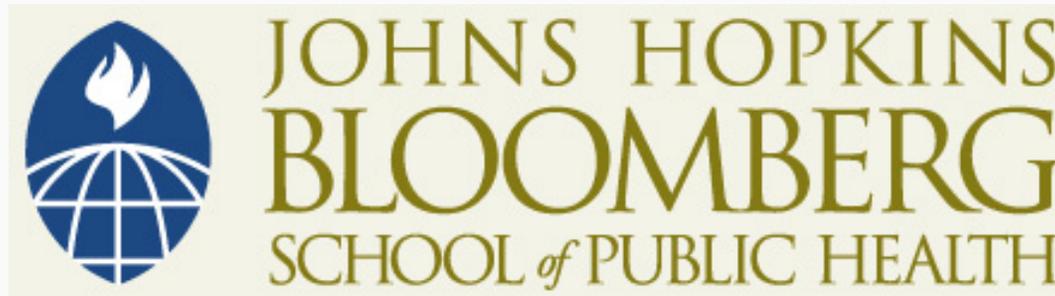


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Biological Agents of Water and Foodborne Bioterrorism

Kellogg Schwab PhD
Johns Hopkins University

Objectives

- Outline microbes as biological weapons
 - Response, exposure, transmission
- Microbial characteristics of interest to perpetrators
 - Availability
 - Propagation
 - Stability
 - Dispersion
- CDC biological classifications of bioterrorism microbes
- Food and waterborne microbial threats
 - Microbial properties
 - Specific microorganisms



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Part 1 of 5

Microbes as Biological Weapons

Microbes as Biological Weapons

- The microorganisms and toxins that could act as biological weapons are naturally occurring.
- The agents that could potentially be used as biological weapons are diverse and widely distributed in nature and include
 - viruses, bacteria, fungi, and protozoa
 - the toxins produced by many microbes
- These microbes are found naturally in soils, waters, plants, and animals.

Infectious Diseases Cause Severe Morbidity and Mortality

- Despite all the medical advances that enhance our abilities to prevent and treat disease, infectious diseases remain the primary cause of death in the world and are one of the leading causes of death in the US.
- There are over 50,000 cases of infectious diseases in the United States each day.
- Outbreaks of disease from pathogenic microorganisms pose a threat to global security even without biological warfare or bioterrorism.

Biological Weapons are Living Microorganisms

- An important feature that distinguishes biological weapons from other weapons of mass destruction is that microorganisms reproduce once inside a host.
- It can take only a few hours to go from having 1 microorganism to millions of infectious agents.
- In some cases it requires exposure to only a few of these pathogens to initiate a deadly infection.

Delay in Symptoms can Complicate the Response

- Typically individuals don't know they were exposed to an infectious agent until days or weeks later when the disease symptoms appear.
- This means that the first responders to an attack with biological weapons may be emergency room workers.
- If the agent can be transmitted from person to person through the air or by direct contact with body fluids these health care workers can themselves become infected.
- If the risk is apparent, steps, such as wearing masks and gowns, can be taken to protect these first responders and to limit the spread of infection.
- But if the risk is not properly recognized the health care workers and others may also become victims.
 - SARS is a classic example of this

Biological Exposure Routes

- Biological agents vary in how they are transmitted to humans and how they enter the body.
- Transmission of biological agents through the air (aerosol transmission) is likely to impact the greatest number of individuals, but transmission by other means--water, food, insect vectors, etc.--may also be routes of exposure of individuals to biological agents.

Differences in Effects and Transmissibility

- Among the viruses, bacteria, and fungi that may be used as biological weapons, there are significant differences in their effects and transmissibility.
- Not all of the agents that may serve as potential biological weapons are equally contagious.
- They also differ greatly in the rates of morbidity (disease) that occur following exposure and mortality (death) that occur as a consequence of disease development.
- This has a significant impact on the threat posed by each specific biological agent and how we might defend against them.

Disease Outcomes

- Exposure to biological agents can have various outcomes, ranging from mild disease with few symptoms to severe disease and high rates of mortality. Some diseases, like many of the hemorrhagic fevers (Ebola, Marburg, etc.), can not be prevented, except by avoiding exposure.