



A Public Health Response to Bioterrorism

Scott Lillibridge, MD

An attack with an agent such as smallpox could quickly culminate in a nationwide, or even international emergency. The control of such an epidemic requires a coordinated effort of the entire public health community. State and federal epidemiologists must be trained to consider unusual or rare threat agents when a suspicious outbreak occurs and must be prepared to address transmission, treatment, and prevention. In the event of a major epidemic, rapid diagnosis and rapid, secure communications among health responders will be crucial to ensure a prompt and coordinated public health and medical response. M&GS 2000;6:82-85.

In the past, an attack with a biological agent was considered very unlikely. Now it seems entirely possible. Many experts believe that it is no longer a matter of “if” but “when” such an attack will occur. They point to the accessibility of information on how to prepare biologic weapons and to activities by groups such as Aum Shinri-kyo, which, in addition to releasing nerve gas in Tokyo's subway, experimented with botulism and anthrax.

An attack with an agent such as small-

pox could pose threats to large populations because of the potential for person-to-person transmission, enabling spread to other cities and states, and quickly culminating in a nationwide, or even international, emergency. The control of such an epidemic requires a coordinated effort of the entire public health community.

The US Centers for Disease Control and Prevention (CDC) has significant experience in responding to explosions and chemical-related emergencies, including terrorism events. Chemicals are plentiful and many of the world's worst disasters have involved the release of industrial compounds. While there have been many decades of experience with industrial safety and chemical preparedness, special risks attend biological terrorism. For example, when people are exposed to a pathogen such as plague, they may not know that they have been exposed, and they may not feel sick for some time. A delay between exposure and onset of illness, or the incubation period, is characteristic of infectious diseases. The incubation period may range from several hours to a few weeks, depending on

At the time of publication, SL was a Director for Bioterrorism Preparedness and Response, National Center for Infectious Diseases, US Centers for Disease Control and Prevention, Department of Health and Human Services. Address correspondence to Scott Lillibridge, MD, Mailstop C-18, 1600 Clifton Rd., Atlanta, GA.

Adapted from testimony before the Subcommittee on National Security, Veterans Affairs, and International Relations, Committee on Government Reform, US House of Representatives, on September 22, 1999.

the exposure and pathogen. During this time, patients may continue to travel, visit family and friends, or attend public meetings at a time when they may be highly contagious. Consequently, a disease may be well established in the population before the first cases appear ill and require medical attention.

Detecting, diagnosing, responding to, and preventing illnesses, including those that occur as a result of bioterrorism or any other deliberate attempt to harm our citizens, are integral parts of CDC's overall mission to monitor the health of the US population. In 1998, CDC issued *Preventing Emerging Infectious Diseases: A Strategy for the 21st Century*. The report focused on four goals, each of which has direct relevance to preparedness for bioterrorism:

1. disease surveillance and outbreak response;
2. applied research to develop diagnostic tests, drugs, vaccines, and surveillance tools;
3. infrastructure and training;
4. disease prevention and control.

This plan emphasizes the need to be prepared for the unexpected--whether it be a naturally occurring influenza pandemic or the deliberate release of anthrax by a terrorist. As a part of this plan, CDC and its partners are defining specific activities that will need to be conducted over the next several years to ensure that the country is prepared to respond to any threat or actual act of bioterrorism.

Public Health Readiness to Address Bioterrorism

Unlike an explosion or a tornado, a biological event will be unlikely to occur in a single, localized place or among a cluster of people who would be identified for traditional first responder activity. The initial responders to a biological attack will most likely include county and city health officers, hospital staff, members of the outpatient medical community, and a wide range of response personnel in the public health system. Thus, protection against bioterrorism requires investment in the public health system. This point is underscored in a report, commissioned by the Department of Health and Human Services (HHS) Office of Emergency Preparedness (OEP), that stresses the need for long-term public health improvements in surveillance and epidemiology infrastructure [1].

Increased vigilance and preparedness for unexplained illnesses are essential parts of the public health effort to protect against bioterrorism. Toward this end, CDC, working in collaboration with state and local health departments, many other public

health partners, and other federal agencies, has begun the effort to upgrade public health capabilities locally and nationally to respond to biological and chemical terrorism.

Areas for Public Health Action

In fiscal years 1999 and 2000, CDC has provided approximately \$80,000,000 through cooperative agreements with state and large metropolitan health departments to enhance public health capacities to respond to epidemics. This program focuses in several ways on strengthening components of the public health infrastructure.

Detecting Unusual Events

Because the initial detection of bioterrorism will most likely occur at the local level after a period when patients have incubated the disease, it is essential to educate and train members of the medical community--both public and private --who may be the first to examine and treat the victims. State and federal epidemiologists must be trained to consider unusual or rare threat agents when a suspicious outbreak occurs and must be prepared to address questions related to their transmission, treatment, and prevention. It is also necessary to upgrade the surveillance systems of state and local health departments, which will be relied upon to identify unusual patterns of disease occurrence and to locate additional cases of illness as the disease spreads throughout the community and beyond.

CDC will promote the development of new disease surveillance networks which will better link critical health care facilities and components of the emergency medical system to public health agencies. CDC will also pilot and evaluate new surveillance systems to improve the nation's ability to detect low incidences of unexplained illnesses or track critical health resource utilization.

Investigating and Containing Outbreaks

In the response to an outbreak caused by an act of bioterrorism, the CDC and other federal health authorities will most likely be alerted to the event only after state or local health officers, medical practitioners, or other workers in the health sector have identified and validated a cluster of cases that are highly unusual and potentially unexplained.

For this reason, it is imperative that state and local health departments have sufficient resources to conduct disease outbreak investigations. Through cooperative agreements and other mechanisms, CDC will provide state and large metropolitan health departments with tools, training, and financial resources for local outbreak investigations and will help develop rapid public health

response capacity at the state and local levels. Additionally, in the event of a suspected or an actual attack, CDC will assist in identifying threat agents and their modes of transmission, in instituting control measures, and in providing consultation on medical management.

To ensure the ready availability of drugs, vaccines, prophylactic medicines, chemical antidotes, medical supplies, and equipment that might be needed in a medical response to a biological or chemical terrorist incident, CDC is working to establish a National Pharmaceutical Stockpile, to be utilized when necessary and appropriate to contain the spread of disease in the outbreak.

Laboratory Diagnosis

In the event of an epidemic, rapid diagnosis will be critical so that prevention and treatment measures can be implemented quickly. CDC has provided cooperative agreement assistance to state and major metropolitan health departments to improve capacity to diagnose infectious diseases. In addition, CDC is enabling selected state health laboratories to function as reference facilities for the evaluation of persons exposed to chemicals. CDC will also evaluate existing rapid assay technology for identifying critical biological agents and develop rapid toxic screening that can assess whether humans have been exposed to up to 150 different chemical agents. CDC will develop guidelines and quality assurance standards for the safe and secure collection, storage, transport, and processing of clinical samples.

Finally, CDC is working with public health partners such as the Association of Public Health Laboratories to implement a network of laboratories that will be used to provide the most immediate diagnosis during a public health emergency. This network will ultimately include hospital laboratories, commercial reference laboratories, state and local health laboratories, and highly specialized federal facilities. It will not only enhance the public health capacity to address bioterrorism, but will also contribute to the overall public health capacity to address naturally occurring infectious diseases.

Coordination and Communication

In order to assure the most effective federal response to a bioterrorism event, CDC coordinates closely with the Department of Justice, including the FBI and the National Domestic Preparedness Office. In addition, there is ongoing coordination with OEP, the Food and Drug Administration (FDA), the National Institutes of Health (NIH), the DOD, the Federal Emergency Management

Agency (FEMA), and private sector organizations.

Global health security will be enhanced as CDC, in collaboration with the World Health Organization (WHO) and various ministries of health, responds to reports of unexplained illnesses, unusual pathogens, and other outbreaks that might threaten the lives of US citizens and foreign populations.

Strengthening communication among clinicians, emergency rooms, infection control practitioners, hospitals, pharmaceutical companies, and public health personnel is of paramount importance. The Health Alert Network component of the CDC state and local preparedness initiative will provide a robust national electronic platform for communications, information access, delivery of targeted health alerts, and distance learning for use by public health officials working to detect and respond to bioterrorism and other unexplained health threats.

In the event of a major epidemic, rapid and secure communications among health responders will be especially crucial to ensure a prompt and coordinated public health and medical response. Further, in the event of such an attack, the public must be provided with accurate and timely information. An act of terrorism is likely to cause widespread panic; ongoing communication of accurate and up-to-date information will help calm public fears and limit collateral effects of the attack.

Preparedness and Planning

Every level of the public health community--federal, state, and local--must be prepared to work in coordination with the medical and emergency response communities to address the public health consequences of bioterrorism. CDC will assist in developing local public health bioterrorism preparedness plans that are well integrated into existing emergency response plans at the local, state, and federal level. CDC is also creating diagnostic and epidemiological performance standards for state and local health departments and will help states conduct drills, exercises, and laboratory readiness for such emergencies.

First responders must be better prepared against biological and chemical exposures. CDC has significant experience in the areas of detector technology, personal protective equipment, including protective clothing and respirators, and the necessary training to work in hazardous environments. The challenge is to expand these capacities to better protect first responders from perils of biological and chemical terrorism.

CDC, NIH, and other agencies are sup-

porting and encouraging research to address scientific issues related to bioterrorism preparedness. New or enhanced vaccines, antitoxins, or innovative drug treatments may be required. Moreover, we need to learn more about the pathogenesis and epidemiology of these rare diseases.

Disease experts at CDC are considering various strategies for preventing the spread of disease during an epidemic. Strategies under evaluation include creating protocols for immunizing at-risk populations, isolating large numbers of exposed individuals and reducing occupational exposures, assessing methods of safeguarding food and water from deliberate contamination, and exploring ways to improve linkages between animal and human disease surveillance networks since threat agents that affect both humans and animals may first be detected in animals.

Biosafety Level 3 and 4 laboratories, which are required for handling highly dangerous pathogens, must be designed and operated safely. Access to potential terrorist agents must be limited by administering federal rules that regulate shipments of certain hazardous biological organisms and toxins [2].

Conclusion

The best approach to protect, respond to, and defend the health of our citizens against the adverse health effects of bioterrorism is to develop, organize, and enhance life-saving public health interventions, and to enhance the existing infrastructure. Expanded public health laboratory capacity, increased surveillance and outbreak response capabilities, and augmented health communications and training, all supported by focused public health preparedness resources at the state and local level are necessary to ensure we will be able to respond when the alarm is sounded.

References

1. Institute of Medicine, National Research Council. Chemical and biological terrorism: Research and development to improve civilian medical response. Washington, DC: IOM, NRC. 1999.
2. Select Agent Rule, Additional Requirements for Facilities Transferring or Receiving Select Agents (42 CFR Section 72.6)