



April 21, 2000 / Vol. 49 / No. RR-4



*Recommendations
and
Reports*

Inside: Continuing Education Examination

Biological and Chemical Terrorism: Strategic Plan for Preparedness and Response

**Recommendations of the CDC Strategic
Planning Workgroup**

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention (CDC)
Atlanta, GA 30333



The *MMWR* series of publications is published by the Epidemiology Program Office, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Atlanta, GA 30333.

SUGGESTED CITATION

Centers for Disease Control and Prevention. Biological and Chemical Terrorism: Strategic Plan for Preparedness and Response. Recommendations of the CDC Strategic Planning Workgroup. *MMWR* 2000;49(No. RR-4):[inclusive page numbers].

Centers for Disease Control and Prevention Jeffrey P. Koplan, M.D., M.P.H.
Director

The material in this report was prepared for publication by
Agency for Toxic Substances and Disease Registry Jeffrey P. Koplan, M.D., M.P.H.
Administrator

Epidemiology Program Office Barbara R. Holloway, M.P.H.
Acting Director

National Center for Environmental Health Richard J. Jackson, M.D., M.P.H.
Director

National Center for Infectious Diseases James M. Hughes, M.D.
Director

National Institute for Occupational Safety and Health Linda Rosenstock, M.D., M.P.H.
Director

Public Health Practice Program Office Edward L. Baker, M.D.
Director

The production of this report as an *MMWR* serial publication was coordinated in
Epidemiology Program Office Barbara R. Holloway, M.P.H.
Acting Director

Office of Scientific and Health Communications John W. Ward, M.D.
Director
Editor, MMWR Series

Recommendations and Reports Suzanne M. Hewitt, M.P.A.
Managing Editor

C. Kay Smith-Akin, M.Ed.
Project Editor

Martha F. Boyd
Visual Information Specialist

Contents

Introduction 1
U.S. Vulnerability to Biological and Chemical Terrorism 2
Overt Versus Covert Terrorist Attacks 3
Focusing Preparedness Activities 4
Key Focus Areas 8
 Preparedness and Prevention 8
 Detection and Surveillance 9
 Diagnosis and Characterization of Biological and Chemical Agents 9
 Response 9
 Communication Systems 11
Partnerships and Implementation 11
Recommendations 13
Conclusion 13
References 14

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

Copies can be purchased from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325. Telephone: (202) 512-1800.

References to non-CDC sites on the Internet are provided as a service to *MMWR* readers and do not constitute or imply endorsement of these organizations or their programs by CDC or the U.S. Department of Health and Human Services. CDC is not responsible for the content of pages found at these sites.

The following CDC staff members prepared this report:

Ali S. Khan, M.D.
Alexandra M. Levitt, M.A., Ph.D.
National Center for Infectious Diseases

Michael J. Sage, M.P.H.
National Center for Environment Health

in collaboration with the CDC Strategic Planning Workgroup

Samuel L. Groseclose, D.V.M., M.P.H.
Epidemiology Program Office

Edwin Kent Gray
Elaine W. Gunter
Alison B. Johnson, M.P.A.
Anne L. Wilson, M.S.
National Center for Environmental Health

David A. Ashford, D.V.M., M.P.H., D.Sc.
Robert B. Craven, M.D.
Robert P. Gaynes, M.D.
Stephen A. Morse, Ph.D.
Clarence J. Peters, M.D.
Richard A. Spiegel, D.V.M., M.P.H.
David L. Swerdlow, M.D.
National Center for Infectious Diseases

Scott D. Deitchman, M.D., M.P.H.
National Institute for Occupational Safety and Health

Paul K. Halverson, Dr.P.H., M.H.S.A.
Public Health Practice Program Office

Joseph Hughart, M.P.H.
Agency for Toxic Substances and Disease Registry

Patricia Quinlisk, M.D.
Iowa Department of Health
Des Moines, Iowa

Biological and Chemical Terrorism: Strategic Plan for Preparedness and Response

Recommendations of the CDC Strategic Planning Workgroup

"... and he that will not apply new remedies must expect new evils; for time is the greatest innovator. . . ."

—The Essays by Sir Francis Bacon, 1601

Summary

The U.S. national civilian vulnerability to the deliberate use of biological and chemical agents has been highlighted by recognition of substantial biological weapons development programs and arsenals in foreign countries, attempts to acquire or possess biological agents by militants, and high-profile terrorist attacks. Evaluation of this vulnerability has focused on the role public health will have detecting and managing the probable covert biological terrorist incident with the realization that the U.S. local, state, and federal infrastructure is already strained as a result of other important public health problems. In partnership with representatives for local and state health departments, other federal agencies, and medical and public health professional associations, CDC has developed a strategic plan to address the deliberate dissemination of biological or chemical agents. The plan contains recommendations to reduce U.S. vulnerability to biological and chemical terrorism — preparedness planning, detection and surveillance, laboratory analysis, emergency response, and communication systems. Training and research are integral components for achieving these recommendations. Success of the plan hinges on strengthening the relationships between medical and public health professionals and on building new partnerships with emergency management, the military, and law enforcement professionals.

INTRODUCTION

An act of biological or chemical terrorism might range from dissemination of aerosolized anthrax spores to food product contamination, and predicting when and how such an attack might occur is not possible. However, the possibility of biological or chemical terrorism should not be ignored, especially in light of events during the past 10 years (e.g., the sarin gas attack in the Tokyo subway [1] and the discovery of military bioweapons programs in Iraq and the former Soviet Union [2]). Preparing the nation to address this threat is a formidable challenge, but the consequences of being unprepared could be devastating.

The public health infrastructure must be prepared to prevent illness and injury that would result from biological and chemical terrorism, especially a covert terrorist attack. As with emerging infectious diseases, early detection and control of biological or chemical attacks depends on a strong and flexible public health system at the local, state, and federal levels. In addition, primary health-care providers throughout the United States must be vigilant because they will probably be the first to observe and report unusual illnesses or injuries.

This report is a summary of the recommendations made by CDC's Strategic Planning Workgroup in *Preparedness and Response to Biological and Chemical Terrorism: A Strategic Plan* (CDC, unpublished report, 2000), which outlines steps for strengthening public health and health-care capacity to protect the United States against these dangers. This strategic plan marks the first time that CDC has joined with law enforcement, intelligence, and defense agencies in addition to traditional CDC partners to address a national security threat.

As a reflection of the need for broad-based public health involvement in terrorism preparedness and planning, staff from CDC's centers, institute, and offices participated in developing the strategic plan, including the

- National Center for Infectious Diseases,
- National Center for Environmental Health,
- Public Health Practice Program Office,
- Epidemiology Program Office,
- National Institute for Occupational Safety and Health,
- Office of Health and Safety,
- National Immunization Program, and
- National Center for Injury Prevention and Control.

The Agency for Toxic Substances and Disease Registry (ATSDR) is also participating with CDC in this effort and will provide expertise in the area of industrial chemical terrorism. In this report, the term *CDC* includes ATSDR when activities related to chemical terrorism are discussed. In addition, colleagues from local, state, and federal agencies; emergency medical services (EMS); professional societies; universities and medical centers; and private industry provided suggestions and constructive criticism.

Combating biological and chemical terrorism will require capitalizing on advances in technology, information systems, and medical sciences. Preparedness will also require a re-examination of core public health activities (e.g., disease surveillance) in light of these advances. Preparedness efforts by public health agencies and primary health-care providers to detect and respond to biological and chemical terrorism will have the added benefit of strengthening the U.S. capacity for identifying and controlling injuries and emerging infectious diseases.

U.S. VULNERABILITY TO BIOLOGICAL AND CHEMICAL TERRORISM

Terrorist incidents in the United States and elsewhere involving bacterial pathogens (3), nerve gas (1), and a lethal plant toxin (i.e., ricin) (4), have demonstrated that the United States is vulnerable to biological and chemical threats as well as explosives. Recipes for preparing "homemade" agents are readily available (5), and reports of arsenals of military bioweapons (2) raise the possibility that terrorists might have access to highly dangerous agents, which have been engineered for mass dissemination as small-particle aerosols. Such agents as the variola virus, the causative agent of smallpox, are highly contagious and often fatal. Responding to large-scale outbreaks caused

by these agents will require the rapid mobilization of public health workers, emergency responders, and private health-care providers. Large-scale outbreaks will also require rapid procurement and distribution of large quantities of drugs and vaccines, which must be available quickly.

OVERT VERSUS COVERT TERRORIST ATTACKS

In the past, most planning for emergency response to terrorism has been concerned with overt attacks (e.g., bombings). Chemical terrorism acts are likely to be overt because the effects of chemical agents absorbed through inhalation or by absorption through the skin or mucous membranes are usually immediate and obvious. Such attacks elicit immediate response from police, fire, and EMS personnel.

In contrast, attacks with biological agents are more likely to be covert. They present different challenges and require an additional dimension of emergency planning that involves the public health infrastructure (Box 1). Covert dissemination of a biological agent in a public place will not have an immediate impact because of the delay between exposure and onset of illness (i.e., the incubation period). Consequently, the first casualties of a covert attack probably will be identified by physicians or other primary health-care providers. For example, in the event of a covert release of the contagious variola virus, patients will appear in doctors' offices, clinics, and emergency rooms during the first or second week, complaining of fever, back pain, headache, nausea, and other symptoms of what initially might appear to be an ordinary viral infection. As the disease progresses, these persons will develop the papular rash characteristic of early-stage smallpox, a rash that physicians might not recognize immediately. By the time the rash becomes pustular and patients begin to die, the terrorists would be far away and the disease disseminated through the population by person-to-person contact. Only a short window of opportunity will exist between the time the first cases are identified and a second wave of the population becomes ill. During that brief period, public health officials will need to determine that an attack has occurred, identify the organism, and prevent more casualties through prevention strategies (e.g., mass vaccination or prophylactic treatment). As person-to-person contact continues, successive waves of transmission could carry infection to other worldwide localities. These issues might also be relevant for other person-to-person transmissible etiologic agents (e.g., plague or certain viral hemorrhagic fevers).

BOX 1. Local public health agency preparedness

- Because the initial detection of a covert biological or chemical attack will probably occur at the local level, disease surveillance systems at state and local health agencies must be capable of detecting unusual patterns of disease or injury, including those caused by unusual or unknown threat agents.
- Because the initial response to a covert biological or chemical attack will probably be made at the local level, epidemiologists at state and local health agencies must have expertise and resources for responding to reports of clusters of rare, unusual, or unexplained illnesses.

Certain chemical agents can also be delivered covertly through contaminated food or water. In 1999, the vulnerability of the food supply was illustrated in Belgium, when

chickens were unintentionally exposed to dioxin-contaminated fat used to make animal feed (6). Because the contamination was not discovered for months, the dioxin, a cancer-causing chemical that does not cause immediate symptoms in humans, was probably present in chicken meat and eggs sold in Europe during early 1999. This incident underscores the need for prompt diagnoses of unusual or suspicious health problems in animals as well as humans, a lesson that was also demonstrated by the recent outbreak of mosquito-borne West Nile virus in birds and humans in New York City in 1999. The dioxin episode also demonstrates how a covert act of foodborne biological or chemical terrorism could affect commerce and human or animal health.

FOCUSING PREPAREDNESS ACTIVITIES

Early detection of and response to biological or chemical terrorism are crucial. Without special preparation at the local and state levels, a large-scale attack with variola virus, aerosolized anthrax spores, a nerve gas, or a foodborne biological or chemical agent could overwhelm the local and perhaps national public health infrastructure. Large numbers of patients, including both infected persons and the "worried well," would seek medical attention, with a corresponding need for medical supplies, diagnostic tests, and hospital beds. Emergency responders, health-care workers, and public health officials could be at special risk, and everyday life would be disrupted as a result of widespread fear of contagion.

Preparedness for terrorist-caused outbreaks and injuries is an essential component of the U.S. public health surveillance and response system, which is designed to protect the population against any unusual public health event (e.g., influenza pandemics, contaminated municipal water supplies, or intentional dissemination of *Yersinia pestis*, the causative agent of plague [7]). The epidemiologic skills, surveillance methods, diagnostic techniques, and physical resources required to detect and investigate unusual or unknown diseases, as well as syndromes or injuries caused by chemical accidents, are similar to those needed to identify and respond to an attack with a biological or chemical agent. However, public health agencies must prepare also for the special features a terrorist attack probably would have (e.g., mass casualties or the use of rare agents) (Boxes 2–5). Terrorists might use combinations of these agents, attack in more than one location simultaneously, use new agents, or use organisms that are not on the critical list (e.g., common, drug-resistant, or genetically engineered pathogens). Lists of critical biological and chemical agents will need to be modified as new information becomes available. In addition, each state and locality will need to adapt the lists to local conditions and preparedness needs by using the criteria provided in CDC's strategic plan.

Potential biological and chemical agents are numerous, and the public health infrastructure must be equipped to quickly resolve crises that would arise from a biological or chemical attack. However, to best protect the public, the preparedness efforts must be focused on agents that might have the greatest impact on U.S. health and security, especially agents that are highly contagious or that can be engineered for widespread dissemination via small-particle aerosols. Preparing the nation to address these dangers is a major challenge to U.S. public health systems and health-care providers. Early detection requires increased biological and chemical terrorism awareness among front-line health-care providers because they are in the best position to report suspicious illnesses and injuries. Also, early detection will require improved communication systems between those providers and public health officials. In addition, state and local

health-care agencies must have enhanced capacity to investigate unusual events and unexplained illnesses, and diagnostic laboratories must be equipped to identify biological and chemical agents that rarely are seen in the United States. Fundamental to these efforts is comprehensive, integrated training designed to ensure core competency in public health preparedness and the highest levels of scientific expertise among local, state, and federal partners.

BOX 2. Preparing public health agencies for biological attacks

Steps in Preparing for Biological Attacks

- Enhance epidemiologic capacity to detect and respond to biological attacks.
- Supply diagnostic reagents to state and local public health agencies.
- Establish communication programs to ensure delivery of accurate information.
- Enhance bioterrorism-related education and training for health-care professionals.
- Prepare educational materials that will inform and reassure the public during and after a biological attack.
- Stockpile appropriate vaccines and drugs.
- Establish molecular surveillance for microbial strains, including unusual or drug-resistant strains.
- Support the development of diagnostic tests.
- Encourage research on antiviral drugs and vaccines.

BOX 3. Critical biological agents

Category A

The U.S. public health system and primary health-care providers must be prepared to address varied biological agents, including pathogens that are rarely seen in the United States. High-priority agents include organisms that pose a risk to national security because they

- can be easily disseminated or transmitted person-to-person;
- cause high mortality, with potential for major public health impact;
- might cause public panic and social disruption; and
- require special action for public health preparedness (Box 2).

Category A agents include

- variola major (smallpox);
- *Bacillus anthracis* (anthrax);
- *Yersinia pestis* (plague);
- *Clostridium botulinum* toxin (botulism);
- *Francisella tularensis* (tularemia);
- filoviruses,
 - Ebola hemorrhagic fever,
 - Marburg hemorrhagic fever; and
- arenaviruses,
 - Lassa (Lassa fever),
 - Junin (Argentine hemorrhagic fever) and related viruses.

BOX 3. (Continued) Critical biological agents**Category B**

Second highest priority agents include those that

- are moderately easy to disseminate;
- cause moderate morbidity and low mortality; and
- require specific enhancements of CDC's diagnostic capacity and enhanced disease surveillance.

Category B agents include

- *Coxiella burnetti* (Q fever);
- *Brucella* species (brucellosis);
- *Burkholderia mallei* (glanders);
- alphaviruses,
 - Venezuelan encephalomyelitis,
 - eastern and western equine encephalomyelitis;
- ricin toxin from *Ricinus communis* (castor beans);
- epsilon toxin of *Clostridium perfringens*; and
- *Staphylococcus* enterotoxin B.

A subset of List B agents includes pathogens that are food- or waterborne.

These pathogens include but are not limited to

- *Salmonella* species,
- *Shigella dysenteriae*,
- *Escherichia coli* O157:H7,
- *Vibrio cholerae*, and
- *Cryptosporidium parvum*.

Category C

Third highest priority agents include emerging pathogens that could be engineered for mass dissemination in the future because of

- availability;
- ease of production and dissemination; and
- potential for high morbidity and mortality and major health impact.

Category C agents include

- Nipah virus,
- hantaviruses,
- tickborne hemorrhagic fever viruses,
- tickborne encephalitis viruses,
- yellow fever, and
- multidrug-resistant tuberculosis.

Preparedness for List C agents requires ongoing research to improve disease detection, diagnosis, treatment, and prevention. Knowing in advance which newly emergent pathogens might be employed by terrorists is not possible; therefore, linking bioterrorism preparedness efforts with ongoing disease surveillance and outbreak response activities as defined in CDC's emerging infectious disease strategy is imperative.*

*CDC. Preventing emerging infectious diseases: a strategy for the 21st century. Atlanta, Georgia: U.S. Department of Health and Human Services, 1998.

BOX 4. Preparing public health agencies for chemical attacks**Steps in Preparing for Chemical Attacks**

- Enhance epidemiologic capacity for detecting and responding to chemical attacks.
- Enhance awareness of chemical terrorism among emergency medical service personnel, police officers, firefighters, physicians, and nurses.
- Stockpile chemical antidotes.
- Develop and provide bioassays for detection and diagnosis of chemical injuries.
- Prepare educational materials to inform the public during and after a chemical attack

BOX 5. Chemical agents

Chemical agents that might be used by terrorists range from warfare agents to toxic chemicals commonly used in industry. Criteria for determining priority chemical agents include

- chemical agents already known to be used as weaponry;
- availability of chemical agents to potential terrorists;
- chemical agents likely to cause major morbidity or mortality;
- potential of agents for causing public panic and social disruption; and
- agents that require special action for public health preparedness (Box 4).

Categories of chemical agents include

- nerve agents,
 - tabun (ethyl N,N-dimethylphosphoramidocyanidate),
 - sarin (isopropyl methylphosphanofluoridate),
 - soman (pinacolyl methyl phosphonofluoridate),
 - GF (cyclohexylmethylphosphonofluoridate),
 - VX (o-ethyl-[S]-[2-diisopropylaminoethyl]-methylphosphonothiolate);
- blood agents,
 - hydrogen cyanide,
 - cyanogen chloride;
- blister agents,
 - lewisite (an aliphatic arsenic compound, 2-chlorovinylchloroarsine),
 - nitrogen and sulfur mustards,
 - phosgene oxime;
- heavy metals,
 - arsenic,
 - lead,
 - mercury;
- Volatile toxins,
 - benzene,
 - chloroform,
 - trihalomethanes;

BOX 5. (Continued) Chemical agents

- pulmonary agents,
 - phosgene,
 - chlorine,
 - vinyl chloride;
- incapacitating agents,
 - BZ (3-quinuclidinyl benzilate);
- pesticides, persistent and nonpersistent;
- dioxins, furans, and polychlorinated biphenyls (PCBs);
- explosive nitro compounds and oxidizers,
 - ammonium nitrate combined with fuel oil;
- flammable industrial gases and liquids,
 - gasoline,
 - propane;
- poison industrial gases, liquids, and solids,
 - cyanides,
 - nitriles; and
- corrosive industrial acids and bases,
 - nitric acid,
 - sulfuric acid.

Because of the hundreds of new chemicals introduced internationally each month, treating exposed persons by clinical syndrome rather than by specific agent is more useful for public health planning and emergency medical response purposes. Public health agencies and first responders might render the most aggressive, timely, and clinically relevant treatment possible by using treatment modalities based on syndromic categories (e.g., burns and trauma, cardiorespiratory failure, neurologic damage, and shock). These activities must be linked with authorities responsible for environmental sampling and decontamination.

KEY FOCUS AREAS

CDC's strategic plan is based on the following five focus areas, with each area integrating training and research:

- preparedness and prevention;
- detection and surveillance;
- diagnosis and characterization of biological and chemical agents;
- response; and
- communication.

Preparedness and Prevention

Detection, diagnosis, and mitigation of illness and injury caused by biological and chemical terrorism is a complex process that involves numerous partners and activities. Meeting this challenge will require special emergency preparedness in all cities and

states. CDC will provide public health guidelines, support, and technical assistance to local and state public health agencies as they develop coordinated preparedness plans and response protocols. CDC also will provide self-assessment tools for terrorism preparedness, including performance standards, attack simulations, and other exercises. In addition, CDC will encourage and support applied research to develop innovative tools and strategies to prevent or mitigate illness and injury caused by biological and chemical terrorism.

Detection and Surveillance

Early detection is essential for ensuring a prompt response to a biological or chemical attack, including the provision of prophylactic medicines, chemical antidotes, or vaccines. CDC will integrate surveillance for illness and injury resulting from biological and chemical terrorism into the U.S. disease surveillance systems, while developing new mechanisms for detecting, evaluating, and reporting suspicious events that might represent covert terrorist acts. As part of this effort, CDC and state and local health agencies will form partnerships with front-line medical personnel in hospital emergency departments, hospital care facilities, poison control centers, and other offices to enhance detection and reporting of unexplained injuries and illnesses as part of routine surveillance mechanisms for biological and chemical terrorism.

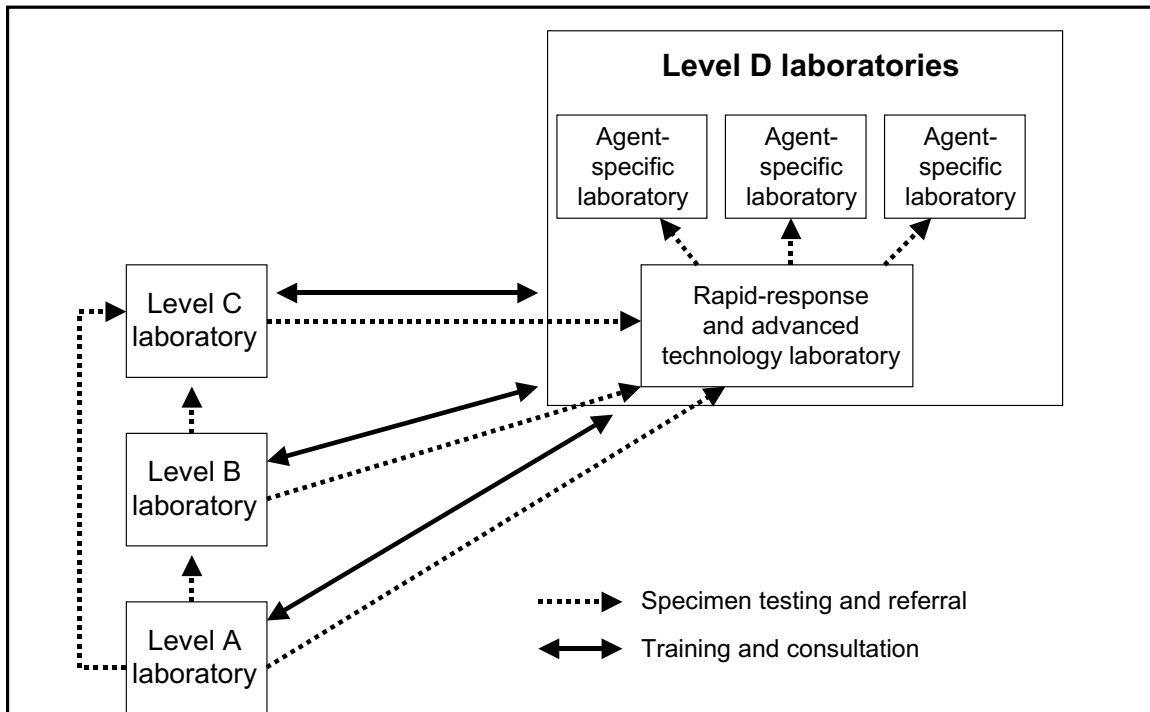
Diagnosis and Characterization of Biological and Chemical Agents

CDC and its partners will create a multilevel laboratory response network for bioterrorism (LRNB). That network will link clinical labs to public health agencies in all states, districts, territories, and selected cities and counties and to state-of-the-art facilities that can analyze biological agents (Figure 1). As part of this effort, CDC will transfer diagnostic technology to state health laboratories and others who will perform initial testing. CDC will also create an in-house rapid-response and advanced technology (RRAT) laboratory. This laboratory will provide around-the-clock diagnostic confirmatory and reference support for terrorism response teams. This network will include the regional chemical laboratories for diagnosing human exposure to chemical agents and provide links with other departments (e.g., the U.S. Environmental Protection Agency, which is responsible for environmental sampling).

Response

A comprehensive public health response to a biological or chemical terrorist event involves epidemiologic investigation, medical treatment and prophylaxis for affected persons, and the initiation of disease prevention or environmental decontamination measures. CDC will assist state and local health agencies in developing resources and expertise for investigating unusual events and unexplained illnesses. In the event of a confirmed terrorist attack, CDC will coordinate with other federal agencies in accord with Presidential Decision Directive (PDD) 39. PDD 39 designates the Federal Bureau of Investigation as the lead agency for the crisis plan and charges the Federal Emergency Management Agency with ensuring that the federal response management is adequate to respond to the consequences of terrorism (8). If requested by a state health agency, CDC will deploy response teams to investigate unexplained or suspicious illnesses or

FIGURE 1. Multilevel laboratory response network for bioterrorism that will link clinical labs to public health agencies



Functional Levels of the Laboratory Response Network for Bioterrorism

Level A: Early detection of intentional dissemination of biological agents — Level A laboratories will be public health and hospital laboratories with low-level biosafety facilities. Level A laboratories will use clinical data and standard microbiological tests to decide which specimens and isolates should be forwarded to higher level biocontainment laboratories. Level A laboratory staff will be trained in the safe collection, packaging, labeling, and shipping of samples that might contain dangerous pathogens.

Level B: Core capacity for agent isolation and presumptive-level testing of suspect specimens — Level B laboratories will be state and local public health agency laboratories that can test for specific agents and forward organisms or specimens to higher level biocontainment laboratories. Level B laboratories will minimize false positives and protect Level C laboratories from overload. Ultimately, Level B laboratories will maintain capacity to perform confirmatory testing and characterize drug susceptibility.

Level C: Advanced capacity for rapid identification — Level C laboratories, which could be located at state health agencies, academic research centers, or federal facilities, will perform advanced and specialized testing. Ultimately, Level C laboratories will have the capacity to perform toxicity testing and employ advanced diagnostic technologies (e.g., nucleic acid amplification and molecular fingerprinting). Level C laboratories will participate in the evaluation of new tests and reagents and determine which assays could be transferred to Level B laboratories.

Level D: Highest level containment and expertise in the diagnosis of rare and dangerous biological agents — Level D laboratories will be specialized federal laboratories with unique experience in diagnosis of rare diseases (e.g., smallpox and Ebola). Level D laboratories also will develop or evaluate new tests and methods and have the resources to maintain a strain bank of biological agents. Level D laboratories will maintain the highest biocontainment facilities and will be able to conduct all tests performed in Level A, B, and C laboratories, as well as additional confirmatory testing and characterization, as needed. They will also have the capacity to detect genetically engineered agents.

unusual etiologic agents and provide on-site consultation regarding medical management and disease control. To ensure the availability, procurement, and delivery of medical supplies, devices, and equipment that might be needed to respond to terrorist-caused illness or injury, CDC will maintain a national pharmaceutical stockpile.

Communication Systems

U.S. preparedness to mitigate the public health consequences of biological and chemical terrorism depends on the coordinated activities of well-trained health-care and public health personnel throughout the United States who have access to up-to-the minute emergency information. Effective communication with the public through the news media will also be essential to limit terrorists' ability to induce public panic and disrupt daily life. During the next 5 years, CDC will work with state and local health agencies to develop a) a state-of-the-art communication system that will support disease surveillance; b) rapid notification and information exchange regarding disease outbreaks that are possibly related to bioterrorism; c) dissemination of diagnostic results and emergency health information; and d) coordination of emergency response activities. Through this network and similar mechanisms, CDC will provide terrorism-related training to epidemiologists and laboratorians, emergency responders, emergency department personnel and other front-line health-care providers, and health and safety personnel.

PARTNERSHIPS AND IMPLEMENTATION

Implementation of the objectives outlined in CDC's strategic plan will be coordinated through CDC's Bioterrorism Preparedness and Response Program. Program personnel are charged with a) helping build local and state preparedness, b) developing U.S. expertise regarding potential threat agents, and c) coordinating response activities during actual bioterrorist events. Program staff have established priorities for 2000–2002 regarding the focus areas (Box 6).

Implementation will require collaboration with state and local public health agencies, as well as with other persons and groups, including

- public health organizations,
- medical research centers,
- health-care providers and their networks,
- professional societies,
- medical examiners,
- emergency response units and responder organizations,
- safety and medical equipment manufacturers,
- the U.S. Office of Emergency Preparedness and other Department of Health and Human Services agencies,
- other federal agencies, and
- international organizations.

BOX 6. Implementation Priorities Regarding Focus Areas for 2000–2002**Preparedness and Prevention**

- Maintain a public health preparedness and response cooperative agreement that provides support to state health agencies who are working with local agencies in developing coordinated bioterrorism plans and protocols.
- Establish a national public health distance-learning system that provides biological and chemical terrorism preparedness training to health-care workers and to state and local public health workers.
- Disseminate public health guidelines and performance standards on biological and chemical terrorism preparedness planning for use by state and local health agencies.

Detection and Surveillance

- Strengthen state and local surveillance systems for illness and injury resulting from pathogens and chemical substances that are on CDC's critical agents list.
- Develop new algorithms and statistical methods for searching medical databases on a real-time basis for evidence of suspicious events.
- Establish criteria for investigating and evaluating suspicious clusters of human or animal disease or injury and triggers for notifying law enforcement of suspected acts of biological or chemical terrorism.

Diagnosis and Characterization of Biological and Chemical Agents

- Establish a multilevel laboratory response network for bioterrorism that links public health agencies to advanced capacity facilities for the identification and reporting of critical biological agents.
- Establish regional chemical terrorism laboratories that will provide diagnostic capacity during terrorist attacks involving chemical agents.
- Establish a rapid-response and advanced technology laboratory within CDC to provide around-the-clock diagnostic support to bioterrorism response teams and expedite molecular characterization of critical biological agents.

Response

- Assist state and local health agencies in organizing response capacities to rapidly deploy in the event of an overt attack or a suspicious outbreak that might be the result of a covert attack.
- Ensure that procedures are in place for rapid mobilization of CDC terrorism response teams that will provide on-site assistance to local health workers, security agents, and law enforcement officers.
- Establish a national pharmaceutical stockpile to provide medical supplies in the event of a terrorist attack that involves biological or chemical agents.

BOX 6. (Continued) Implementation Priorities Regarding Focus Areas for 2000–2002**Communication Systems**

- Establish a national electronic infrastructure to improve exchange of emergency health information among local, state, and federal health agencies.
- Implement an emergency communication plan that ensures rapid dissemination of health information to the public during actual, threatened, or suspected acts of biological or chemical terrorism.
- Create a website that disseminates bioterrorism preparedness and training information, as well as other bioterrorism-related emergency information, to public health and health-care workers and the public.

RECOMMENDATIONS

Implementing CDC's strategic preparedness and response plan by 2004 will ensure the following outcomes:

- U.S. public health agencies and health-care providers will be prepared to mitigate illness and injuries that result from acts of biological and chemical terrorism.
- Public health surveillance for infectious diseases and injuries — including events that might indicate terrorist activity — will be timely and complete, and reporting of suspected terrorist events will be integrated with the evolving, comprehensive networks of the national public health surveillance system.
- The national laboratory response network for bioterrorism will be extended to include facilities in all 50 states. The network will include CDC's environmental health laboratory for chemical terrorism and four regional facilities.
- State and federal public health departments will be equipped with state-of-the-art tools for rapid epidemiological investigation and control of suspected or confirmed acts of biological or chemical terrorism, and a designated stock of terrorism-related medical supplies will be available through a national pharmaceutical stockpile.
- A cadre of well-trained health-care and public health workers will be available in every state. Their terrorism-related activities will be coordinated through a rapid and efficient communication system that links U.S. public health agencies and their partners.

CONCLUSION

Recent threats and use of biological and chemical agents against civilians have exposed U.S. vulnerability and highlighted the need to enhance our capacity to detect and control terrorist acts. The U.S. must be protected from an extensive range of critical biological and chemical agents, including some that have been developed and stockpiled for military use. Even without threat of war, investment in national defense ensures preparedness and acts as a deterrent against hostile acts. Similarly, investment in the

public health system provides the best civil defense against bioterrorism. Tools developed in response to terrorist threats serve a dual purpose. They help detect rare or unusual disease outbreaks and respond to health emergencies, including naturally occurring outbreaks or industrial injuries that might resemble terrorist events in their unpredictability and ability to cause mass casualties (e.g., a pandemic influenza outbreak or a large-scale chemical spill). Terrorism-preparedness activities described in CDC's plan, including the development of a public health communication infrastructure, a multilevel network of diagnostic laboratories, and an integrated disease surveillance system, will improve our ability to investigate rapidly and control public health threats that emerge in the twenty first century.

References

1. Okumura T, Suzuki K, Fukuda A, et al. Tokyo subway sarin attack; disaster management, Part 1: community emergency response. *Acad Emerg Med* 1998;5:613-7.
2. Davis, CJ. Nuclear blindness: an overview of the biological weapons programs of the former Soviet Union and Iraq. *Emerg Infect Dis* 1999;5:509-12.
3. Török TJ, Tauxe RV, Wise RP, et al. Large community outbreak of Salmonellosis caused by intentional contamination of restaurant salad bars. *JAMA* 1997;278:389-95.
4. Tucker JB. Chemical/biological terrorism: coping with a new threat. *Politics and the Life Sciences* 1996;15:167-184.
5. Uncle Fester. *Silent death*. 2nd ed. Port Townsend, WA: Loompanics Unlimited, 1997.
6. Ashraf H. European dioxin-contaminated food crisis grows and grows [news]. *Lancet* 1999;353:2049.
7. Janofsky M. Looking for motives in plague case. *New York Times*. May 28, 1995:A18.
8. Federal Emergency Management Agency. Federal response plan. Washington, DC: Government Printing Office, 1999. Available at <<http://www.fema.gov/r-n-r/frp>>. Accessed February 3, 2000.

GOALS and OBJECTIVES

This *MMWR* provides recommendations and guidance for initiating a national preparedness program for biological and chemical terrorism. The recommendations were developed by a workgroup with representatives from the Council of State and Territorial Epidemiologists, Association of State and Territorial Health Officials, and Association of Public Health Laboratories, with contributions from federal and professional organizations during a meeting held in August 1999. The goal of this report is to guide United States public health and medical preparedness efforts. Upon completing this educational activity, the reader should be able to identify a) criteria used to designate critical biological and chemical agents; b) five core focus areas for domestic terrorism preparedness; c) critical components of public health response to terrorism; and d) partners in an effective response to biological and chemical terrorism.

To receive continuing education credit, please answer all of the following questions.

1. **Which of the following are good biological terrorism threats because of substantial morbidity and mortality, ease of production, efficient dissemination, stability in aerosol, or high infectivity?**
 - A. Anthrax, chickenpox, botulism, and plague.
 - B. Anthrax, smallpox, chickenpox, and plague.
 - C. Anthrax, smallpox, botulism, and plague.
 - D. Anthrax, smallpox, mumps, and plague.

2. **Biological weapons can be considered the ultimate weapon because they . . .**
 - A. cause mass casualties.
 - B. are inexpensive and easy to produce.
 - C. can be difficult to detect.
 - D. can be disseminated at great distances.
 - E. all of the above.

3. **Which of the following diseases have potential for person-to-person transmission?**
 - A. Anthrax and plague.
 - B. Plague and botulism.
 - C. Botulism and brucellosis.
 - D. Smallpox and plague.

4. **Which attribute does NOT determine whether or not a biological agent is included on the CDC critical agent list?**
 - A. The agent's potential for causing morbidity and mortality to the public.
 - B. The agent's ability to cause disease in animals.
 - C. The agent's ability for dissemination to a large number of persons.
 - D. The need for special preparedness in response to the agent's release.
 - E. The likelihood of person-to-person transmission of an agent because of its release.

5. **Which of the following would be included in a public health response to a biological terrorism event or any other disease outbreak?**
- A. Conducting a surveillance.
 - B. Investigating disease clusters.
 - C. Testing a hypothesis regarding transmission.
 - D. Evaluating control strategies.
 - E. All of the above.
6. **Which of the following would NOT be considered a requirement for public health response preparedness for biological terrorism?**
- A. Stockpiling a national supply of vaccine, antitoxins, and medical equipment?
 - B. Vaccinating the civilian population for anthrax.
 - C. Creating a state emergency response plan for biological terrorism.
 - D. Establishing a surveillance system for critical biological agents.
7. **Which of the following positions are responsible for evaluating or reporting a cluster of disease that is suspected to be the result of terrorism activity?**
- A. Epidemiologists.
 - B. Primary-care providers.
 - C. Laboratorians.
 - D. Emergency response personnel (e.g., emergency medical service, fire, or police).
 - E. All of the above.
8. **Which of the following federal agencies has responsibility for crisis management during a biological or chemical terrorism event?**
- A. Internal Revenue Service.
 - B. Federal Bureau of Investigation.
 - C. Federal Emergency Management Agency.
 - D. Central Intelligence Agency.
 - E. Centers for Disease Control and Prevention.
9. **Which of the following would NOT have a potential impact on the public health-care system in case of a biological terrorism event involving anthrax?**
- A. Fear and panic among the public.
 - B. Overwhelming number of casualties.
 - C. Overwhelming demand for intensive care modalities.
 - D. High potential for patient-to-provider spread of the disease agent.
 - E. Overwhelming demand for antibiotics.

- 10. Which of the following group(s) need to prepare and test a community emergency preparedness plan?**
- A. Public and private health-care providers.
 - B. Public safety officials.
 - C. Law enforcement personnel.
 - D. Elected officials.
 - E. All of the above.
- 11. A local preparedness plan should include which of the following?**
- A. Communication systems between state and local groups.
 - B. Testing mechanisms in laboratories.
 - C. Plans to triage and treat mass casualties.
 - D. Exercises to test community plans.
 - E. All of the above.
- 12. The key components of a national preparedness plan include which of the following?**
- A. Establishing response mechanisms.
 - B. Strengthening surveillance systems.
 - C. Strengthening laboratory systems.
 - D. Enhancing communications and training.
 - E. All of the above.
- 13. Indicate your work setting.**
- A. State/local health department.
 - B. Other public health setting.
 - C. Hospital clinic/private practice.
 - D. Managed care organization.
 - E. Academic institution.
 - F. Other.
- 14. Which of the following best describes your professional activities?**
- A. Patient care — emergency/urgent care department.
 - B. Patient care — inpatient.
 - C. Patient care — primary-care clinic.
 - D. Laboratory/pharmacy.
 - E. Administration.
 - F. Public health.

- 15. I plan to use these recommendations as the basis for . . . (Indicate all that apply.)**
- A. Health education materials.
 - B. Insurance reimbursement policies.
 - C. Local practice guidelines.
 - D. Public policy.
 - E. Other.
- 16. How much time did you spend reading this report and completing the exam?**
- A. 1–1½ hours.
 - B. More than 1½ hours but fewer than 2 hours.
 - C. 2–2½ hours.
 - D. More than 2½ hours.
- 17. After reading this report, I am confident I can identify criteria used to designate critical biological and chemical agents.**
- A. Strongly agree.
 - B. Agree.
 - C. Neither agree nor disagree.
 - D. Disagree.
 - E. Strongly disagree.
- 18. After reading this report, I am confident I can identify five core focus areas for domestic terrorism preparedness.**
- A. Strongly agree.
 - B. Agree.
 - C. Neither agree nor disagree.
 - D. Disagree.
 - E. Strongly disagree.
- 19. After reading this report, I am confident I can identify critical components of public health response to terrorism.**
- A. Strongly agree.
 - B. Agree.
 - C. Neither agree nor disagree.
 - D. Disagree.
 - E. Strongly disagree.

- 20. After reading this report, I am confident I can identify partners in an effective response to biological and chemical terrorism.**
- A. Strongly agree.
 - B. Agree.
 - C. Neither agree nor disagree.
 - D. Disagree.
 - E. Strongly disagree.
- 21. The objectives are relevant to the goal of this report.**
- A. Strongly agree.
 - B. Agree.
 - C. Neither agree nor disagree.
 - D. Disagree.
 - E. Strongly disagree.
- 22. The text boxes and figure are useful.**
- A. Strongly agree.
 - B. Agree.
 - C. Neither agree nor disagree.
 - D. Disagree.
 - E. Strongly disagree.
- 23. Overall, the presentation of the report enhanced my ability to understand the material.**
- A. Strongly agree.
 - B. Agree.
 - C. Neither agree nor disagree.
 - D. Disagree.
 - E. Strongly disagree.
- 24. These recommendations will affect how I conduct or participate in biological and chemical terrorism preparedness planning.**
- A. Strongly agree.
 - B. Agree.
 - C. Neither agree nor disagree.
 - D. Disagree.
 - E. Strongly disagree.

**MMWR Response Form for Continuing Education Credit
April 21, 2000/Vol. 49/No. RR-4**

**Biological and Chemical Terrorism: Strategic Plan for Preparedness and Response
Recommendations of the CDC Strategic Planning Workgroup**

To receive continuing education credit, you must
1. *provide your contact information;*
2. *indicate your choice of CME or CNE credit;*
3. *answer all of the test questions;*
4. *sign and date this form or a photocopy;*
5. *submit your answer form by April 21, 2001.*
Failure to complete these items can result in a delay or rejection of your application for continuing education credit.

Check One

CME Credit

CNE Credit

Last Name

First Name

Street Address or P.O. Box

Apartment or Suite

City

State

Zip Code

Fill in the appropriate blocks to indicate your answers. Remember, you must answer all of the questions to receive continuing education credit!

1. A B C D

13. A B C D E F

2. A B C D E

14. A B C D E F

3. A B C D

15. A B C D E

4. A B C D E

16. A B C D

5. A B C D E

17. A B C D E

6. A B C D

18. A B C D E

7. A B C D E

19. A B C D E

8. A B C D E

20. A B C D E

9. A B C D E

21. A B C D E

10. A B C D E

22. A B C D E

11. A B C D E

23. A B C D E

12. A B C D E

24. A B C D E

Signature

Date I Completed Exam

Detach or Photocopy

MMWR

The *Morbidity and Mortality Weekly Report (MMWR)* Series is prepared by the Centers for Disease Control and Prevention (CDC) and is available free of charge in electronic format and on a paid subscription basis for paper copy. To receive an electronic copy on Friday of each week, send an e-mail message to listserv@listserv.cdc.gov. The body content should read *SUBscribe mmwr-toc*. Electronic copy also is available from CDC's World-Wide Web server at <http://www.cdc.gov>/or from CDC's file transfer protocol server at <ftp.cdc.gov>. To subscribe for paper copy, contact Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; telephone (202) 512-1800.

Data in the weekly *MMWR* are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the following Friday. Address inquiries about the *MMWR* Series, including material to be considered for publication, to: Editor, *MMWR* Series, Mailstop C-08, CDC, 1600 Clifton Rd., N.E., Atlanta, GA 30333; telephone (888) 232-3228.

All material in the *MMWR* Series is in the public domain and may be used and reprinted without permission; citation as to source, however, is appreciated.

☆U.S. Government Printing Office: 2000-533-206/28003 Region IV