Section 6

Biological Emergencies

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Introduction

Biological pathogens are bacterial, viral, fungal, and parasitic organisms that cause disease in humans, plants, and animals. Human exposure to these agents may occur through inhalation, skin (cutaneous) exposure, or ingestion of contaminated food or water. In recent years, international concern has increased about the deliberate use of certain pathogens or biological products by terrorists to influence the conduct of government or to intimidate or coerce a civilian population. As was learned in the spring of 2003, epidemics resulting from emerging infectious diseases like severe acute respiratory syndrome (SARS) can cause widespread civil panic and conditions similar to a bioterrorist event.

Effective response to a disease outbreak (natural or intended) depends on rapid identification of the causative agent and specific diagnosis. To enhance detection and treatment capabilities, physicians and other health professionals in acute care settings should be familiar with the clinical manifestations, diagnostic techniques, isolation precautions, treatment, and prophylaxis for likely causative agents (eg, smallpox, pneumonic plague, anthrax, viral hemorrhagic fevers). For some of these agents, delay in medical response could result in a potentially devastating number of casualties. To mitigate such consequences, early identification and intervention are imperative.

Front-line physicians must have an increased level of suspicion regarding the possible intentional use of biologic agents as well as an increased sensitivity to reporting those suspicions to public health authorities, who, in turn, must be willing to evaluate a predictable increase in false-positive reports. Clinicians should report noticeable increases in unusual illnesses, symptom complexes, or disease patterns (even without definitive diagnosis) to public health authorities. Prompt reporting of unusual patterns of illness can allow public health officials to initiate an epidemiologic investigation earlier than would be possible if the report awaited definitive etiologic diagnosis.

Medical response efforts also require coordination and planning with emergency management agencies, law enforcement, health care facilities, and social services agencies. Health care agencies should ensure that physicians know whom to call with reports of suspicious cases and clusters of infectious diseases, and should work to build a good relationship with the local medical community. Resource integration is absolutely necessary to establish adequate capacity to initiate rapid investigation of an outbreak, to educate the public, to begin mass distribution of antibiotics and vaccines, to ensure mass medical care, and to control public anger and fear.

The following resources provide quick access to current information on preparing for a biological emergency, management of infected persons, hazard assessment, health effects, and accessing emergency assistance. They are intended to help physicians and other health care professionals recognize signs and symptoms of potential infectious disease threats and the important need to notify appropriate authorities.

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Your feedback is welcome. E-mail comments to: disastercd@ama-assn.org.

AMA Quick Reference Guide: Biological Emergencies

Disease/ Agent	Possible Means of Exposure	Clinical Features	Lethality	Diagnostic Tests	Treatment[1]	Vaccine	Chemo-prophylaxis
BACTERIAL AGENTS							
Anthrax *Bacillus anthracis*	Inhalation of anthrax spores; ingestion of insufficiently cooked meat from infected animals; cutaneous exposure when working with infected animals No evidence of person-to-person spread for inhalational and gastrointestinal anthrax **Infection Control** Standard precautions	**Incubation Period** 1-5 d possibly up to 60 d)[2] **Clinical Syndromes** *Cutaneous*: Evolving skin lesion (face, neck, arms); local edema progresses to pruritic macule or papule, which enlarges and ulcerates after 1-2 d; subsequent development of painless, depressed, black eschar	20% if untreated, otherwise rarely fatal	Gram stain and culture of blood, pleural fluid, cerebrospinal fluid, ascitic fluid, vesicular fluid or lesion exudate Sputum rarely positive Confirmatory serological and PCR tests available through public health laboratory network Widened mediastinum on chest radiograph is characteristic of inhalational and occasionally, gastrointestinal anthrax[4,5]	Begin treatment when inhalational anthrax is suspected; do not wait for confirmatory testing[6] Combination therapy of ciprofloxacin or doxycycline **plus** one or two other antimicrobials should be considered with inhalational anthrax[7] Penicillin should be considered if strain is susceptible and does not possess inducible beta-lactamases If meningitis is suspected, doxycycline may be less optimal because of poor CNS penetration Steroids may be considered for severe edema and for meningitis	Inactivated vaccine (licensed but not readily available) 6 injections and annual booster	Ciprofloxacin or doxycycline, with or without vaccination; if strain is susceptible, penicillin or amoxicillin should be considered
		Gastrointestinal: Nausea, vomiting, abdominal pain, bloody diarrhea, sepsis	Approaches 100% if untreated but data are limited Rapid, aggressive treatment may reduce mortality				
		Inhalational: Abrupt onset of nonspecific flu-like symptoms (fever with or without chills, sweats, fatigue or malaise, non- or minimally productive cough, nausea and vomiting, dyspnea, headache, chest pain) followed in 2-5 d by severe respiratory distress, mediastinitis, hemorrhagic meningitis, sepsis, shock[3]	Once respiratory distress develops, mortality rates may approach 90%				

Disease/ Agent	Possible Means of Exposure	Clinical Features	Lethality	Diagnostic Tests	Treatment[1]	Vaccine	Chemo-prophylaxis
Brucellosis *B. mellitensis* *B. suis* *B. abortus* *B. canis*	Ingestion of/or contact with contaminated animals or animal products or by inhalation Person-to-person transmission possible but unlikely **Infection Control** Standard precautions	**Incubation Period** 5-60 d (usually 1-2 mo) **Clinical Syndrome** Nonspecific flu-like symptoms, fever, headache, profound weakness and fatigue, gastrointestinal symptoms such as anorexia, nausea, vomiting, diarrhea or constipation Osteoarticular complications common	Less than 5% even if untreated; tends to incapacitate rather than kill	Blood and bone marrow culture (may require 6 wk to grow Brucella); confirmatory culture and serological testing available through public health laboratory network	Doxycycline **plus** streptomycin or rifampin Alternative therapies: ofloxacin **plus** rifampin Doxycycline **plus** gentamicin Trimethoprim-sulfamethoxazole **plus** gentamicin	No approved human vaccine	Doxycycline **plus** streptomycin or rifampin
Inhalational (pneumonic) tularemia *Francisella tularensis*	Inhalation; ingestion; through abraded skin and mucous membranes; insect bites; animal contact No evidence of person-to-person spread **Infection Control** Standard precautions	**Incubation Period** 3-5 d (range of 1-21 d) **Clinical Syndrome** Sudden onset of acute, nonspecific febrile illness, weakness, chills, headache, generalized body aches, elevated white blood cells Pulmonary symptoms such as dry cough, chest pain or tightness with or without objective signs of pneumonia Progressive weakness, malaise, anorexia, and weight loss occurs, potentially leading to sepsis and organ failure	About 30-60% if untreated	Largely clinical diagnosis Culture of blood, sputum, biopsies, pleural fluid, bronchial washings (culture is difficult and potentially dangerous); confirmatory serological testing available through public health laboratory network	Streptomycin or gentamicin Alternatives: Ciprofloxacin Doxycycline Chloramphenicol	Live attenuated vaccine (USAMRIID, IND) given by scarification; currently under review by FDA, limited availability	Tetracycline Doxycycline Ciprofloxacin

Disease/ Agent	Possible Means of Exposure	Clinical Features	Lethality	Diagnostic Tests	Treatment[1]	Vaccine	Chemo-prophylaxis
Pneumonic plague *Yersinia pestis*	Inhalation Person-to-person spread **Infection Control** Droplet precautions; patients with pulmonary plague can be contagious	**Incubation Period** 1-10 d (typically 2-3 d) **Clinical Syndrome** Acute onset of flu-like prodrome: fever, myalgia, weakness, headache; within 24 hours of prodrome, chest discomfort, cough with bloody sputum, and dyspnea By day 2 to 4 of illness, symptoms progress to cyanosis, respiratory distress and hemodynamic instability	Almost 100% if untreated; 20-60% if appropriately treated within 18-24 h of symptoms Begin treatment when diagnosis of plague is suspected; do not wait for confirmatory testing	Gram stain and culture of blood, cerebrospinal fluid, sputum, lymph node aspirates, bronchial washings; confirmatory serological and bacteriological tests available through public health laboratory network Chest radiograph will show evidence of bronchopneumonia	Streptomycin or gentamicin Alternatives: Doxycycline Tetracycline Ciprofloxacin Chloramphenicol Chloramphenicol is first choice for meningitis except for pregnant women	Inactivated whole cell vaccine licensed but not readily available; injection with boosters Vaccine not effective against aerosol exposure	Tetracycline Doxycycline Ciprofloxacin
RICKETTSIAL AGENTS							
Q-fever *Coxiella burnetii*	Inhalation; ingestion; bites from infected ticks; contact with infected animals Person-to-person transmission rare **Infection Control** Standard precautions	**Incubation Period** 2-14 d (may be up to 40 d) **Clinical Syndrome** Nonspecific febrile disease, chills, cough, weakness and fatigue, pleuritic chest pain, possible pneumonia	1-3%; fatalities are uncommon even if untreated, but relapsing symptoms possible	Isolation of organism may be difficult; confirmatory testing by serology or PCR available through public health laboratory network	Tetracycline Doxycycline	Inactivated whole-cell vaccine (IND) Skin test to determine prior exposure to *C. burnetii* recommended before vaccination	Tetracycline Doxycycline

Disease/ Agent	Possible Means of Exposure	Clinical Features	Lethality	Diagnostic Tests	Treatment[1]	Vaccine	Chemo-prophylaxis
VIRAL AGENTS							
Smallpox Variola major virus	Inhalation of airborne droplets; contact with skin sores, secretions, clothing, or bedding Person-to-person spread **Infection Control** Contact and airborne precautions	**Incubation Period** 7-17 d **Clinical Syndrome** Nonspecific prodrome of high fever, myalgias, malaise, prostration, headache, vomiting, delirium followed in 2-3 d by maculopapular rash uniformly progressing to pustules and scabs, mostly on extremities and face Requires astute clinical evaluation; may be confused with chickenpox, erythema multiforme with bullae, or allergic contact dermatitis	30% in unvaccinated persons	Pharyngeal swab, vesicular fluid, biopsies, scab material for electron microscopy and PCR testing through public health laboratory network Notify CDC Poxvirus Section at 1-404-639-2184	Supportive care Cidofovir shown to be effective in vitro and in experimental animals infected with surrogate orthopox virus	Live attenuated vaccinia vaccine derived from calf lymph; given by scarification (licensed, restricted supply) Currently available to high risk groups (eg, first responders, military)	Vaccination given within 3-4 days of exposure can prevent or decrease disease severity
Viral encephalitis: Venezuelan (VEE) Eastern (EEE) Western (WEE)	Mosquito bite No evidence of person-to-person spread **Infection Control** Standard precautions	**Incubation Period** 2-6 d (VEE); 7-14 d (EEE, WEE) **Clinical Syndrome** Systemic febrile illness, with encephalitis developing in some populations Generalized malaise, spiking fevers, headache, myalgia Incidence of seizures and/or focal neurologic deficits may be higher after biological attack	<10% (VEE); 10% (WEE); 50-75% (EEE)	Clinical and epidemiological diagnosis White blood cell count may show striking leukopenia and lymphopenia Confirmatory serological tests and viral isolation available through public health laboratory network	Supportive care Analgesics, anticonvulsants as needed	Several IND vaccines, poorly immunogenic, highly reactogenic	None available

Disease/ Agent	Possible Means of Exposure	Clinical Features	Lethality	Diagnostic Tests	Treatment[1]	Vaccine	Chemo-prophylaxis
Viral hemorrhagic fevers (VHFs): Arenaviruses (Lassa, Junin, and related viruses) Bunyaviruses (Hanta, Congo-Crimean, Rift Valley) Filoviruses (Ebola, Marburg) Flaviviruses (Yellow Fever, Dengue, tick-borne disease viruses)	Inhalation, through mucous membranes; mosquito bite; or direct contact with an infected person, animal, or their secretions (depending on the VHF) VHFs are extremely contagious after contact with blood and body fluids **Infection Control** VHFs present special challenges for hospital infection control Strict adherence to contact precautions; isolation with possible upgrade to airborne isolation	**Incubation Period** 4-21 d **Clinical Syndrome** Abrupt onset of fever, myalgia, and headache Other signs and symptoms may include nausea, vomiting, abdominal pain, diarrhea, chest pain, cough, and pharyngitis Maculopapular rash, prominent on the trunk, typically develops 5 d after onset of illness Bleeding manifestations (petechia, ecchymoses, hemorrhages), thrombocytopenia, and hypotension as disease progresses	Variable depending on viral strain; 15-25% with Lassa fever to as high as ≤90% with Ebola	Confirmatory serological testing and viral isolation available through public health laboratory network Notify CDC Special Pathogens Office at 1-404-639-1115	Supportive therapy Ribavirin may be effective for Lassa fever, Rift Valley fever, Argentine hemorrhagic fever, and Congo-Crimean hemorrhagic fever	Yellow fever vaccine is the only licensed vaccine available Vaccines for some of the other VHFs exist but are for investigational use only	Ribavarin is suggested for Congo-Crimean hemorrhagic fever and Lassa fever
Toxin/ Agent	**Possible Means of Exposure**	**Clinical Features**	**Lethality**	**Diagnostic Tests**	**Treatment[1]**	**Vaccine**	**Chemo-prophylaxis**
BIOLOGICAL TOXINS							
Botulinum toxin *Clostridium botulinum*	Inhalation; ingestion of contaminated food or untreated water; contamination of an open wound by live bacteria No evidence of secondary spread **Infection Control** Standard precautions	**Incubation Period** 1-5 d (typically 12-36 h) **Clinical Syndrome** Blurred vision, diplopia, dry mouth, ptosis, fatigue As disease progresses, acute bilateral descending flaccid paralysis, respiratory paralysis resulting in death	60% without ventilatory support	Clinical diagnosis Serum and stool should be assayed for toxin by mouse neutralization bioassay, which may require several days	Intensive and prolonged supportive care; ventilation may be necessary Trivalent equine antitoxin (serotypes A,B,E – licensed, available from the CDC) should be administered immediately after clinical diagnosis Anaphylaxis and serum sickness are potential complications of antitoxin Aminoglycosides and clindamycin must not be used	Pentavalent toxoid (A-E), yearly booster (IND, CDC) Not available to the public	Antitoxin may be sufficient to prevent illness after exposure but is not recommended until patient is showing symptoms

Toxin/ Agent	Possible Means of Exposure	Clinical Features	Lethality	Diagnostic Tests	Treatment[1]	Vaccine	Chemo-prophylaxis
Enterotoxin B *Staphylococcus aureus*	Inhalation; ingestion No evidence of secondary spread **Infection Control** Standard precautions	**Incubation Period** 3-12 h **Clinical Syndrome** Acute onset of fever, chills headache, nonproductive cough Normal chest radiograph	Probably low (few data for respiratory exposure)	Clinical diagnosis Serology on acute and convalescent serum can confirm diagnosis	Supportive care	No vaccine available	None available
Ricin toxin *Ricinus communis*	Inhalation; Ingestion; injection No evidence of secondary spread **Infection Control** Standard precautions	**Incubation Period** 18-24 h (acute symptoms may appear as early as 2-8 h following exposure) **Clinical Syndrome** Weakness, nausea, chest tightness, fever, cough, pulmonary edema, respiratory failure, circulatory collapse, hypoxemia resulting in death (usually within 36-72 h)	Mortality data not available but potential for death is likely to be high with extensive exposure	Clinical and epidemiological diagnosis Confirmatory serological testing available through public health laboratory network	Supportive care Treatment for pulmonary edema Gastric decontamination if toxin ingested	No vaccine available	None available
T-2 mycotoxins: *Fusarium Myrotecium Trichoderma Stachybotrys* and other filamenttous fungi	Ingestion; inhalation; cutaneous; ocular No evidence of secondary spread **Infection Control** Contact precautions until decontamination completed	**Incubation Period** Minutes to hours **Clinical Syndrome** Abrupt onset of mucocutaneous and airway irritation and pain May include skin, eyes, and gastrointestinal tract; systemic toxicity may follow	Severe exposure can cause death in hours to days	Consult with local health department regarding specimen collection and diagnostic testing procedures; confirmation requires testing of blood, tissue and environmental samples	Clinical support Soap and water washing within 4-6 h reduces dermal toxicity; washing within 1 h may eliminate toxicity entirely No effective medications or antidotes	No vaccine available	None available

[1] Different scenarios may require different treatment regimens. Please consult listed references and an infectious disease specialist for definitive dosage information.

[2] Data from 22 patients infected with anthrax in October and November 2001 indicate a median incubation period of 4 d (range 4-7 d) for inhalational anthrax and a mean incubation of 5 d (range 1-10 d) for cutaneous anthrax.

[3] Limited data from the October/November 2001 anthrax infections indicate hemorrhagic pleural effusions to be strongly associated with inhalational anthrax; rhinorrhea was present in only 1/10 patients.

[4] Chest radiograph abnormalities include paratracheal and hilar fullness and may be subtle. Consider chest computer tomography if diagnosis is uncertain.

[5] Limited data from the October 2001 infections indicate that for inhalational anthrax, chest radiograph abnormalities are present within 48 hours of the appearance of symptoms. Consider chest computerized tomography if diagnosis is uncertain.

[6] Limited data from the 2001 anthrax infections indicate that early treatment significantly decreased the mortality rate.

[7] Other agents with in vitro activity suggested for use in conjunction with ciprofloxacin or doxycycline for treatment of inhalational anthrax include rifampin, vancomycin, imipenem, chloramphenicol, penicillin and ampicillin, clindamycin, and clarithromycin.

Physicians should report noticeable increases in unusual illnesses, symptom complexes, or disease patterns (even without definitive diagnosis) to public health authorities. Prompt reporting of unusual patterns of illness can allow public health officials to initiate an epidemiologic investigation earlier than would be possible if the report awaited definitive etiologic diagnosis. Any suspicious or confirmed exposure to a biological weapons agent should be reported immediately to the local health department, local Federal Bureau of Investigations office, and the **Centers for Disease Control and Prevention at 770-488-7100**. Any incident related to terrorism or possible terrorist activity also requires telephonic notification to the **National Response Center at 800-424-8802**. This includes bombings, bomb threats, suspicious letters or packages, and incidents related to the intentional release of chemical, radiological, and biological agents.

If an unusual disease or possible outbreak is suspected, contact the state or local health department at:
http://www.statepublichealth.org
http://www.naccho.org/general8.cfm

Information contained in this table was current as of November 2004 and is intended for educational purposes only. Medication information should be researched and verified before initiation of patient treatment.

This table was compiled from the following references:

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Roy MJ, ed. Part II Biological Agents. In: *Physician's Guide to Terrorist Attack*. Totowa, NJ: Humana Press; 2004.

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World Health Organization. Public Health Response to Biological and Chemical Weapons. Geneva: WHO; 2004.

Abbreviations:

CDC - Centers for Disease Control and Prevention
FDA - Food and Drug Administration
IND - Investigational New Drug
PCR - Polymerase Chain Reaction
USAMRIID - United States Army Medical Research Institute of Infectious Diseases

Other Quick Reference Guides

Biological and Chemical Agent Quick Reference Tables
U.S. Army Soldier and Biological Chemical Command, Edgewood Chemical Biological Center

Biological, Chemical, and Radiological Terrorism: An Overview of Indicators and Response
Medical Society of the State of New York

Biological Terrorism Pocket Card
Department of Veterans Affairs (VA)

Bioterrorism Patient Isolation Guide – Quick Reference Table
Center for the Study of Bioterrorism, St. Louis University

Biologic Terrorism Preparedness and Response Card
NY State Department of Health

Clinical Pathways (Flow Diagrams)
Infectious Diseases Society of America (IDSA)

- Clinical Pathway: Anthrax
- Clinical Pathway: Botulism
- Clinical Pathway: Pneumonic Plague
- Clinical Pathway: Pneumonic Tularemia
- Clinical Pathway: Vesicular or Pustular Rash Illness
- Clinical Pathway: Viral Hemorrhagic Fever

Decision Support Tools/Quick Facts
American College of Physicians (ACP)

Interim Recommended Notification Procedures for Local and State Public Health Department Leaders in the Event of a Bioterrorist Incident (Flow Diagram)
Centers for Disease Control and Prevention (CDC)

Guide to Bioterrorism Identification
American College of Physicians (ACP)

Quick Reference for Potential Biological Weapons
Association for Professionals in Infection Control and Epidemiology (APIC)

“Recognizing the Zebra" Poster
Minnesota Department of Health

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Key Points About Bioterrorism

Biological weapons are devices used intentionally to cause disease or death through dissemination of microorganisms or toxins in food and water, by insect vectors, or by aerosols. Potential targets include human beings, food crops, livestock, and other resources essential for national security, economy, and defense.

Various biological agents could be used as weapons and the actual clinical syndrome will vary depending on the type of agent, its virulence, route of the exposure, and susceptibility of the victim to infection. Most likely biological weapon agents include bacteria, rickettsia, viruses, and bacterial toxins, which are poisonous chemicals produced by bacteria.

Some biological agents (eg, anthrax spores) persist in the environment creating a long-term hazard after their release.

Unlike nuclear, chemical, and conventional weapons, the onset of a biological attack will probably be insidious. A covert release of a contagious biologic agent has the potential for large scale spread before detection (which is dependent on traditional disease surveillance methods). For some infectious agents, secondary and tertiary transmission may continue for weeks or months after the initial attack.

In an epidemic, overwhelming numbers of critically ill patients will require acute and follow-up medical care. Both infected persons and the “worried well” would seek medical attention, with a corresponding need for medical supplies, diagnostic tests, and hospital beds.

The impact – or even the threat – of an attack can elicit widespread panic and civil disorder, overwhelm hospital resources, and disrupt social services.

Some biological agents have a high potential for secondary transmission from infected patients to others. This requires that medical treatment facilities have clearly defined procedures for handling infected casualties, many of whom will transport themselves to the facility.

Infection control precautions must be used until thorough assessment has been performed or the specific biological agent is identified. Health care professionals must first protect themselves (eg, by using protective suits, respiratory protection, and gloves) to minimize exposure.

Effective response to an infectious disease outbreak depends on individual clinicians (who well may be the “first responders”) having the knowledge and necessary level of awareness to suspect that something unusual might be occurring and to then activate the public health system.

Clinicians should report noticeable increases in unusual illnesses, symptom complexes, or disease patterns (even without definitive diagnosis) to public health authorities.

Prompt reporting of unusual patterns of illness can allow public health officials to initiate an epidemiologic investigation earlier than would be possible if the report awaited definitive etiologic diagnosis.

Important Clues That May Signal a Biological Emergency

- A single suspected case of an uncommon disease
- Single or multiple cases of a suspected common disease or syndrome that does not respond to treatment as expected
- Clusters of a similar illness occurring in the same time frame in different locales
- Unusual clinical, geographical, seasonal, or temporal presentation of a disease and/or unusual transmission route
- Unexplained increase in incidence of an endemic disease
- Unusual illness that affects a large, disparate population or is unusual for a population or age group
- Unusual pattern of illness or death among animals or humans
- Sudden increase in the following nonspecific illnesses:
  - pneumonia, flu-like illness, or fever with atypical features
  - bleeding disorders
  - unexplained rashes and mucosal or skin irritation, particularly in adults
  - neuromuscular illness, such as muscle weakness and paralysis
  - diarrhea

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Key Medical Resources

In the event of a biological emergency, health care providers must:

- Be ready and willing to deal with military and civilian casualties
- Be aware of infection control procedures to protect themselves and others from harm
- Be knowledgeable of infectious disease diagnosis and treatment protocols
- Understand that they may be the first to recognize a public health emergency and will be responsible for reporting to appropriate authorities

For immediate help in assessing clinical effects from exposure to a potentially hazardous biological agent, contact an infectious disease specialist, state or local health agency, or the **CDC Hotline at 770-488-7100**.

Consensus Statements

American Academy of Pediatrics (AAP)

Chemical-Biological Terrorism and Its Impact on Children: A Subject Review

Reviews key aspects of chemical and biological agents, the consequences of their use, the potential impact of a terrorist attack on children, and issues to consider in disaster planning and management for pediatric patients

Working Group on Civilian Biodefense
(published in the *Journal of the American Medical Association*)

- Anthrax
- Botulinum Toxin
- Hemorrhagic Fever
- Plague
- Smallpox
- Tularemia

Other Guidance Documents

Army Medical Research Institute of Infectious Diseases (USAMRIID)

Medical Management of Biological Casualties Handbook

The 4th edition of the 'Blue Book' provides in-depth information on biological weapon agent characteristics, therapeutics, diagnostics and more. Also provides a Palm OS version for download.

Centers for Disease Control and Prevention (CDC)

Laboratory Testing, Shipping, and Reporting: Information and Protocols

Laboratory specimen collection and testing procedures, laboratory safety information, and guidance for shipping specimens/isolates for further testing; includes information on the Laboratory Response Network, an integrated national and international network of laboratories that are fully equipped to respond quickly to acts of chemical or biological terrorism, emerging infectious diseases, and other public health threats and emergencies.

Department of Defense (DoD)

The Official Anthrax Vaccination Site

Offers detailed information on the anthrax vaccine and provides resources for vaccination inquiries.

eMedicine

Emergency Medicine: Chemical and Biological Warfare Agents and Topics

An extensive list of chemical and biological warfare agents and related information from the world's largest medical textbooks.

Food and Drug Administration (FDA), Center for Drug Evaluation and Research

Drug Preparedness and Response to Biologic Emergencies

To help prepare the country for possible terrorism attacks, the FDA is working with other federal agencies to make sure adequate supplies of medicine and vaccines are available to the American public. This Web site provides links to current information on vaccines and antimicrobials for prevention and treatment of infectious diseases.

Infectious Diseases Society of America (IDSA)

***Bacillus anthracis* (anthrax)**

Anthrax Medical Summary

Clinical Pathway: Anthrax

***Clostridium botulinum* toxin (botulism)**

Botulism Medical Summary

Clinical Pathway: Botulism

***Francisella tularensis* (tularemia)**

Tularemia Medical Summary

Clinical Pathway: Pneumonic Tularemia

Variola major (smallpox)

Smallpox Medical Summary

Clinical Pathway: Vesicular or Pustular Rash Illness

Viral hemorrhagic fevers

Viral Hemorrhagic Fever (VHF) Medical Summary

Clinical Pathway: Viral Hemorrhagic Fever

***Yersinia pestis* (plague)**

Plague Medical Summary

Clinical Pathway: Pneumonic Plague

Medical Fact Sheets

American College of Physicians (ACP)

Centers for Disease Control and Prevention (CDC)

Center for the Study of Bioterrorism, Saint Louis University

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Reporting Safety and Security Concerns

Federal, state, and local officials are responsible for working together to develop community and hospital response plans for the management of biological emergencies. Clinicians should be aware of such plans and knowledgeable of whom to contact in an emergency situation. Any suspicious or confirmed exposure to a biological weapons agent should be reported to national, state, and local authorities. A coordinated communication network is critical for transmitting reliable information to emergency personnel and the public.

Any suspicious or confirmed disaster situation should be reported immediately to the local 9-1-1 emergency response number. If you believe that someone has been exposed deliberately to a biological, chemical, or radioactive agent, or if you believe an intentional terrorist threat will occur or is occurring, please contact your local health department, your local police or other law enforcement agency, and the **Centers for Disease Control and Prevention (770-488-7100)**. Any incident related to terrorism or possible terrorist activity also requires telephonic notification to the **National Response Center at 800-424-8802**. This includes bombings, bomb threats, suspicious letters or packages, and incidents related to the intentional release of chemical, radiological, and biological agents.

National Contacts

American Association of Poison Control Centers (AAPCC)
Poisoning Emergency Hotline: 800-222-1222

Centers for Disease Control and Prevention (CDC)
Emergency 24-hour Response Hotline: 770-488-7100

Clinician email: coca@cdc.gov
Clinician information line: 877-554-4625

Public email: cdcresponse@ashastd.org
Public information line: 888-246-2675

What to do in an Emergency
Key contact information from CDC's Emergency Preparedness and Response Web site

Interim Recommended Notification Procedures for Local and State Public Health Department Leaders in the Event of a Bioterrorist Incident
A CDC schema for use by local public health officials who identify or suspect a bioterrorist incident in their community. It should be incorporated into the local communications plan for bioterrorism.

Laboratory Testing, Shipping, and Reporting Information and Protocols

National Response Center
24-hour Emergency Hotline: 800-424-8802

State Contacts

- **State Emergency Management Agencies**
- **State Health Agency Hotline Numbers**
- **State Health Agency Web Sites**
- **State Homeland Security Offices**

Local Contacts

- **FBI Field Offices**
- **Local Public Health Agencies**

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Additional Resources

Management of Exposed Victims

American Academy of Pediatrics (AAP)

Chemical-Biological Terrorism and Its Impact on Children: A Subject Review

Reviews key aspects of chemical and biological agents, the consequences of their use, the potential impact of a terrorist attack on children, and issues to consider in disaster planning and management for pediatric patients

Children, Terrorism & Disasters

Seeks to ensure: (1) that pediatricians and other pediatric providers have the information they need about terrorism and disasters as fast as it becomes available; (2) that children's needs are considered in all terrorism and disaster planning and response efforts; and (3) functioning linkages with all national, state and local governmental and private entities working on issues concerning terrorism and disasters.

American College of Physicians (ACP)

Bioterrorism Resources

Comprehensive clinical resource for the detection and treatment of various biological threats

American Dental Association (ADA)

Dentistry's Role in Responding to Bioterrorism and Other Catastrophic Events

Summary of a March 2003 conference to consider ways that dental professionals can contribute to the detection and management of a bioterrorism-related incident or other public health emergency

American Medical Association (AMA)

Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians and Other Health Care Professionals

Created though a partnership of the AMA and the American Nurses Association-American Nurses Foundation in conjunction with the CDC's Food Safety Office, the Food and Drug Administration's Center for Food Safety and Applied Nutrition, and the U.S. Department of Agriculture's Food Safety and Inspection Service, this educational guide assists health care professionals to detect foodborne pathogens – including the deliberate contamination of food.

Center for Biosecurity

Clinicians' Biodefense Network

A free, not-for-profit email and Web-based system created in association with the Johns Hopkins School of Public Health and the University of Pittsburgh School of Medicine to facilitate and encourage communication and information exchange among clinicians in the event of bioterrorism. Specifically designed for clinicians, subscribers receive information about bioterrorism preparedness and response, homeland security, and related topics selected for their relevance to clinical practice. Information sources include publications, news accounts, and input from a cadre of clinicians and biodefense experts.

Centers for Disease Control and Prevention (CDC)

In addition to the following resources, the CDC provides a free registry to provide clinicians with real-time information to help prepare for (and possibly respond to) terrorism and other emergency events. Participants receive regular e-mail updates on terrorism and other relevant emergency issues and training opportunities.

Biologic Agents – Listed by Pathogen

Biologic Agents – Listed by Disease Category

Case Definitions for Infectious Conditions Under Public Health Surveillance
Case definitions and reporting requirements mandated by state laws or regulations.

Children and Anthrax: A Fact Sheet for Clinicians

Disease Surveillance Systems
Information on surveillance and reporting systems to enhance the detection of clusters or patterns of illness that might suggest the covert release of a biological agent or other disease outbreak

Guidelines for Isolation Precautions in Hospitals
Consensus recommendations for the prevention and control of infections in hospitals

Health Advisory Alert Network
A nationwide, integrated information and communications system serving as a platform for distribution of health alerts and national disease surveillance information, as well as for dissemination of prevention guidelines and distance learning opportunities to support CDC initiatives to strengthen emergency preparedness at the local and state levels.

Strategic National Stockpile
National program to ensure the availability and rapid deployment of life-saving pharmaceuticals, antidotes, other medical supplies, and equipment necessary to counter the effects of chemical agents, biological pathogens, and trauma. The CDC provides such supplies at 10 positions across the country. Called “push packs”, they are filled with antibiotics, vaccines, antidotes, antitoxins, and other medical supplies that can be delivered anywhere in the United States within 12 hours in the event of an emergency.

Syndrome Definitions for Disease Associated with Critical Bioterrorism-Associated Agents
Definitions and associated ICD-9-CM-coded groups that can be used in syndromic surveillance systems. The syndrome categories to be monitored are indicative of the clinical presentations of several critical bioterrorism-associated conditions.

Center for the Study of Bioterrorism, Saint Louis University

Bioterrorism Resources
With CDC support, the Centers for the Study of Bioterrorism and Emerging Infections were established to provide health professionals, other response organizations, and the public with the readiness education needed for preparedness, response, recovery and mitigation of emerging public health threats.

Council of State and Territorial Epidemiologists (CSTE)

Reporting Requirements for Health Care Providers and Laboratories for Diseases and Conditions Under National Surveillance.

Provides information on reportable public health conditions under state and territorial laws, as well as information on the authority of state and territories to collect public health data, and the flow and pattern of disease reporting in jurisdictions.

Department of Defense (DoD)

The Official Anthrax Vaccination Site

Offers detailed information on the anthrax vaccine and provides resources for vaccination inquiries.

Department of Homeland Security (DHS)

Be Informed: Biological Threats

eMedicine

Warfare – Biological, Chemical, Radiological, Nuclear, and Explosive

An extensive list of online articles on the evaluation and treatment of victims exposed to various biological, chemical, explosive, incendiary, and radioactive agents, including personal protection measures

Food and Drug Administration (FDA)

Drug Preparedness and Response to Biologic Emergencies

To help prepare the country for possible terrorism attacks, the FDA is working with other federal agencies to make sure adequate supplies of medicine and vaccines are available to the American public. This Web site provides links to current information on vaccines and antimicrobials for prevention and treatment of infectious diseases.

Foodborne Pathogenic Microorganisms and Natural Toxins Handbook, The "Bad Bug Book"

Handbook provides basic facts regarding foodborne pathogenic microorganisms and natural toxins, and collates information from the FDA, CDC, USDA Food Safety Inspection Service, and National Institutes of Health

Infectious Diseases Society of America (IDSA)

Comprehensive, current, and authoritative resources developed to help clinicians identify and manage potential biological threats

***Bacillus anthracis* (anthrax)**

- Anthrax Medical Summary
- Anthrax Resources
- Clinical Pathway: Anthrax

***Clostridium botulinum* toxin (botulism)**

- Botulism Medical Summary
- Botulism Resource List
- Clinical Pathway: Botulism

***Francisella tularensis* (tularemia)**

- Tularemia Medical Summary
- Tularemia Resource List
- Clinical Pathway: Pneumonic Tularemia

Variola major (smallpox)

- Smallpox Medical Summary
- Smallpox Resource List
- Clinical Pathway: Vesicular or Pustular Rash Illness

Viral hemorrhagic fevers

- Viral Hemorrhagic Fever (VHF) Medical Summary
- Viral Hemorrhagic Fever (VHF) Resource List
- Clinical Pathway: Viral Hemorrhagic Fever

***Yersinia pestis* (plague)**

- Plague Medical Summary
- Plague Resource List
- Clinical Pathway: Pneumonic Plague

Mailman School of Public Health, Columbia University

National Center for Pediatric Preparedness Consensus Report

National consensus conference report and recommendations for ensuring the needs of children are met in planning and preparing for disasters and terrorist events

Minnesota Department of Health

"Recognizing the Zebra" Poster

A helpful clinical teaching tool

National Institute for Occupational Safety and Health (NIOSH)

Interim Recommendations for the Selection and Use of Protective Clothing and Respirators Against Biological Agents

NIOSH Approved Respirators

Information on testing and certifying self-contained breathing apparatus (SCBA) for use by emergency responders in chemical, biological, radiological, and nuclear (CBRN) environments

National Library of Medicine (NLM)

MedlinePlus – Biodefense and Bioterrorism

MedlinePlus – Anthrax

MedlinePlus – Smallpox

University of Alabama-Birmingham

Bioterrorism and Emerging Infections Web Site

With funding from the Agency for Healthcare Research and Quality, this site was developed by the University of Alabama School of Medicine to provide timely clinical information, resources, and continuing education about rare infections and potential bioterrorist agents.

U.S. Army Medical Research Institute of Chemical Defense (USAMRICD)

Field Management of Chemical Casualties – Biological Agents

U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID)

Medical Management of Biological Casualties Handbook

The online 4th edition of the "Blue Book" provides in-depth information on biological weapon agent characteristics, therapeutics, diagnostics and more. Also provides a Palm OS version for download.

Other Army Field Manuals and Handbooks

Defense Against Toxin Weapons

Health Service Support in a Nuclear, Biological and Chemical Environment (FM 4-02.7)

Field manual providing tactics, techniques, and procedures for health service support personnel operating in a hazardous nuclear, radiological biological, and chemical environment.

NATO Handbook on the Medical Aspects of NBC Defensive Operations Part II – Biological

A guide for medical officers on the medical aspects of nuclear, biological and chemical (NBC) operations. The handbook is in three parts, Part I-Nuclear, Part II-Biological, and Part III-Chemical. There is some necessary overlap and several aspects are common to all three, for example: combined injuries; the effect of radiation on the response to infection and on the healing of thermal and chemical burns; psychological factors and morale; public health aspects; and medical care in a mass casualty situation.

The Medical NBC Battlebook (Army Tech Guide 244)

Addresses operational health concerns related to NBC threats, protective clothing and measures, and management of NBC casualties

Treatment of Biological Warfare Agent Casualties

Virginia Department of Emergency Management

Terrorism Information: Biological Agents

Comprehensive public information, in question-and-answer format, on bioterrorism and disaster planning

World Health Organization (WHO)

Public Health Response to Biological and Chemical Weapons

Guidance report provides analyses of the health aspects of the possible hostile use of biological or chemical agents. It describes how biological and chemical agents may endanger public health; provides the standard principles of risk management to prepare for the deliberate release of biological or chemical agents; and presents national and international laws, including their potential role in mobilizing international assistance and available sources of such assistance.

Guidelines for the Surveillance and Control of Anthrax in Humans and Animals

Working Group on Civilian Biodefense (*JAMA* Consensus Statements)

- Anthrax
- Botulinum Toxin
- Hemorrhagic Fever
- Plague
- Smallpox
- Tularemia

World Medical Leaders

Biological Terrorism Resources

World Medical Leaders was founded to create a physicians-only Internet site where doctors from around the world could learn from and interact with a distinguished medical faculty. The Web site provides practicing physicians with original, CME-certified lectures and up-to-date resources on bioterrorism and other topics.

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Hospital and Community Preparedness for Disease Outbreaks

American Hospital Association (AHA)

Chemical and Bioterrorism Preparedness Checklist

Checklist for hospitals to help them describe and assess their present state of preparedness for chemical and biological incidents

The Weill/Cornell Bioterrorism and Epidemic Outbreak Response Model (BERM)

Interactive planning tool designed to estimate the number of staff needed to operate a mass prophylaxis center given specific population size and staff limitations

Agency for Healthcare Research and Quality (AHRQ)

Bioterrorism Emergency Planning and Preparedness Questionnaire for Healthcare Facilities

Association for Professionals in Infection Control and Epidemiology (APIC)

Bioterrorism Readiness Plan: A Template for Healthcare Facilities

Developed in cooperation with the Centers for Disease Control and Prevention, this template facilitates preparation of bioterrorism readiness plans for individual healthcare facilities.

Centers for Disease Control and Prevention (CDC)

CDC Interim Smallpox Response Plan and Guidelines

Most recent version contains important section describing the operational and logistical considerations associated with implementing a large-scale voluntary vaccination program in response to a confirmed smallpox outbreak. This provides details on all aspects of immunization clinic operations and staffing and includes an example of a model smallpox vaccination clinic.

Laboratory Response Network (LRN)

An integrated network of state and local public health, federal, military, and international laboratories that can respond to both bioterrorism and chemical terrorism

Public Health Response to Biological and Chemical Terrorism: Interim Planning Guidance for State Public Health Officials

Developed to assist state public health officials determine their agency's roles in a biological or chemical terrorism and to understand emergency response roles of local health departments, the emergency management system, and other entities.

Strategic National Stockpile

National program to ensure the availability and rapid deployment of life-saving pharmaceuticals, antidotes, other medical supplies, and equipment necessary to counter the effects of chemical agents, biological pathogens, and trauma. The CDC provides such supplies at 10 positions across the country. Called "push packs", they are filled with antibiotics, vaccines, antidotes, antitoxins, and other medical supplies that can be delivered anywhere in the United States within 12 hours in the event of an emergency.

National Institute for Occupational Safety and Health (NIOSH)

Guidance for Protecting Building Environments from Airborne Chemical, Biological, or Radiological Attacks

Preventive measures that building owners and managers can take to protect building air environments from a terrorist release of contaminants.

National Vaccine Program Office (NVPO)

Preparing for the Next Influenza Pandemic

A list of resources for preparing and responding to the next influenza pandemic. The site includes a specialized spreadsheet-based software called FluSurge 1.0 designed for public health officials and hospital administrators in preparing for the next influenza pandemic. The software helps estimate the potential surge in demand for hospital-based healthcare needs (eg, hospital beds, mechanical ventilators) during a pandemic. In September 2004, the draft pandemic influenza preparedness and response plan was released for public comment; it describes a coordinated national strategy to prepare for and respond to an influenza pandemic.

U.S. Army Soldier and Biological Chemical Command, Edgewood Chemical Biological Center

Improving Local and State Agency Response to Terrorism Incidents Involving Biological Weapons: Planning Guide

Guidance document to help communities evaluate current emergency procedures and identify best practical approaches that can be used to plan an effective response to a terrorist incident involving biological weapons.

Modular Emergency Medical System (MEMS): Expanding Local Healthcare Structure in a Mass Casualty Terrorism Incident

Introduces key characteristics of the MEMS concept and modules and presents an overview of MEMS as one possible approach to use in planning a response to biological terrorism. MEMS provides options and points of consideration that can be integrated in or tailored to any existing emergency plan. It is based on the rapid organization of 2 types of patient care modules, the Neighborhood Emergency Help Center and the Acute Care Center.

Modular Emergency Medical System (MEMS): Concept of Operations for the Acute Care Center (ACC)

Describes the organization and operation of the ACC, which is envisioned to supplement the existing healthcare system in managing the overwhelming number of casualties that are likely occur in a biological weapons or other terrorist attack.

World Health Organization (WHO)

WHO Preparedness for Deliberate Epidemics

Global strategy for international and national emergency planning and response, disease surveillance and alert networks, and preparedness for selected diseases/intoxication.

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Suggested Reading List

American Academy of Pediatrics (AAP) Committee on Infectious Disease. *Red Book 2003*. 26th Edition. Elk Grove Village, Illinois: American Academy of Pediatrics; 2003. Read more.
Provides reliable and clinically useful information on the manifestations, etiology, epidemiology, diagnosis, and treatment of some 200 childhood infectious disease.

American College of Emergency Physicians (ACEP), U.S. Department of Health and Human Services Office of Emergency Preparedness. *Developing Objectives, Content, and Competencies for the Training of Emergency Medical Technicians, Emergency Physicians, and Emergency Nurses to Care for Casualties Resulting from Nuclear, Biological, or Chemical (NBC) Incidents*. Dallas, Texas: American College of Emergency Physicians;2001.

American Medical Association (AMA). *JAMA* Terrorism Preparedness Collection
On-line collection of articles from the *Journal of the American Medical Association* dealing with biological agents and terrorism.

Army Medical Research Institute of Infectious Diseases. Medical Management of Biological Casualties Handbook
The 4th edition of the "Blue Book" provides in-depth information on biological weapon agent characteristics, therapeutics, diagnostics and more. Also provides a Palm OS version for download.

Centers for Disease Control and Prevention (CDC)

Biosafety in Microbiological and Biomedical Laboratories, 4th Edition
Guidelines for laboratories using biological agents or toxins capable of causing serious or fatal illness to humans or animals

Compendium on Bioterrorism
On-line library of *Morbidity and Mortality Weekly Reports (MMWR)* articles dealing with biological agents and terrorism.

Biological and chemical terrorism: strategic plan for preparedness and response. Recommendations of the CDC Strategic Planning Workgroup. *Morbidity and Mortality Weekly Report (MMWR).* 2000; April 21;49(RR-4):1-14.
A synopsis of emergency preparedness involving the threat of biological and chemical weapons.

Medical Examiners, Coroners, and Biologic Terrorism: A Guidebook for Surveillance and Case Management. *Morbidity and Mortality Weekly Reports (MMWR)*. 2004; 53(RR08):1-27.
Report created to (1) help public health officials understand the role of medical examiners and coroners (ME/Cs) in biologic terrorism surveillance and response efforts and (2) provide ME/Cs with the detailed information required to build capacity for biologic terrorism preparedness in a public health context. It provides background information regarding biological terrorism, possible biological agents, consequent clinical/pathologic manifestations, autopsy procedures, and diagnostic tests, as well as a description of biosafety risks and standards for autopsy precautions. It further describes the relationship between ME/Cs and public health departments, emergency management agencies, emergency operations centers, and the Incident Command System.

Recognition of Illness Associated with the Intentional Release of a Biologic Agent. *Mortality Weekly Report (MMWR).* 2001;50:893-897.
Provides guidance for health care professionals and public health personnel about recognizing illnesses or pattern of illness that might be associated with intentional release of biologic agents.

Committee on Environmental Health and Committee on Infectious Diseases, American Academy of Pediatrics (AAP). Chemical-biological terrorism and its impact on children: a subject review. *Pediatrics*. 2000;105:662-670.
Reviews key aspects of chemical and biological agents, the consequences of their use, the potential impact of a terrorist attack on children, and issues to consider in disaster planning and management for pediatric patients

Committee on R&D Needs for Improving Civilian Medical Response to Chemical and Biological Terrorism, institute of Medicine. Chemical and Biological Terrorism: Research and Development to Improve Civilian Medical Response. Washington, DC; National Academy Press; 1999.

Heymann DL, ed. *Control of Communicable Diseases Manual.* 18th Edition. Washington, DC: American Public Health Association; 2004. Read more.
Compact, easy to use manual containing detailed information for public health workers, including those serving in the armed forces and other governmental agencies, and for all health professions students. Each listing includes information on the identification of the infectious agent, its occurrence, mode of transmission, incubation period, susceptibility and resistance, and methods of control that are not limited to but include prevention and epidemic control measures.

Office of the US Army Surgeon General. Textbook of Military Medicine: Medical Aspects of Chemical and Biological Warfare.
Electronic version of the *Textbook of Military Medicine* series is a comprehensive reference dealing with the history, development, use, and medical management of chemical and biological warfare agents.

Stacey L. Knobler, Adel A.F. Mahmoud, and Leslie A. Pray, eds. Biological Threats and Terrorism: Assessing the Science and Response Capabilities: Institute of Medicine Workshop Summary. Washington, DC; National Academy Press; 2002.

World Health Organization (WHO). Public Health Response to Biological and Chemical Weapons. Geneva: WHO; 2004.
Guidance report provides analyses of the health aspects of the possible hostile use of biological or chemical agents. It describes how biological and chemical agents may endanger public health; provides the standard principles of risk management to prepare for the deliberate release of biological or chemical agents; and presents national and international laws, including their potential role in mobilizing international assistance and available sources of such assistance.

World Medical Association (WMA). The WMA Declaration of Washington on Biological Weapons.
WMA statement adopted in 2002 calling for global action against the development and use of biological weapons and for increased physician involvement in disaster preparedness and response efforts.

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