



NOTICE:
THIS MATERIAL MAY BE
PROTECTED BY COPYRIGHT
LAW (TITLE 17, U.S. CODE)

The Medical First Response to Bioterrorism

Tara O'Toole, MD, MPH

There is a need to raise awareness within the medical community of the threat of bioterrorism. The first responders to an epidemic caused by such an event would be physicians, nurses, and public health professionals in local health departments. Effective response will require extensive coordination and cooperation. Unfortunately, the public health infrastructure in the US has been neglected. There are pressing needs to upgrade the capacity of local public health systems to respond to an intentional epidemic; to engage the medical community, including hospitals, in bioterrorism response planning and preparedness; and to ensure institutional connectedness to mount an effective response. M&GS 2000;6:76-81.

A terrorist attack using a biological weapon against civilians will require a response that is fundamentally different from the response demanded by an attack that employs chemical weapons or explosives—even nuclear explosives. The medical and public health response to a bioterrorist attack will also differ significantly from response to natural disasters such as earthquakes or fires. Construction of effective response programs requires that these differences be clearly recognized.

The outcome of a bioterrorist attack on civilians would be an epidemic. A bioterror-

ist attack on civilians could have several outcomes, ranging from low-grade symptoms confined to a local area and not immediately recognized as a consequence of biological weapons use, to a widespread epidemic. The “first responders” to such an event would be physicians, nurses, and public health professionals in local health departments. A covert bioterrorist attack would likely come to attention gradually, as doctors became aware of an accumulation of inexplicable deaths among previously healthy people. The speed and accuracy with which physicians and laboratories reached correct diagnoses and reported their findings to public health authorities would directly affect the number of deaths, and—if the attack employed a contagious disease—the ability to contain the epidemic. Few, if any, practicing clinicians have ever seen a case of smallpox or anthrax or plague. Only a handful of laboratories have the ability to identify definitively the pathogens of greatest concern.

No recent disasters on American soil have resulted in large numbers of patients needing immediate and sustained medical care. It is hard to identify a modern event that has truly tested the capacity of the US health care system to respond to massive casualties. Nothing in memory is comparable to the situation that would arise if a US city were tar-

TO'T is Senior Fellow, Center for Civilian Biodefense Studies, the Johns Hopkins University Schools of Public Health and Medicine. She was US Assistant Secretary of Energy for Environment Safety and Health from 1993-1997. Address correspondence to: Tara O'Toole, MD, 111 Market Place, Baltimore, MD 21201; e-mail: taraotoole@erols.com.

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.

© Copyright 1999 the Johns Hopkins University Center for Civilian Biodefense Studies. Reused with permission.

geted with, say, an aerosolized anthrax weapon.

In the most fearsome bioterrorist scenarios, hundreds, thousands, or perhaps even tens of thousands of people would need immediate care, and many would require intensive therapy or ventilators. Hospitals, which thus far are almost entirely absent from any bioterrorism response planning activities, are already overburdened. Few cities have sufficient numbers of unoccupied hospital beds, staff, or equipment to absorb a large, sudden influx of severely ill patients.

In any situation involving the use of biological weapons, the number of people who were ill and in need of hospital treatment would likely be exceeded by individuals seeking care because they were fearful of being sick. The Scud missile attacks on Israeli citizens during the Gulf War produced large numbers of people going to physicians and clinics for symptoms of acute anxiety—symptoms that closely mimic early nerve gas effects. Similarly, in their initial stages many of the diseases delivered by biological weapons resemble common illnesses. Rapid diagnostic tests for smallpox, anthrax, and other diseases would be most helpful, but even the availability of such tools will not prevent the need to distinguish the truly sick from the worried well. Accomplishing this, and triaging affected individuals so as to best deploy limited drugs and equipment, will require significant resources.

In the event that a bioterrorist attack employs a contagious pathogen, provisions must be made to protect health professionals from the diseases afflicting their patients and to prevent patients from infecting others. Most hospital infection plans are capable of managing a handful of infectious patients. We are unaware of any hospital that has the capacity to effectively isolate as many as 50 to 100 such patients. Not even the largest academic medical centers have more than a dozen isolation rooms. Most planning documents address “infectious disease emergencies” in terms of one or two contagious patients. The need to handle dozens of potentially contagious patients simultaneously seems not to have come up.

No one knows how people would react to an attack with a deadly pathogen. Some health care workers might leave their jobs to care for their families; others might leave fearing for their own safety. Maintaining security at hospitals, health care centers, and pharmacies would pose great challenges since many hospital security staff are off-duty police officers who would presumably be needed elsewhere during the crisis.

Media coverage of modern epidemics will have a profound influence on the out-

come of response efforts should a biological attack occur. It is easy to imagine the opportunities for misinformation, or contradictory interpretations by various self-appointed or media-anointed “experts” in the context of a bioterrorist attack, fueling public mistrust. Yet providing the public with accurate, timely information that people not only believe, but act on, could literally save lives.

The Role of Public Health in Bioterrorism Response

Public health agencies at the municipal, county, state and federal levels will be central participants in efforts to recognize and respond to bioterrorist attacks. Public health response activities will be especially essential to shaping the scope and outcome of a bioterrorist attack. Containment of transmissible disease outbreaks in the modern world is a formidable undertaking. The mobility of urban populations, the global availability of high-speed transportation networks, and legal limits on the authority of public health officials are factors that have an impact on epidemic management.

Electronically-based syndromic surveillance systems may possibly be helpful in detecting an attack; it is certain that such systems will be essential tools in managing an epidemic. Thus, the ability of local and state health departments to analyze and monitor the epidemiological situation is a key component of any national response system. Epidemiologic analysis of initial victims may be critical in determining where the attack occurred, who is at risk, and who requires prophylactic treatment.

Efforts to limit the number who become ill will include the identification of contacts requiring vaccination, antibiotics, or quarantine. Epidemiologic tracking of the epidemic will be necessary to determine if response efforts are succeeding, where resources should be invested, and whether additional attacks have occurred. History shows that governments’ ability to describe accurately the course of disease outbreaks has a great impact on public credibility and on citizens’ willingness to follow the recommendations of public health authorities.

Unfortunately, the public health infrastructure in the US has been neglected for decades. In 1988, the Institute of Medicine wrote that “public health in the United States has been taken for granted” and that “our current capabilities for effective public health actions are inadequate” [1]. In the ensuing

Epidemiologic analysis of initial victims may be critical in determining where the attack occurred, who is at risk, and who requires prophylactic treatment.

Johns Hopkins Center for Civilian Biodefense Studies

The Johns Hopkins Center for Civilian Biodefense Studies is dedicated to fostering the development of medical and public health policies and structures to prevent the use of biological weapons and protect the civilian population from bioterrorism. The Center's principal focus is upon those bioweapons that have the potential to cause catastrophic, potentially destabilizing epidemics.

Begun in September 1998, the Center is dedicated to a sustained examination of the policy and operational issues associated with medical and public health implications of bioterrorist threats, providing opportunities for informed dialogue among a diverse array of policy experts and health practitioners. The Center itself possesses expertise in medicine, public health, and government.

The Center's approach includes three focus areas:

◆ Raising national and international awareness of the medical and public health threats posed by biological weapons, thereby augmenting the potential legal, political, and moral prohibitions against their use.

likely decade, the situation has only gotten worse. City and state health agencies remain seriously underfunded and understaffed, a situation that endangers the potential to manage effectively an epidemic among the civilian population. The state grants program initiated this year by the US Centers for Disease Control and Prevention (CDC) Bioterrorism Preparedness and Response Office is an important first step towards strengthening state and local public health capacities [see Lillibridge, pg. 82].

Collaboration between public health departments and the medical community is also critical to bioterrorism response. The gulf between medicine and public health is well documented and significant. Communication between hospitals and state health agencies is extremely limited. For example, few state health agencies have the ability to determine how many intensive care unit beds in the state are occupied at any given time, and few physicians know how to contact government health agencies were they to suspect a case of smallpox or anthrax. Re-establishing the linkages among medical practitioners, hospitals and public health agencies will be extremely important (and is likely to yield dividends beyond bioterrorism response).

The Role of Medicine

There is an enormous need to raise awareness within the medical community of the threat of bioterrorism. During a bioterrorist attack, health professionals will be the first responders. Yet, this critical component of the nation's response capability has thus far received inadequate funding. Moreover, very few medical or hospital industry leaders seem aware that bioterrorism is a problem.

Physicians must be educated about the potentially calamitous consequences of bioterrorism and the critical role that astute clinicians could play in recognizing such attacks. It is essential that at least a core of practitioners in selected medical specialties—such as emergency medicine, infectious disease, internal medicine, and hospital epidemiology—are aware of the basic clinical manifestations and management of diseases caused by biological weapons.

Should a bioterrorist attack on civilians occur, hospitals would be frontline institutions for dealing with the response, regardless of the type or scale of the attack. The current hospital system is not well prepared to deal with a mass disaster. Economic pressures have reduced staff and the number of available hospital beds. Intensive care and isolation beds are particularly scarce. Drugs and equipment are purchased on an "as needed" basis, which has resulted in reduced stockpiles available for immediate use.

Hospitals have been largely missing from bioterrorism response planning to date. Efforts to include hospitals in exercises sponsored by the Domestic Preparedness programs have been slowed by the preoccupation of hospital leaders with the changing and financially competitive terrain of modern health care. A carefully thought out menu of national incentives could encourage and motivate many hospitals to develop and participate in bioterrorism response programs, which, in the absence of such incentives, could face resistance as unfunded mandates.

Effective response to a bioterrorist attack that results in hundreds or thousands of patients will require extensive coordination and cooperation among dozens of hospitals and health maintenance organizations in a city or region. The protocols and infrastructure for implementing such collaboration should be examined, especially in view of the autonomous and financially competitive nature of health care organizations.

It is critical that response roles and capabilities of hospitals be carefully examined and augmented as appropriate. The Hopkins Center for Biodefense Studies has begun a project to design a "template" that would identify key elements in creating institutional capacities required for effective hospital response [see sidebar]. Increasing awareness among hospital leaders and staff of the threat bioterrorism is a key component of building such capacity.

Social Dimensions of Bioterrorism

Planning for a response to terrorist attacks must not neglect the social consequences of epidemics. A deliberate epidemic may continue to produce victims over a period of weeks or months. Additional attacks must be anticipated. If the biological weapon used is a contagious disease, fellow citizens may represent ongoing threats to public safety, or be perceived as such. Managing the response to a bioterrorist attack will exact a physical and emotional toll on the whole population, but especially on health care workers and family caretakers, many of whom may fear for their own health. Normal routines and commercial activity are likely to be seriously disrupted, possibly on a citywide or regional basis and for an extended time period. Proper attention to the psychological needs of people in crisis is essential.

Historically, some disease control measures taken in times of public health emergencies have been at odds with, or perceived as violating, certain democratic principles and processes [2]. For example, mandatory quarantine or enforced vaccination to limit disease spread have been perceived as

threats to individual autonomy and the right to privacy, or as discriminatory actions against certain groups. During a crisis, communication failures among different communities and between government officials and citizens can create suspicions and resistance that inhibit the accomplishment of public health objectives. Moreover, differing ideas of what constitutes proper response can also have long term political consequences, contributing to distrust of government institutions and disengagement from the processes of representative democracy.

A bioterrorist attack will undoubtedly raise many important political and legal questions, including issues of civil liberties, the authority of state and federal health officials, liability in the event mass vaccination is necessary, and others. Efforts to identify and better understand such issues are important.

Federal Bioterrorism Response Programs

All Federal response plans in place and under development—including those of the Department of Defense (DOD) and the Department of Health and Human Services (HHS)—are designed to support local resources and capabilities. However, it is estimated that 24-48 hours will elapse before federal resources arrive on the scene. During this initial—and for bioterrorism, most crucial—phase of response, local hospitals and health agencies are on their own. Thus, it is extremely important that the federal efforts to augment state and local bioterrorism response capacities be expanded to include as partners the medical and public health communities.

In recent years, a number of laudable federal efforts aimed at augmenting terrorism preparedness on the local level have gotten underway. Some of these programs have been criticized for being poorly coordinated on the federal level, an observation not without foundation. Such criticism may reflect, in part, the complexity of the technical issues and the unusual panoply of actors that would be engaged in terrorism response activities. Both of these aspects—the technical difficulty of the issues and the challenge of integrating diverse organizations and cultures—are magnified in the context of bioterrorism.

Three aspects of current federal programs deserve emphasis. The first is the pressing need to upgrade the capacity of local public health systems to respond to an intentional epidemic [see Lillibridge, pg. 82]. The second is the imperative to engage the medical community, including hospitals, in bioterrorism response planning and preparedness. The third aspect of federal efforts that requires attention is the institutional “connectedness” that will be essential to mount an

effective response to acts of bioterrorism.

Bioterrorism Response Planning

The Nunn-Lugar-Domenici Domestic Preparedness Programs have thus far focused primarily on responses to terrorist attacks using conventional explosives or chemical weapons. Training exercises focused on chemical attacks or conventional explosions have appropriately targeted traditional “first responders”—firefighters, emergency response technicians, law enforcement personnel, and the like. Few cities have considered or practiced responding to an attack that employs biological weapons. Thus, the medical community, hospitals, and even state health departments have been missing from training and exercises sponsored by the Domestic Preparedness Programs. Furthermore, even when bioterrorism scenarios are considered, clinicians, hospital leaders, and public health experts are frequently not included.

The Office of Emergency Preparedness (OEP) within HHS is in charge of a number of programs that carry out important medical missions during natural disasters. The National Disaster Medical System (NDMS) is designed as a partnership between the public and private sectors during emergencies and includes resources from the Departments of Defense, Veterans Affairs, and the Federal Emergency Management Agency as well as HHS. OEP’s role within the NDMS might provide important support functions following a bioterrorist attack, including logistical support and coordination of hospital resources.

The NDMS is specifically envisioned as a supplement to state and local medical resources. About 7,000 volunteers nationwide comprise Disaster Medical Assistance Teams (DMATs), which are typically mobilized during natural disasters or discrete events such as the bombing of the federal building in Oklahoma. DMATs usually include about 30 people, only one or two of whom are physicians and are trained to interact with traditional emergency response personnel. Other OEP capabilities, including mental health services and mortuary services, might be extremely useful resources. How such teams would interface with hospitals or local health departments; how and whether such volunteer teams could be mustered during a large epidemic; and how any public health or medical unit will interact with federal program personnel are all areas needing attention.

It is not easy to engage the medical community in bioterrorism response planning and preparedness. The practical task of educating clinicians about the possibilities and medical implications of biological weapons is

◇ Developing a broad appreciation of the threat posed by the biological agents of greatest concern—and possible medical and public health management options—through analysis of expected clinical manifestations, available treatment strategies, epidemiology, and potential methods of prophylaxis; and disseminating this knowledge throughout the medical and public health communities.

◇ Catalyzing development of effective, practical systems to respond to epidemics; informing the planning and preparation for possible bioterrorist attacks, thereby lessening their potential effects and attractiveness as instruments of terror; engaging the medical and public health communities in comprehensive planning in critical areas such as epidemiological characterization of intentional epidemics, the care and treatment of casualties, communication of information to the public, and the pursuit of unmet research and preparedness needs.

probably best addressed by professional societies. Hospitals and large HMOs are unlikely to devote scarce resources to bioterrorism preparedness without promises of financial support and the engagement of key authorities within the hospital community. Whether all hospitals should be prepared to respond to bioterrorism or whether a limited number of institutions should be selected to pursue more advanced capabilities is an open question.

Institutional Coordination

Institutional coordination is an important aspect of response planning. The lack of a precise understanding of roles and responsibilities among federal agencies involved in terrorist response is well recognized. Local institutions are not, in general, in better shape, and have far fewer resources to devote to planning activities.

Coherent statewide plans that embrace all relevant parties—including hospitals, emergency response systems, and government health agencies—in functional consortia would be extremely useful. CDC, OEP, and state preparedness initiatives must address issues of coordination and collaboration that result in a constructive reexamination of strategies and plans.

A top priority is to educate clinicians about what to do if they suspect a biological attack.

All 50 US states responded to the CDC's 1999 request for proposals to strengthen public health response to bioterrorism; to date, however, very few representatives of the medical or hospital communities have participated in planning projects or are even aware of the threat posed by bioterrorism. The leadership from both the medical and public health communities must become engaged soon, to ground the process in an accurate understanding of technical and institutional issues, and to incorporate a realistic and thoughtful analysis of the social repercussions of public health options.

Coordination between the health sector and law enforcement authorities is especially important, given that a bioterrorist attack will necessarily involve a high-profile, high-stakes criminal investigation and will raise profound national security issues. Efforts to ensure adequate communication and collaboration among health authorities and law enforcement deserve a high priority given the lack of practical experience in such collaboration and the significant cultural differences among these sectors.

Recommendations

A number of steps must be taken to develop the appropriate level of readiness at

the local, state, and federal levels to deal effectively with the threat of bioterrorism:

1. *Augment local public health capacity:* Investment of talent and money in the HHS bioterrorism response program in CDC should continue and be significantly increased. More attention should be directed towards identifying and implementing the essential elements of bioterrorism response, and toward making sure that federal efforts can effectively plug into local resources. All agencies involved with the public health response to bioterrorism should seek greater cooperation and a more explicit understanding of responsibilities and capabilities.

2. *Improve clinicians' awareness of the threat of bioterrorism and the diagnosis and treatment of diseases caused by biological weapons:* The medical community must be brought into the planning and preparations for bioterrorism response. In the event of a bioterrorist attack, local health resources—physicians, nurses, and the technicians and administrators who support them—will carry the weight of the response. Yet none of the preparedness programs now in place include any appreciable engagement of physicians or hospitals. Increasing health professionals' awareness of the medical manifestations of biological weapons and educating clinicians about what to do should they suspect a biological attack must be a top priority. This can be accomplished most efficiently if curricula are designed and distributed through professional societies such as the American College of Emergency Physicians, the American Colleges of Physicians, and the Infectious Diseases Society of America, rather than by for-profit contractors. (A professional effort currently underway by the ACEP has not yet produced any materials.)

3. *Engage hospitals in bioterrorism preparedness and response planning:* With very few exceptions, hospitals are not yet participants in any response planning efforts. Given the competing priorities facing health care institutions, initiatives to make hospitals aware of the bioterrorist threat and of their critical role in bioterrorism response must engage leaders within at the appropriate levels of authority and influence. As the path towards constructive integration of hospitals into response planning becomes better defined, proper heed should be paid to the resources hospitals will require to fulfill their roles and missions.

4. *Assess the impact of the media:* Careful anticipation and study of the influence of the media on the events following a bioterrorist event is needed. The media's impact on the epidemic and its concomitant potential to generate or quell public panic has great salience for any practical response planning.

Consideration should be given to advance preparation of educational videos and briefings for reporters. Protocols for providing the public with rapid and accurate medical information in the event of an attack should be determined.

Conclusion

If a bioterrorist attack occurs, the ensuing response will engage all levels of government, most federal agencies, and multiple professional communities, most particularly health care providers and public health professionals. It will take place in an atmosphere of great tension, uncertainty, and fear. Decisions will have to be made and coordinated very rapidly. Planning and implementation of effective response strategies must take into account the complexity of this challenge and the essential multidisciplinary, inter-institutional nature of the problem. There is an urgent need to develop a comprehensive picture of what such a response should include and how it might be organized, recognizing the importance of crafting strategies that are locally based and flexible enough to accommodate specific contexts and unexpected conditions.

References

1. Institute of Medicine. The future of public health. Washington, DC: National Academy Press. 1988.
2. Gostin L, Mann J. Towards the development of a human rights impact assessment for the formulation and evaluation of health policies. Health and Human Rights 1994;1:58-80.

Recommendations

Readiness to deal with the threat of bioterrorism requires that local, state, and federal agencies:

1. Augment local public health capacity;
2. Improve clinicians' awareness of the threat of bioterrorism and the diagnosis and treatment of diseases caused by biological weapons;
3. Engage hospitals in bioterrorism preparedness and response planning;
4. Assess the impact of the media.