts, buses, subways, etc.).
- Do not go to public places (e.g., shopping centers, movie theaters, or conferences).
- Do not go to your workplace unless permitted.
- Maintain a 6-foot distance from others while in non-congregate settings (e.g., jogging in a park).

Failure to comply with these control measures is a violation of 18 U.S.C. § 1346). If you fail to comply with these control measures, you may be subject to prosecution for a misdemeanor offense pursuant to DC law (D.C. § 13-1502) and punishable by up to two (2) years imprisonment.
Summary

- Before an event:
  - Know your community
  - Know the laws
  - Review the science
  - Establish partnerships
- During an event:
  - Assess your environment
- After an event:
  - Identify deficiencies

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  - Aaron T. Fleischauer, PhD, MSPH
  - Sarah Rhea, DVM, MPH, PhD
  - CDC
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