

# MODULE I

## Introduction to Bioterrorism

Bioterrorism Training and Emergency  
Preparedness (BTEP) Curriculum



*Department of Health Science*  
California State University, Long Beach  
January 2007



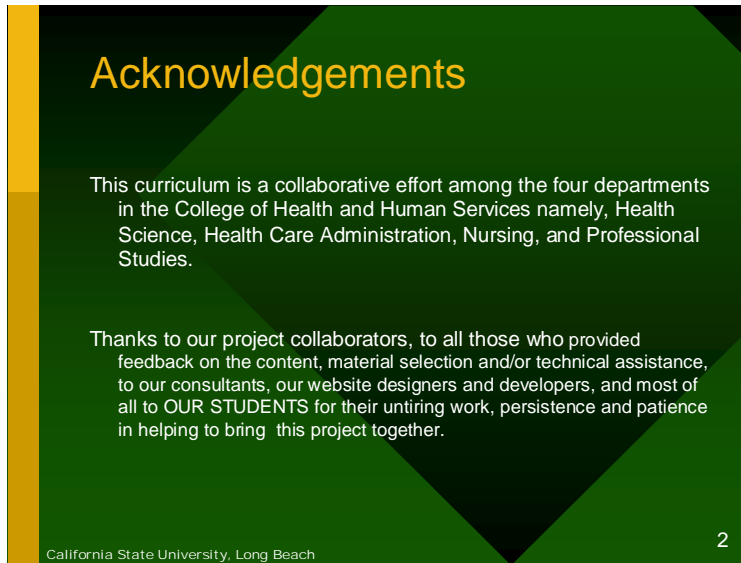
# The Bioterrorism Training and Emergency Response Curriculum

The Bioterrorism Training and Emergency Response Curriculum was developed to educate students and the public on information regarding bioterrorism preparedness and emergency response. Through the Bioterrorism Training Curriculum Development Project funded by the Health Resources Services Administration (HRSA), 12 modules were selected to be utilized in classes at the Departments of Health Science, Health Care Administration, Nursing, and Professional Studies in the College of Health and Human Services at California State University, Long Beach. These modules were modified to include local, countywide, and statewide information as well as information from various community agencies and public health departments. Instructors are encouraged to use portions or all of the material freely for its intended purpose.

## TERMS OF USE

**This material was originally developed by the [Northwest Center for Public Health Practice](#), at the University of Washington, School of Public Health & Community Medicine for educational purposes.** Permission has been obtained to copy, adapt, and distribute for non-commercial use only.

# Acknowledgements



## THE BIOTERRORISM TRAINING AND CURRICULUM DEVELOPMENT PROJECT GROUP

### **Project Director:**

Veronica Acosta-Deprez, PhD, CHES  
Department of Health Science  
California State University, Long Beach

### **Project Co-Directors:**

Sarath Gunatilake, MD, DrPH  
Department of Health Science  
California State University, Long Beach

Mohammed Forouzesh, PhD  
Department of Health Science  
California State University, Long Beach

### **Project Co-Collaborators:**

Robert Friis, PhD, Chair  
Mohammed Forouzesh, PhD, Graduate Director  
Department of Health Science

Paul Bott, PhD, Chair  
Department of Professional Studies

Tony Sinay, PhD, Chair  
Health Care Administration Program

Barbara White, PhD  
Department of Nursing

**The following people provided feedback on the content, material selection and/or technical assistance:**

Charles W. Clark, Chief of School Safety and Emergency Preparedness, Long Beach Unified School District

Kathy Crow, RN, St. Mary's Hospital, Disaster Resource Center, Long Beach

Elizabeth Cross, Orange County Health Care Agency

Sue Donelson, MPH, California State University, Long Beach

Vanessa Garcia, Orange County Health Care Agency

Lisa Grabhorn, MPH California State University, Long Beach

Jee Kim, MPH, County of Los Angeles Public Health Department

Hang Nguyen, MPH Orange County Health Care Agency Bioterrorism Preparedness Unit

Hanan Obeidi, MPH, Long Beach Health Department, coordinator, Bioterrorism Preparedness Coordinator

Phil Falcetti, MPH, Orange County Health Care Agency

Steve Raginold, Captain, Long Beach Fire Department

Ibtisam Sirhan, MPH California State University, Long Beach

John Van Sky, PhD, Director, Orange County Public Health Department, Bioterrorism Preparedness Unit

**Consultants:**

Palitha Abeykoon, MD, World Health Organization, Sri-Lanka

Ron Arias, MPA, Director, City of Long Beach Health and Human Services

Curt Bonk, PhD, Instructional Systems Technology Department, Indiana University, Bloomington, Indiana

Joseph Carlucci, MD, World Health Organization

Thushara Fernando, MD, World Health Organization, Sri-Lanka

Ravindu Gunatilake, MD, University of Hawaii- Manoa

Indika Karunathilake, MD, Faculty of Medicine, Colombo, Sri Lanka

J. M Peiris, MD, University of Hong Kong

Emelinda Parentela, PhD, Department of Civil Engineering, California State University, Long Beach

**Students:**

Sherlene Gatdula, BS, Department of Health Science

Cindy Gotz, MPH Candidate, Department of Health Science

Shirley Jensen, RN, PHN, MPH Candidate, Department of Health Science

Bow Lee, MPH candidate, Department of Health Science

Kristina Mayuga, BS, Department of Health Science

Kristine Talavera, BS candidate, Department of Health Science

Riza Tamayo, BS, Department of Health Science

Jevie Tomilloso, BS candidate, Department of Health Science

**Website design and development:**

Yiubun Liu, MS candidate, Civil Engineering Department

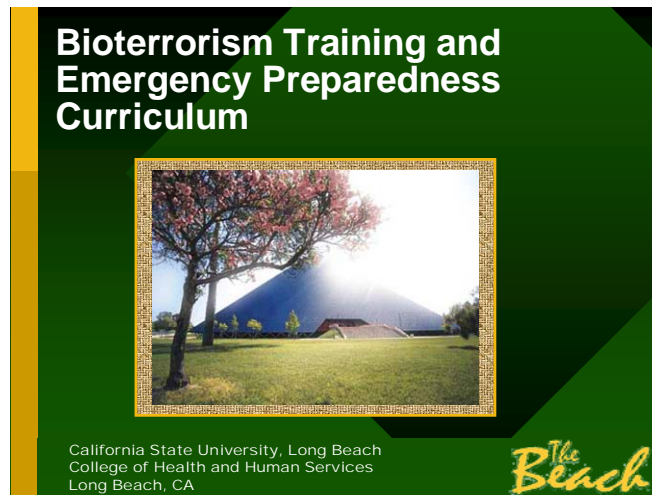
Marvin Mayo, University College Extension Services, California State University, Long Beach Foundation

Francisco Romero, University College Extension Services, California State University, Long Beach Foundation

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## About This Module



This is one of a series of modules in a curriculum developed to provide a basic understanding about bioterrorism preparedness and response, and how public health fits into the overall purpose. The target audience for this module includes students in the four collaborating departments: Health Science, Health Care Administration, Nursing, and Professional Studies at California State University, Long Beach. Instructors are encouraged to use portions or all of the material freely for its intended purpose.

This module was originally developed by the Northwest Center for Public Health Practice in Seattle, Washington. However, modifications have been made in the format as well as in the addition of other information from local (Greater Long Beach), countywide (Los Angeles and Orange counties), and state (California) resources in order to be more relevant to our target audience and applicable to the local setting. This module incorporates information from a wide variety of sources including the Centers for Disease Control and Prevention, the Federal Emergency Management Agency, the Working Group on Civil Biodefense, the United States Army Medical Research Institute in Infectious Disease (USAMRIID), and public health departments including Long Beach Department of Health Services, Los Angeles County Public Health Department, Orange County Health Care Agency, and the California Department of Health Services, among others.

This module is not copyrighted and may be used freely for the education of students and public health employees, and other partners working within bioterrorism and emergency response.

## How to Use This Manual

This manual provides the instructor with additional useful information related to the accompanying MS PowerPoint® slides. The manual and slides are divided into twelve topic areas: Introduction to Bioterrorism, Planning for Emergency Response, Overview of Diseases, Bioterrorism Surveillance and Epidemiologic Response Plan, Consequence Management: Public Health Leaders, Consequence Management: Public Health Staff, Consequence Management: Other Public Health Staff, Risk Communication, Public Health and the Law, Incident Command System and The Anarchist: Tabletop Exercise. Links to Web sites of interest are included in the lower right-hand corner of some slides and can be accessed by clicking the link while in the “Slide Show” view. Blocks of material in the manual are periodically summarized in the “Key Point” sections, to assist the instructor in deciding what material to include in a particular presentation.

# Introduction to Bioterrorism

Introduction to Bioterrorism

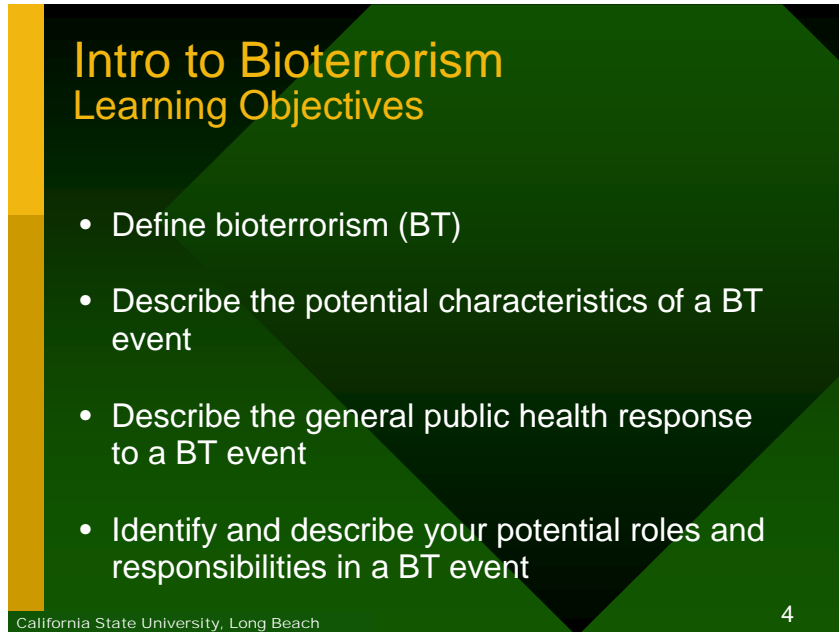
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## Summary of Key Points (Slide 29)

1. A bioterrorist attack is likely to be covert.
2. First responders in a covert attack are likely to be health care providers.
3. Public health workers will use many of the same skills in response to a bioterrorism incident as they do in a routine workday.
4. The manner in which job skills are implemented will potentially differ from a routine workday.

Slide 3: Module Title

## Learning Objectives (Slide 4)

The slide features a dark green background with a yellow vertical bar on the left side. The title 'Intro to Bioterrorism Learning Objectives' is written in yellow text at the top left. Below the title, there is a bulleted list of four learning objectives in white text. At the bottom left, the text 'California State University, Long Beach' is visible, and at the bottom right, the number '4' is displayed.

**Intro to Bioterrorism  
Learning Objectives**

- Define bioterrorism (BT)
- Describe the potential characteristics of a BT event
- Describe the general public health response to a BT event
- Identify and describe your potential roles and responsibilities in a BT event

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The learning objectives for this module are:

1. Define bioterrorism (BT)
2. Describe the potential characteristics of a BT event
3. Describe the general public health response to a BT event
4. Identify and describe your potential roles and responsibilities in a BT event

## What Is Bioterrorism (Slides 5-8)

### KEY POINTS

1. Biological agents producing either *high mortality* or *low mortality*, but *moderate-high morbidity*, are capable of creating significant terror and disruption in society.
2. A bioterrorist attack may be announced, but is more likely to be unannounced (covert).
3. Health care providers may be the first to recognize victims of a covert attack.

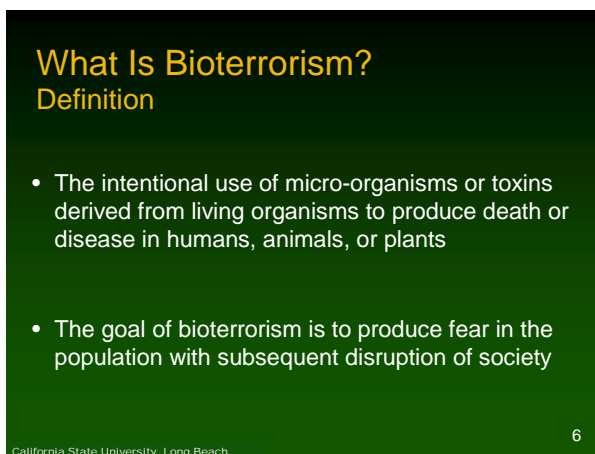


**What Is Bioterrorism?**  
Definition

- Terrorism (FBI definition): "The unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment of it, in furtherance of political or social objectives."

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Bioterrorism (BT) is terrorism involving the use of biological weapons, i.e., microbes or biologically derived toxins to inflict disease on humans. Terrorists seek to create fear and consequent disruption in society. The number of cases and deaths may be large, although terrorism achieves fear and societal disruption out of proportion to the actual damage done by the attack, as illustrated in the 2001 anthrax outbreak on the East Coast of the United States. Biological agents producing both high mortality and low mortality with moderate-high morbidity are included among the CDC-identified "critical agents" of concern (to be discussed in the module on diseases of BT potential). Although terrorists ultimately seek to create terror in other humans, their activities may produce death or disease in plants and animals



**What Is Bioterrorism?**  
Definition

- The intentional use of micro-organisms or toxins derived from living organisms to produce death or disease in humans, animals, or plants
- The goal of bioterrorism is to produce fear in the population with subsequent disruption of society

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Animals and humans may both become infected through the intentional release of a biological agent in the environment, or animals and plants may be infected or contaminated for the purpose of infecting humans via the food supply.

A bioterrorist attack can be either announced (overt, slide 7), or unannounced (covert, slide 8). The first scenario may result in a response similar to that of other overt emergencies, such as chemical spills and fires. The second scenario (covert) is thought to be the more likely scenario in a bioterrorist incident. The first casualties are likely to be discovered by health care providers, as opposed to traditional emergency first-responders such as fire and HAZMAT teams.

## What Is Bioterrorism? Potential



- An “overt attack” is announced.
- Resembles the traditional HAZMAT event: Response to explosives and chemical exposures.
- First responders are likely to be “traditional” first-responders: fire, HAZMAT, police.

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## What is Bioterrorism? Definite



- A “covert attack” is unannounced.
- Thought to be likely scenario bioterrorism.
- First responders are likely to be health care providers, including Emergency Departments, primary care physicians, and hospitals.

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## History of Bioterrorism (Slides 9-11)

### KEY POINTS

1. Biological agents have been used in the past for offensive purposes.
2. Biological weapons programs existed in many countries prior to 1972 and most likely continued to exist in some countries beyond that time.
3. Although the United States no longer has an offensive biological weapons program, a defensive program has been active since 1953.

**History of Bioterrorism**

- Biological warfare (BW) employed as far back as 6th century BC.
- Examples of past BW:
  - 14th Century: Mongols catapulted corpses with bubonic plague over walls into Crimea.
  - 15th Century: Pizarro presented native South Americans with smallpox-contaminated clothing.
  - 1940: Japan's "Unit 731" dropped plague-infected fleas over Manchuria & China.

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Bioterrorism is not a new concept. The use of biological agents for offensive purposes has been documented as far back as the 6th century BC. Historical examples of biological warfare are noted in slide 9, and more recent examples of their use in terrorist activity in slide 10. Many of the biological agents considered to have potential for use in terrorist activity are agents that have been used before in biological warfare or were known to have been studied for that purpose prior to the Biological Weapons Convention in 1972

**History of Bioterrorism**  
Recent Examples

- 1984: Rajneeshee Cult contaminated restaurant salad bars with *Salmonella typhimurium*.
- 1995: Aum Shinrikyo cult attempted unsuccessfully to disperse BW agents in aerosol form; sarin gas attack in Tokyo.
- 2001: Anthrax-contaminated letters to U.S. media and government offices.

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The United States actively studied biological agents for their use in warfare, from 1943 to 1969, when President Nixon ended the offensive arm of the program by executive order. By May 1972, all stockpiles of biological agents and munitions from the U.S. program had been destroyed. A treaty was signed that year by over 140 countries, agreeing not to stockpile or conduct research on biological weapons for offensive purposes. The USSR signed, but did not adhere to, this treaty; and their offensive program continued until the dissolution of the Soviet Union in 1992. It is suspected that other countries also did not adhere to the provisions of the treaty.

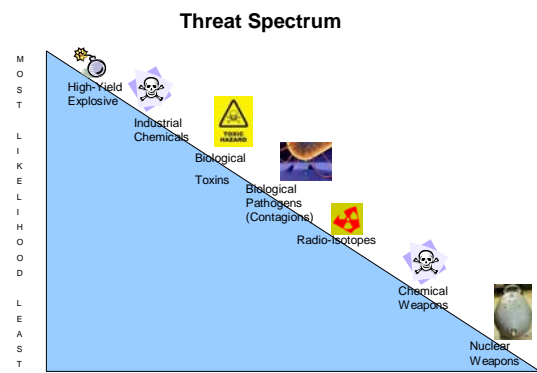
The U.S. defensive biological weapons program to develop prophylactic and treatment interventions began in 1953 and continues today at the U.S. Army Medical Research Institute of Infectious Disease (USAMRIID), in Fort Detrick, Maryland.

## History of Bioterrorism

### State-sponsored Bioweapons Research

- 1972 Biological Weapons Convention
  - Treaty prohibiting stockpiling and research into biological agents for offensive purposes
  - Ratified by >140 countries
  - Not adhered to in some countries (former Soviet Union)
- United States Bioweapons program
  - Offensive program: 1943-1969
  - Defensive program: 1953-today at USAMRIID

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Source: Department of Homeland Security & Texas A&M University

## Recognition of a BT Event (Slides 12-19)

### KEY POINTS

1. According to California State law (Title 17, CCR 2505), all suspected cases of illness caused by potential bioterrorism agents are immediately reportable to the local health jurisdiction.
2. Most diseases caused by potential bioterrorism agents present initially with a non-specific or flu-like illness.
3. Being alert to unusual clusters of illness and familiar with epidemiological clues suggesting a potential bioterrorism event are important to allow early recognition of a bioterrorist event.

## Surveillance/Detection (Slide 12):

**Recognition of a BT Event**  
Surveillance/Detection

- Goal: Detect unusual medical events sooner rather than later
- Depends on ability to identify a greater than expected number of “cases” or syndromes
- Requires sensitivity to unusual clusters of disease syndromes compatible with naturally occurring or BT-related outbreaks


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Surveillance systems play an important role in BT recognition by documenting baseline levels of disease and illness in a community and detecting case numbers and patterns that differ from typical. BT events are most likely to be covert, and lag times between exposure and disease development in the index case (i.e., incubation period), transmission to others (if person-person transmission exists), and laboratory diagnosis present a challenge in source identification and response. Health care providers also play an important role in recognizing a BT event by being alert to, and reporting to public health, suspicious cases or clusters of illness in their clinical practice.

## General Characteristics (Slide 13):

Most of the identified agents with bioterrorist potential produce an initial non-specific (slide 13 (e.g., fever, malaise, GI distress) and/or “influenza-like” illness—a common presentation that might not be recognized as atypical until the illness has progressed further. Because an effective mode of intentional dissemination for a biological agent is the aerosol route, pneumonia is another likely presentation.

**Recognition of a BT Event**  
General Characteristics

- Many agents initially produce a specific and/or flu-like illness 
- Aerosol dissemination
  - Not detectable: odorless, colorless, tasteless
  - Particle size 1-5um
  - Potential wide-spread dissemination
- May require special treatment approach

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Aerosol dissemination is “ideal” because it has the potential to expose a large number of people in a short period of time when released in a densely populated area. Aerosols can be imperceptible to the senses, and thus individuals unaware of the presence of danger would not know they had been infected until symptoms began. A certain degree of sophistication, however,

is required for aerosol production (the degree differing by agent); particles need to be between 1-5 microns to settle in the lungs.

Contamination of the food supply is another potential mode of biological agent dissemination. It is thought that a biological attack involving a community water supply would be unlikely because of dilution effects in reservoirs and the use of chlorination and filtration. Infiltrating smaller water distribution systems with infectious agents or toxins may be a more likely scenario

## Epidemiologic Clues (Slides 14-15)

**Recognition of BT Event  
Epidemiologic Clues I**

- Increase in persons ill with a similar or unusual syndrome
- Increase in unexplained disease or deaths
- Single case of disease due to an uncommon agent
- Unexpected geographic or seasonal distribution of disease
- Unusual age distribution
  - e.g., varicella, measles in adults

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Single case of disease due to an uncommon agent. For example, anthrax cases do occur spontaneously among humans in the United States, but infrequently, and typically as an occupational exposure in those working with infected animals or animal products. A single case of anthrax in someone without a known animal exposure would, therefore, warrant investigation.

Unexpected geographic or seasonal distribution of disease  
For example, plague occurs mainly in the Southwestern US, but is extremely rare in Oregon State.

**Recognition of BT Event  
Epidemiologic Clues II**

- Illness in persons with common ventilation system or other exposure
- Atypical route of transmission
  - e.g., aerosol botulism
- Unusual illness among animals preceding or accompanying human illness
- Failure to respond to usual antibiotic therapy

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Unusual age distribution  
(e.g., adults with a chickenpox-like rash illness)

Illness in persons sharing a common ventilation system or other exposure  
(i.e., an aerosol release indoors would create an exposure for all using the same ventilation system)

Atypical route of transmission

For example, botulism occurs when *C. Botulinum* spores release toxin under anaerobic conditions, such as improperly canned food or in wounds. Aerosol botulism does not occur naturally, and a botulism-like illness with no apparent food vehicle would suggest a deliberate source of infection.

Slides 16-17 summarize disease reporting requirements in California.

### Recognition of BT Event Surveillance/Detection

- By California State statute
- Medical Examiner (Government Code, State of California section 27491)

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### Recognition of BT Event Surveillance/Detection

- Effective September 2000, the following are immediately reportable to the local health jurisdiction
  - All suspected illnesses caused by potential bioterrorism agents
  - Unexplained critical illness or death
  - Rare diseases of public health importance

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## Public Health Response to a BT Event (Slides 18-27)

### Key Points

1. Public health workers will use many of the same skills in response to a bioterrorism incident that they use in a routine workday.
2. Potential differences between a routine public health workday and the response to a bioterrorism event include the coordination of activities with different agencies such as law enforcement and the size and scope of response efforts.

### Public Health Response to a BT Event General Characteristics

- Old skills applied in new ways
  - Disease/illness investigation
  - Informing and educating the public
  - Providing medications and immunizations
  - Referring and connecting people to resources
  - Informing and educating health care workers
  - Enforcing laws that protect the public's health
  - Coordinating activities with other agencies

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For the most part, the response of public health to a bioterrorism incident is similar to the response to other public health emergencies. Workers will use the same job-related skills required of them on a daily basis, but the size and scope, time frame, involved partners, and security precautions may differ from that of a typical day. The criminal nature, the potentially covert presentation, and the potentially large numbers of casualties each present a challenge to the public health response in a bioterrorism incident. Public health workers may be called upon to address the needs of the public for information and education, resource referral, medications and immunizations in larger numbers than typical, within a more concentrated time period, and in a higher state of stress.

## Public Health Response to a BT Event General Characteristics

- ...with a few additional factors
  - Coordination of activities with local law enforcement and FBI
    - Preservation of evidence
  - Early notification and involvement of federal health officials
  - Epidemiologic characteristics of disease may differ from typically expected

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Law enforcement has chain of custody procedures (i.e., to preserve evidence) that may influence when and where public health workers can gather information for their investigation (i.e., epidemiologists conducting surveys, environmental health workers conducting site investigations, etc.). The need to preserve evidence and security may also influence what information is released and when.

Public health workers may need security clearance to enter the crime scene or, at the very least, identification. Agents used in BT may have engineered resistance to the usual treatment (i.e., antibiotics); the population exposed and the time of year may differ than that typically seen.

### Key Preparedness Elements (Slides 20-21)

## Key Preparedness Elements

- Hazard Analysis
  - Determining what emergencies might occur & the availability of local resources for emergency response
- Emergency Response Planning
- Health Surveillance and Epidemiologic Investigation
  - Monitoring the health status of the community & investigating when it differs from expected



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## Key Preparedness Elements

- Laboratory Diagnosis and Characterization
  - Identifying the cause of illness
- Consequence Management
  - Responding to the emergency
  - Immediate response & long-term recovery



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The key preparedness elements listed in slides 20 and 21 come from the Center for Disease Control's Interim Planning Guidance for State Public Health Officials. Although the guide was written for state public health officials, each of the elements has applicability at the local level. The preparedness elements, with the exception of laboratory diagnosis and characterization, are discussed in varying levels of detail (depending on the target audience) in the other modules included in this curriculum.

## Potential Roles for Public Health Workers in BT Response (Slides 22-28)

### Potential Roles for Public Health Workers in BT Response: *Clinical Staff*

- Dispensing mass antibiotic prophylaxis
- Administering mass immunizations
- Triage (e.g., phone calls or clinic visits) and referring individuals as appropriate
- Referring individuals to social support and informational resources
- General counseling and reassurance of anxious clients
- Assisting in conducting interviews during disease investigations and follow-up

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### Potential Roles for Public Health Workers in BT Response: *Epidemiologists and Communicable Diseases Staff*

- Assisting communicable disease epidemiologists in disease investigation:
  - Case interviewing and data collection
  - Data entry and analysis
  - Case contact tracing and identification
  - Case follow-up

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### Potential Roles for Public Health Workers in BT Response: *Public Health Leaders*

- Emergency response planning
- Activation of the emergency response plan
- Supervising and coordinating public health efforts
- Coordination and communication with other agencies
- Providing information to the media and general public
- Risk communication

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### Potential Roles for Public Health Workers in BT Response: *Public Health Information Staff*

- Educating and informing the public on BT health risks and response efforts (including dispelling myths)
- Assisting in the development of press releases
- Referring individuals to social support and informational resources
- General counseling and reassurance of anxious clients

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### Potential Roles for Public Health Workers in BT Response: *Assessment Coordinators*

- Assisting communicable disease epidemiologists in disease investigation
- Assisting in the creation and dissemination of press releases, health alerts, and other informational resources
- Coordination and communication with other agencies
- Identifying populations in the community that may require special services in the event of an emergency

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### Potential Roles for Public Health Workers in BT Response: *Technical and Support Staff*

- Answering phone calls
  - Delivering critical baseline information
  - Referring calls as appropriate
- Assisting in the creation and dissemination of press releases, health alerts, and other informational resources
- Arranging sites for delivery of mass immunizations or antibiotics
- Coordinating delivery of lab specimens

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**Potential Roles for Public Health Workers in BT Response: Environmental Health**

- Environmental health risk assessment
- Food and water inspection
- Assisting in illness investigation

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A variety of activities are required to ensure the health and safety of the public. In routine public health practice, workers perform different tasks, depending on their specific job category; and for the most part, tasks performed in a bioterrorism event can also be expected to reflect specific job categories. Workers may be called upon to assist in areas

outside of their usual “job description” (e.g., answering phones, making deliveries), but not outside their scope of training (i.e., non-medically trained individuals would not be expected to give medical advice). Slides 22-28 list potential roles for epidemiologists, public health nurses, managers/administrators, assessment coordinators, administrative staff, health educators, and environmental health workers in the public health response to a biological terrorism incident. Note that these are potential roles. The scope of responsibility for any one worker will vary depending on the size, organization, and location of the department.

## Summary of Key Points (Slide 29)

**Introduction to Bioterrorism Summary of Key Points**

- A bioterrorist attack is likely to be covert.
- First responders in a covert attack are likely to be health care providers.
- Public health workers will use many of the same skills in response to a bioterrorism incident as they do in a routine workday.
- The manner in which job skills are implemented will potentially differ from a routine workday.

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## General Resources (Slides 30-32)

**Resources**

- Centers for Disease Control & Prevention  
<http://www.bt.cdc.gov>
- Federal Emergency Management Agency  
<http://www.fema.gov>
- Johns Hopkins Center for Civilian Biodefense Studies fact sheets and links to other info, including JAMA series from Working Group on Civilian Biodefense  
<http://www.hopkins-biodefense.org/>
- USAMRIID <http://www.usamriid.army.mil>

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**Resources**

- Long Beach Public Health Department  
<http://www.ci.long-beach.ca.us>
- (562) 570-7999
- Los Angeles County –  
• <http://www.lapublichealth.org/>
- California State Department of Health Services  
• <http://www.dhs.ca.gov/>
- **Division of Communicable Disease Control**
- 1-510-540-2566 (regular business hours) OR 1-800-971-9631 (24 hour emergency)

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**Resources**

- State of California Emergency Preparedness Office  
<http://www.dhs.ca.gov/epo/EPOIndex.htm>
- Los Angeles County Department of Public Health 800-397-3993 (communicable disease reporting system)  
<http://lapublichealth.org/acd/cdrs.htm> or
- To report a possible bioterrorist incident contact ACDC Bioterrorism and Response at 213-240-7941

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State of California Emergency Preparedness Office  
<http://www.dhs.ca.gov/epo/EPOIndex.htm>  
Los Angeles County Department of Public Health 800-397-3993 (communicable disease reporting system)  
<http://lapublichealth.org/acd/cdrs.htm> or To report a possible bioterrorist incident contact ACDC Bioterrorism and Response at 213-240-7941

## In Case of an Event (Slides 33-34)

**In Case of An Event...  
Web Sites with Up-to-Date Information and Instructions**

- Centers for Disease Control and Prevention  
<http://www.bt.cdc.gov/EmContact/index.asp>
- Level A Lab Protocols: Presumptive Agent ID  
<http://www.bt.cdc.gov/LabIssues/index.asp>

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**In Case of An Event...  
Web Sites with Up-to-Date Information and Instructions**

- FBI Terrorism Web Page  
<http://www.fbi.gov/terrorism/terrorism.htm>
- Mail Security  
<http://www.usps.com/news/2001/press/serviceupdates.htm>
- NIOSH – Worker Safety and Use of PPE  
<http://www.cdc.gov/niosh/emres01.html>

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# Module 1-Introduction to Bioterrorism

## Review Questions

1. A bioterrorist attack is most likely to be overt. True or False?
2. Public health workers will use many of the same skills in response to a bioterror incident as they would in the normal course of their day. True or False?
3. According to the FBI bioterrorism is defined as
4. A Bioterror attack affects
  - a. People
  - b. Animals
  - c. Plants
  - d. All of the above
5. Casualties in a covert bioterrorist event are most likely to be discovered by?
  - a. Police/Fire
  - b. HAZMAT
  - c. Health Care Worker
  - d. All of the above
6. The development of bioterrorism as a method of intimidation is a relatively (last 25 years) new concept. True or False?
7. List 3 things that present a challenge in source identification and response to a bioterror agent exposure.
8. List epidemiological clues which might suggest a bioterror event.

## Answer Key

1. False
2. True
3. Unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population or any segment of it, in furtherance of political or social objectives.
4. D
5. C
6. False
7. Lag times between exposure and disease development in the index case (i.e., incubation period), transmission to others (if person-person transmission exists), and laboratory diagnosis.
8. Single case of disease due to an uncommon agent, unexpected geographical or seasonal distribution of disease, unusual age distribution, illness in persons sharing a common ventilation system or other exposure, atypical route of transmission, unusual illness among animals preceding or accompanying human illness.

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## Table Top Exercise – Tsunami

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Seiji Yamada, MD, MPH [seiji@hawaii.edu](mailto:seiji@hawaii.edu)

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## Appendix A: Glossary

**Bulbar:** Referring to the cranial nerves

**Coagulopathy:** A disease affecting the coagulability (clotting) of the blood

**Confluent:** Joining, running together

**Conjunctivitis:** Inflammation of the conjunctiva; “red eye”

**Depigmentation:** Loss of pigmentation (color)

**Diplopia:** Double vision

**Dyspnea:** Shortness of breath

**Edema:** An accumulation of an excessive amount of watery fluid in cells or tissues

**Enanthem:** A mucous membrane eruption (rash)

**Epistaxis:** Nose bleed

**Erythema:** Redness

**Eschar:** A thick, coagulated crust or slough

**Exanthem:** A skin eruption (rash) occurring as a symptom of an acute viral or coccal disease

**HAZMAT:** Hazardous materials management; HAZMAT workers respond to discharges and/or releases of oil, chemical, biological, radiological, or other hazardous substances .

**Hematemesis:** Vomiting of blood

**Hemoptysis:** Coughing up blood

**Hemorrhagic mediastinitis:** Bloody inflammation in the chest cavity

**Hypotension:** Low blood pressure

**Indolent ulcer:** Chronic ulcer, showing no tendency to heal

**Leukocytosis:** Elevated white blood cell count

**Lymphadenitis:** Inflammation of a lymph node or lymph nodes

**Lymphadenopathy:** A disease process (e.g., swelling) affecting a lymph node or nodes

**Macule:** A small, discolored patch or spot on the skin, neither elevated above nor depressed below the skin's surface

**Malaise:** General ill feeling

**Myalgia:** Muscle aches

**Papule:** A small, circumscribed solid elevation on the skin

**Percutaneous:** Denoting the passage of substances through unbroken skin; passage through the skin by needle puncture

**Petechiae:** Pin-head sized hemorrhagic spots in the skin

**Pharyngitis:** Inflammation of the tissues of the pharynx; "Sore throat"

**Pleuropulmonary:** Relating to the pleura and the lungs

**Preauricular:** Anterior to the auricle of the ear

**Prodrome:** An early or premonitory symptom of a disease

**Prophylaxis:** Prevention of a disease, or of a process that can lead to disease

**Prostration:** A marked loss of strength, as in exhaustion

**Pustule:** A small circumscribed elevation of the skin, containing purulent material

**Sepsis:** The presence of various pus-forming and other pathogenic organisms, or their toxins, in the blood or tissues

**Stomatitis:** Inflammation of the mucous membrane of the mouth

**Vesicle:** A small, circumscribed elevation on the skin containing fluid (I.e., blister)

\*Reference: Stedman's Medical Dictionary, 26<sup>th</sup> Ed.