Responding to 21st Century Emerging Threats

Parham Jaberi, MD, MPH
Chief Deputy Commissioner, Public Health and Preparedness
Virginia Department of Health

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Objective

Describe emerging threats facing public health and healthcare in the 21st century.
Defining a Health Threat

A composite of ongoing or potential enemy actions; environmental, occupational, and geographic and meteorological conditions; endemic diseases; and employment of nuclear, biological, and chemical weapons (to include weapons of mass destruction) that can reduce the effectiveness of joint force through wounds, injuries, illness, and psychological stressors.

Health Threats can Ultimately lead to a Public Health Emergency

Disruption in day-to-day activities.

Individual and/or community resources become depleted or inadequate.

Creates a clear and present danger for the health and well-being of a population.
September 11, 2001
H1N1 Pandemic - 2009

Pandemic H1N1 rapidly spread worldwide:
May 2009

START
March 2009

Cumulative cases
- 1-10
- 11-50
- 51-500
- 500-5,000
- >5,000

29 May *, 15,510 cases including 99 deaths reported by 53 countries
Deepwater Horizon Oil Spill - 2010
Hurricane Irene - 2011
Superstorm Sandy - 2012
California Wildfires - 2015
Ebola Virus Disease
Zika Virus Disease

Zika Virus Travel Alert

VDH VIRGINIA DEPARTMENT OF HEALTH
To protect the health and promote the well-being of all people in Virginia.
Water Sector Challenges

Lead
HABs
Chemical Spills
Aging Infrastructure
Water main break closes part of Virginia Beach Blvd. on Wednesday
Examples of Public Health Threats and Emergencies

Natural Disasters
- Hurricanes, Tornados, Earthquakes, Floods, Wild Fires

Communicable Disease Outbreaks
- Influenza, Ebola Virus Disease, Tuberculosis, Measles

Environmental Disasters
- Oil Spills, Train Derailments, Industrial Explosions,

Acts of Terrorism
- Bioterrorism, Complex Coordinated Terror Attacks
The Perception of a Threat Depends on the Intrinsic Characteristics of the Community

Consider a winter weather event producing 5 inches of snow.

- In Boston... Richmond... Atlanta.
- Consistent with Meteorological Forecast vs. ‘Unexpected’ Event
- Living close to interstates/primary roads vs. secondary roads.
- Stocked Food Pantry/Near-Empty Food Pantry; With Heat / Without Heat; An extra day to relax vs. a day of lost wages.
Air Pollution and Climate Change

- In 2019, air pollution is considered by WHO as the greatest risk to health.

- Microscopic pollutants in the air can penetrate the respiratory and circulatory systems contributing to disease such as cancer, stroke, heart and lung disease. Primary cause: burning fossil fuels.
Climate Change Health Impacts

• **Extreme Heat**
  • Kills more people in the U.S. than hurricanes, lightning, tornadoes, earthquakes and floods combined; Increase risk of wild wires

• **Extreme Weather Events**
  • Hurricanes, Superstorms, Bomb Cyclone
  • Heavy Rains - Flooding (1:500, 1:1000 year event)
  • Droughts, Wild Fires

• **Sea-Level Rise**
  • Loss of land/infrastructure, impact on onsite sewage systems, population displacement
Major U.S. Climate Trends

Rising Temperatures
U.S. average temperature has increased by 1.3°F to 1.9°F since record keeping began in 1895. Warming has been the greatest in North and West while some parts of the Southeast have experienced little change.

Extreme Precipitation
Heavy downpours are increasing nationally, especially over the last three to five decades. The largest increases are in the Midwest and Northeast.

Wildfires
Wildfires in the West start earlier in the spring, last later into the fall, and burn more acreage.

Heat Waves
Heat waves have become more frequent and intense, especially in the West.

Drought
Drought has increased in the West. Over the last decade, the Southwest has experienced the most persistent droughts on record.

Cold Waves and Winter Storms
Cold waves have become less frequent and intense across the Nation. Winter storms have increased in frequency and intensity since the 1950s and their tracks have shifted northward.

Floods
Floods have been increasing in parts of the Midwest and Northeast.

Hurricanes
The intensity, frequency, and duration of North Atlantic hurricanes, as well as the frequency of the strongest (category 4 and 5) hurricanes, have all increased since the early 1980s.

Sea Level
Sea levels along the Mid-Atlantic and parts of the Gulf Coast have risen by about 5 inches over the last half century.

Figure 1: Major U.S. national and regional climate trends. Shaded areas are the U.S. regions defined in the 2014 NCA.²⁴

- Average U.S. precipitation has increased since 1900, but some areas have experienced increases greater than the national average, and some areas have experienced decreases.

Change in Number of Extreme Precipitation Events
Climate Change Health Impacts

• **Impact on Infectious Disease**
  • **Vector Ecology**
    • Mosquitoes (West Nile Virus, La Crosse Encephalitis)
    • Ticks (Lyme disease, spotted fever rickettsiosis, including Rocky Mountain spotted fever)
  • Increased risk of foodborne and waterborne diseases (vibrio parahaemolyticus and vulnificus)

• **Harmful Algal Blooms**
  • Overgrowth of algae that can harm marine life, animals and humans; algae severely lower oxygen levels; may produce harmful toxins.
An exceptionally dense bloom of Alexandrium monilatum was observed in lower Chesapeake Bay along the north shore of the York River between Sarah’s Creek and the Perrin River on 8/17/2015. Credit: W. Vogelbein/VIMS

BE AWARE OF ALGAE BLOOMS

During an algae bloom, water may have surface scum, mats, or films with red, green, white streaks or glops.

REPORT BLOOMS TO THE Harmful Algal Bloom Hotline 888-238-6154

It is safe to eat properly cooked fish caught from waters with an algae bloom. Thoroughly clean the fish, discarding the carcass and guts, and washing hands and surfaces with soapy water is advised.

The Virginia Harmful Algal Bloom Task Force is working to protect public health during algae blooms. Learn more at www.SwimHealthyVA.com

Contact Your Local Health Department at: VDH VIRGINIA DEPARTMENT OF HEALTH Protecting You and Your Environment
Threats Identified by the World Health Organization - with significant impact for Virginia.

Global Influenza Pandemic

- Ensuring effective and equitable access to diagnostics, vaccines and antivirals, especially in developing countries (rural communities).

Ebola and other High-Threat Pathogens

- Consider global threats
- Ebola, Zika, Middle East respiratory syndrome coronavirus (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS)
Threats Identified by the World Health Organization - with significant impact for Virginia

Antimicrobial Resistance

- Making infections such as pneumonia, tuberculosis, gonorrhea, salmonellosis hard to treat.
- Increased morbidity, mortality, and *cost of care*.

Vaccine Hesitancy

- Reluctance or refusal to vaccinate despite availability
- Countries close to eliminating disease such as measles have seen a resurgence.
Unvaccinated boy nearly died from tetanus. The cost of his care was almost $1 million.

6-year-old was infected in 2017 while playing on the family’s farm, the first case of tetanus in Oregon in 30 years, according to a CDC report.

March 8, 2019, 7:12 PM EST

By Linda Carroll

An unvaccinated Oregon boy almost died from tetanus, the first case of the bacterial infection in the state in 30 years. The 6-year-old's harrowing illness and painful, two-month treatment – which cost close to a million dollars – were detailed by doctors in a case report published Friday by the Centers for Disease Control and Prevention.

The boy became infected in 2017 after cutting his head while playing outdoors on the family's farm. His wound was cleaned and stitched by his family at home, according to the Oregon doctors who treated the child and wrote the CDC report. All seemed fine, until six days later when he started crying and experiencing involuntary muscle spasms and clenching his jaw. Soon he was arching his neck and
Increase Risk of Disease in the Community means increased risk for healthcare providers.

As the community becomes more susceptible to vaccine-preventable illnesses (through decreased herd immunity) the chances of exposure and illness by first responders and healthcare providers also increases.

- Even more critical to ensure employees are up-to-date on immunizations.

Maintaining institutional readiness to handle patients requiring special precautions (contact/air-borne).

Access to cache of personal protective equipment (PPE) remains important (at hospitals, health departments, etc).
Health threats identified by the World Health Organization and CDC with significant impact for Virginia

HIV, [Hepatitis C], [Hepatitis A]
Non-communicable diseases
  • Diabetes, Cancer, and Heart Disease
    • Risk Factors: tobacco use, physical inactivity, harmful use of alcohol, unhealthy diets, air pollution
Behavioral/Mental Health Disorders (Exacerbated in Disasters)
  • Substance Abuse Disorders
    • Opioid Epidemic, Tobacco Use.
  • Violence
    • Suicides, Homicides, Domestic Violence
    • Adverse Childhood Experiences
Weak Primary Health Care
  • Lack of access to care (Improving via Medicaid Expansion)
Fragile and Vulnerable Settings
Other Threats Impacting Public Health and Healthcare

• Complex Coordinated Terrorism Attacks
  • Active Shooter
  • Ramming a vehicle into crowds
  • Use of IEDs and other explosives

• Cybersecurity Threats
  • Mobile Device Exploits
  • Cloud Security
  • Ransomware
Responding to Emerging Threats
(Trust for America’s Health)

• Stable and dedicated funding for preparedness activities
  • Accelerated in crisis response

• Maintaining a long-term investment in the Global Health Security Agenda

• Investments in efforts to combat antimicrobial resistance, including diagnostic capabilities, stewardship, detection and treatment methods

• Supporting vaccine infrastructure, research, production, and capability to provide quick response

• Support of the National Biodefense Strategy, Strategic National Stockpile program
Responding to Emerging Threats

• Bolstering the Hospital Preparedness Program and multisector healthcare collaboration

• Address impacts of climate change and sea level rise.

• Consider how technology can be used to increase efficiency in response; ensure responses are data-driven.

• Building resilient communities. Continue planning for Functional Needs, but also promote health equity in emergency preparedness planning, recovery and response.
Keep in Mind the Basics
Planning and Response

Responding to health threats require partnerships and collaborative efforts.

- Local, Regional, State, and Federal
- Measures of readiness - Project Public Health Ready

Require the basic structure and resources to assist with coordination, execution and monitoring of event.
Incident Command System (ICS)

FEMA online classes: http://www.training.fema.gov/is/crslist.aspx
Iterative Planning Process

- Expert Opinion, Research
- Plans/Templates
- Drills/Exercises/Training
- Real World Events
- After-Action Reports
- Plan Modification
Integrating Emergency Protocols in Routine Work
Chesterfield, VA
Personal Responsibilities in Preparedness

1. Personal/Family Preparedness Plans

2. Keep up-to-date with your own preventive health screenings and exams.

3. Maintain skills and licensures.

4. Become involved in local/state coalitions, develop working relationships *prior* to a disaster.
Thank You
References

References

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