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ISSUE BRIEF

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Biological Terrorism: Is the Health Care Community Prepared?

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A roundtable discussion with

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Biological Terrorism

The nature of terrorism is changing. It is no longer only hijackers and bombs. Nor is it only chemical attacks, such as the 1995 Aum Shinrikyo Sarin gas attack in the Tokyo subway. With recent events in Iraq and elsewhere making headlines, biological agents have joined more traditional methods in the public awareness. Similar to chemical terrorism in some ways, bioterrorism differs primarily in the lag time between the terrorist event and its medical consequences. It therefore poses its own critical challenges, particularly for the public health community. Chief among these is assessing just how great a threat is posed by particular agents and improving the nation's surveillance and response capabilities.

To assist in assessing the risk, the Senate Veterans Affairs Committee and other committees have asked the General Accounting Office (GAO) to gather information on the "science behind the threat."[1] Defining the threat is particularly problematic and raises many questions: How available are biological agents? How easy would it be for terrorists to "weaponize" and use them? Are biological agents becoming the weapons of choice for terrorists? Given limited dollars, how and where and on which specific agents should preparedness experts focus their efforts and resources? While some experts disagree about the precise probability of a specific bioterrorist event, others stress that even low-probability events with high-consequence outcomes demand careful attention and planning. Even accidental exposures to biological agents and hoaxes, such as the recent California anthrax pranks, have critical implications for preparedness.

Successful preparation will depend upon the development of a well-orchestrated plan to be used by the civilian personnel first responding to an event. First responders will vary, depending upon the nature of the attack. For biological terrorism, they will be epidemiologists, infections disease experts, emergency room personnel, and critical care unit personnel. These are the persons who are most likely to discover and need to respond initially to acts of bioterrorism because serious attacks with bioweapons would presumably cause epidemics. The traditional first responder community for chemical or explosive events—fire, police, hazardous materials (HAZMAT) teams, and emergency medical technicians—would be complementary but not central to the management of an epidemic caused by bioweapons.

Given the extreme importance attached to the readiness of civilian medical first responders and the growing appreciation for the likelihood of a biological terrorist event to occur in the United States, the U.S. Department of Health and Human Services' Office of Emergency Preparedness (OEP) asked the Institute of Medicine (IOM) in conjunction with the National Academy of Sciences' Commission on Life Sciences to:

- Collect and assess existing research, development, and technology information on detecting potential chemical and biological agents and protecting and treating both the targets of attack and health care providers.
- Provide specific recommendations for priority research and development.

The IOM report, *Chemical and Biological Terrorism: Research and Development to Improve Civilian Medical Response*,

> identifies more than 60 research and development projects potentially useful in minimizing damage caused by a terrorist attack, including new drugs and vaccines, faster and easier-to-use chemical detectors and diagnostic tests, and communications software to improve disease surveillance and provide information about possible attacks. The report also discusses steps that could be taken to improve the capabilities of public health departments, poison control centers and metropolitan police departments.

(See Table 1-1 at the end of the issue brief.)

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This Forum session will use the IOM's study as a springboard for understanding the role the health care community must play in the event of a domestic biological terrorist attack. Speakers—focusing primarily on bioterrorism, as opposed to chemical[2] or radiological terrorism—will highlight the issue of threat assessment and discuss ways to improve the current level of preparedness as well as steps needed to convert the public health system into our best form of civil defense.

BIOLOGICAL WARFARE 101

The use of microorganisms and toxins as weapons of destruction has a long history, with examples of biological terrorism dating back to before the 14th century. Methods used have ranged from deliberately infecting water supplies with diseased cadavers to passing out smallpox-infected blankets to "extirpate" Native American tribes in 1763.[3] Other examples include the use of fomites (objects that harbor and can transmit disease agents), as the Viet Cong did in the early 1960s when they smeared pungi sticks with excrement.[4]

Diseases resulting from biological agents, whether spread person-to-person or through other means, have incubation periods of days. This means, for example, that a person infected in a mass casualty attack could unwittingly continue to spread the disease, perhaps unleashing a deadly epidemic and most likely causing a wave of panic as the death toll mounted. Terrorists count on this added psychological dimension to erode trust in the target country's government and further cripple efforts at containment and control.

Biological agents considered to be priority biological terrorism threats can be categorized into three groups: *bacteria, viruses, and toxins*. In a March 8, 1998, *New York Times* article, Tom Kuntz excerpted the following from *Jane's Chem-Bio Handbook*, a "guide for military, police, and emergency personnel responding to suspected or real chemical or germ attacks."

> **Anthrax**. Anthrax is an acute *bacterial* infection of the skin, lungs, or gastrointestinal tract. The skin infection can be caused by direct contact with contaminated wool, hides or [livestock] tissues. . . . As a biological weapon, it is expected that anthrax spores would be released at a strategic location to be inhaled. Inhalation anthrax results from deposition of the bacterial spores in the lungs and causes fever, shock, and eventually death. . .. Iraqi and Soviet biological warfare programs worked to develop an anthrax weapon.
>
> **Ricin**. Ricin is a *toxin* made from the mash left over after processing castor beans for oil. Castor bean processing is a worldwide activity; therefore, the raw materials for making ricin are easily available. Ricin is easy to produce and is stable. Ricin was used in 1978 by Bulgarian intelligence operatives in the "umbrella murder" of Gregori Markov, a Bulgarian dissident. A ricin-tipped bullet was discharged into the victim, and he died a day after the attack.
>
> **Ebola**. Ebola *virus* is one of the most pathogenic viruses known to science, causing death in 50 to 90 percent of all clinically ill cases. . . . The Ebola virus is transmitted through direct contact with the blood, secretions, organs, or semen of infected persons. Transmission of the virus has also occurred by handling ill or infected chimpanzees. The virus has an incubation period of 2 to 21 days, and is characterized by sudden onset of fever, weakness, muscle pain, headache and sore throat. This is followed by vomiting, diarrhea, rash, limited kidney and liver functions and both internal and external bleeding. . . . Ebola viruses must be considered to have a high priority as a candidate for biological warfare. . . . This virus was assigned high priority in the former offensive program of the Soviet Union.

Additional biologic agents potentially available to bioterrorists include smallpox, brucellosis, plague, Q fever, tularemia, viral encephalitides, viral hemmorrhagic fevers, botulinum, and staphylococcal enterotoxin B.

DETECTING BIOLOGIC AGENTS: THE ROLE OF THE CDC AND STATE HEALTH DEPARTMENTS

Detecting and isolating biologic agents requires not only the ability of clinicians to identify and accurately diagnose uncommon diseases but also a surveillance system for collecting reports of such cases. Fortunately, the Centers for Disease Control and Prevention (CDC) operate a large number of infectious disease surveillance systems based on voluntary collaboration with state and local health departments, surveys, vital records, or registries. Unfortunately, the IOM report noted:

> The best known of these systems, the National Notifiable Disease Surveillance System, currently includes several, but not all, of the diseases considered likely to be used in bioterrorism, and, like all passive surveillance systems, suffers from omissions and long-delayed reports. All of the systems depend upon confirmed diagnosis and are thus no help to a puzzled physician trying to arrive at a diagnosis. No federal funds are provided to state and local health departments to support these systems, and states' ability or willingness to support infectious disease surveillance has declined in recent years. CDC's Emerging Infections Program (EIP) is attempting to reverse this trend by making grants to state and local health departments

for improving epidemiological and laboratory capability. Expanding the activities of these centers would be an excellent way to raise both the awareness of bioterrorism and the ability to respond to it.

Bioterrorism: A Possible Scenario

In his testimony on June 2, 1998, before the Senate Committee on Labor, Health and Human Services, and Education's Subcommittee on Appropriations, Edward Thompson, M.D., the health commissioner for the State of Mississippi, explained:

> The likely scenario that a few major cities have either already tested, or are planning to test, in a table top exercise unfolds as follows: A bioterrorist event occurs involving the unannounced release of anthrax spores in an open air location during a major public event. The first responsibility immediately falls to the local health department to detect that an unusual number and type of case reporting is occurring. Responsibility for diagnosis of the agent falls next to the local or state public health laboratory. Investigation, by interviewing victims, again is the responsibility of the local health department, with assistance from the state health department, in order to identify the source of the agent, when the release took place, and who might have been exposed. Other critical phases of the exercise where major responsibility falls to the local health department, with assistance from the state health department, involves the distribution of vaccine and other essential treatment resources and distribution of diseased victims around the state and region as thousands become symptomatic.

In his testimony, Thompson stated,

> Essential state health department functions in preparing for and responding to a bioterrorist incident would involve the following activities: epidemiologic surveillance, laboratory analysis, epidemiologic investigation, information and communications systems, and coordination of essential equipment and treatment (including health care facilities and personnel, isolation beds, and the availability and distribution of vaccines and other necessary treatment resources).

Experts all agree that states are ill-prepared to respond to a bioterrorist event. To underscore the current lack of preparedness among state health departments, Thompson quoted from a draft document on catastrophic disaster and terrorism by the Illinois Department of Health:

> The Department is mandated to protect the public health and safety of the citizens of Illinois. However, limited opportunities have been made available to adequately prepare staff for a response to a terrorist incident involving radiological, biological, or chemical materials. Therefore, the Department's response capabilities are currently limited. Several factors have prevented the Department from attaining a higher level of preparedness. These factors include: absence of a consistent funding source for training and education programs; limited personnel in infectious diseases, environmental health and laboratory services programs; and a lack of Federal guidance and information on source standards and detection methods.

Local and state health departments cannot fight terrorism alone. Emergency medical personnel as well as hospital personnel will also play a vital role in responding to biological and chemical incidents and reducing their consequences. In an effort to improve the preparedness of medical civilian responders, Congress in 1996 established the Domestic Preparedness Program, or DPP, under the Department of Defense. DPP, also referred to as the Nunn-Luger-Domenici program, appropriated funds to help train local first responders**.** Estimates indicate that approximately $92 million has been appropriated in fiscal years 1997 and 1998 to enable the U.S. Army to deliver special "train the trainer" tutoring programs, to conduct exercises to test what has been learned**,** and to assist in the creation of medical strike teams in some of the largest American cities.

CRISIS AND CONSEQUENCE: MANAGING TERRORIST ATTACKS

According to the September 1997 GAO report *Combating Terrorism: Federal Agencies' Efforts to Implement National Policy and Strategy:*

> U.S. policy on combating terrorism has been evolving for about 25 years. In June 1995, the President issued Presidential Decision Directive 39 (PDD 39), "United States Policy on Counterterrorism," the central blueprint for the U.S. counterterrorism strategy. PDD 39 restated standing U.S. policy and elaborated a strategy for combating terrorism and measures to implement it. The U.S. strategy consists of three main elements: (1) reduce vulnerabilities and prevent and deter terrorist acts before they occur; (2) respond to terrorist acts that do occur, including managing crises and apprehending and punishing terrorist perpetrators; and (3) manage the consequences of terrorist attacks.

More recently, in May 1998, PDD 62 ("Combating Terrorism") and PDD 63 ("Critical Infrastructure Protection") were both issued. These directives establish a national coordinator for security, infrastructure protection, and counterterrorism and authorize the Federal Bureau of Investigation (FBI) to set up a National Infrastructure Protection Center to issue warnings to public and private operators of essential elements of the U.S. government and economy. In addition, the directives include a four-

part initiative focused on biological weapons. According to the IOM report,

> It calls for a national surveillance system based on the public health system, provision of local authorities with necessary equipment and training, stockpiles of vaccines and specialized medicines, and a research and development program on pathogen gene mapping to guide development of new and better medicines and vaccines.

Preparing to meet the needs of civilian victims of a bioterrorist attack will require the coordination of the health care community as a whole, as well as of many other organizations, experts, and agencies at all levels of government. It has been estimated that more than 40 federal departments, agencies, and bureaus have some role in combating terrorism. Part of the challenge, not surprisingly, involves working through the complex maze of multiple bureaucracies to figure out who does what when and who reports to whom.

Generally, if an incident occurs without a warning, crisis and consequence management will be concurrent. The FBI would be in charge of crisis management (that is, controlling the crime scene and gathering evidence used to prosecute the terrorists). Primary responsibility for consequence management, however, rests with the states. The federal government supports state and local governments in domestic incidents through the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The Federal Emergency Management Agency coordinates the federal response through a generic disaster contingency plan known as the Federal Response Plan, which categorizes types of federal assistance into specific emergency support functions. Support functions include, for example, health and medical services, urban search and rescue, and information and planning.

Policy Dilemmas

In addition to organizational and chain-of-command issues, other policy quagmires need to be sorted out. For example, as Sean Paige wrote in his January 26, 1998, *Insight* cover story, "At the Eleventh Hour,"

> Often the government seems to be working at cross-purposes—certain pieces of lifesaving protective gear much in demand by first responders across the country are off-limits to them because they don't meet workplace-safety standards. Yet these same items often are widely used by the military or approved for use in foreign countries.

The IOM draft report noted a similar dilemma.

> With a few exceptions, treatment of a very small number of individuals exposed to any chemical or biological agent is not beyond current medical capabilities. However, large numbers of casualties will quickly overtax those capabilities. Vaccines, drugs, antitoxins, and supportive medical equipment are generally available in small quantities. Moreover, many of the vaccines and antitoxins are not FDA [Food and Drug Administration] approved and are only available as Investigational New Drugs (INDs). This means not only that the product is only available in limited amounts, but that it can be used only in a research setting with the informed consent of the recipient. Thus, IND status effectively precludes use in a mass-casualty situation.

The final IOM report added the following:

> FDA recognized the difficulty IND status presented in potential mass-casualty situations during the Persian Gulf War and passed an interim rule waiving the requirement for the United States military to obtain informed consent in using two investigational products intended to provide protection against chemical and biological warfare agents. The FDA has recently solicited comments on the wisdom of revoking this interim rule as well as on the nature of the evidence that ought to be required when products cannot ethically be tested in humans.

PAYING FOR PREPAREDNESS

Increasing the level of preparedness is not cheap. In addition to funds appropriated more generally to counterterrorism efforts, Congress appropriated funds for bioterrorism and related public health infrastructure activities within DHHS. Specifically, the *Omnibus Consolidated and Emergency Supplemental Appropriations for FY99* allocated $216,922,000 to the Public Health and Social Services Emergency Fund. According to the conference report, "The fund addresses the Administration request for bioterrorism and related activities as well as for bolstering public health infrastructure, conducting studies regarding health and national security, and combating certain infections diseases."

According to the conference report, the $216,922,000 is to be allocated as follows:

- $154,750,000 for the CDC for a variety of activities. These include: $1 million for the development of an overall preparedness plan, $1 million to enhance technical capabilities to identify certain biological agents, $51 million[5] for the CDC to establish a pharmaceutical and vaccine stockpile for civilian populations,[6] $1.75 million for conducting independent studies of health and bioterrorism threats specified in the Senate report, $2 million to assist states in developing emergency preparedness and

response plans, $2 million to expand the CDC Epidemic Intelligence Service, $2 million for regional laboratories for measuring chemical exposures, $5 million to better identify potential biological and chemical terrorism agents, $5 million to develop new sources and methods for surveillance, $5 million to develop rapid toxic screening, $5 million for the environmental health laboratory, $7 million to strengthen state and local epidemiological and surveillance capacity, $11 million for regional laboratories for detecting and measuring biological and chemical agents, $28 million to establish a national health alert network, $20 million for polio eradication activities, and $8 million for measles eradication activities.

- $12,172,000 for the Office of the Secretary, allocated as follows: $2.5 million for the Office of Emergency Preparedness for a national disaster medical system, $1.5 million for developing national response capabilities, $3 million for metropolitan medical response systems, $1.85 million for a nuclear weapons radiation study, and $3 million in for the renovation and modernization of Fort McClellan's Noble Army Hospital in Alabama for bioterrorism training activities. The conference agreement also included $322,000 to be provided to Calhoun County, Michigan, for reimbursement of certain expenses related to food-borne illnesses.
- The remaining approximately $50 million is to be used "to address the HIV/AIDS crisis facing the African American community and other racial and ethnic minority communities due to the changing demographics of the disease."

THE FORUM SESSION

The Forum has invited a number of experts to help sort through how the health care community can better prepare for and contribute to the prevention of a biological terrorist attack. **Margaret A. Hamburg, M.D.,** assistant secretary for planning and evaluation within DHHS and a past commissioner of health for the City of New York, will set the stage by addressing the following: What are we preparing for? How well prepared are we? And what do we need to do in the short-term and the long-term? Dr. Hamburg has a distinguished record of scientific accomplishments and outstanding public service. She has been elected to membership in the Institute of Medicine, the New York Academy of Medicine, and the Council on Foreign Relations and is a fellow of the American Association of the Advancement of Science.

Following Dr. Hamburg's remarks panelists representing several areas of expertise will participate in a roundtable discussion focusing on the following questions:

- What are the medical and public health ramifications of a bioterrorist event?
- What are the most serious bioweapons facing the public health community today?
- How prepared or ill-prepared are various sectors of the health community to respond to a successful bioterrorist attack of any proportion?
- What kind of practical steps could be taken to reduce the risk? To minimize the consequences?
- How much would such steps cost? How should they be funded?
- What are the research needs? Who should be conducting the research?
- What are the commonalities and differences between chemical and biological terrorism? What elements need to be considered in preparedness planning and resource allocation? Should biological and chemical terrorism be linked or unlinked for planning purposes?

Scott R. Lillibridge, M.D., director of the CDC's bioterrorism preparedness and response activities, was the lead public physician during the initial U.S. Public Health Service response to the Oklahoma City bombing and was team leader for the U.S. Medical Delegation to Tokyo following the Sarin release in 1995.

Davi M. D'Agostino, assistant director of GAO's National Security and International Affairs Division, has been leading GAO's work on crosscutting counterterrorism issues for the past three years. In 1995, Ms. D'Agostino was selected to attend the Industrial College of the Armed Forces. She received the GAO Meritorious Service Award in 1997.

Robert F. Knouss, M.D., director of the DHHS Office of Emergency Preparedness, also directed the Public Health Service's refugee health activities during the Cuban-Haitian entrant and Southeast Asian refugee crisis and served as deputy director of the Pan American Health Organization.

Peter Rosen, M.D., director of the emergency medicine residency program at the University of California, San Diego and professor of clinical medicine and surgery there, also served as chair of the IOM's January 1999 study, *Chemical and Biological Terrorism: Research and Development to Improve Civilian Medical Response.*

Donald A. Henderson, M.D., M.P.H., director of the Johns Hopkins Center for Civilian Biodefense Studies, is also the Johns Hopkins University Distinguished Service Professor and has appointments in the Departments of Epidemiology and International Health in the School of Hygiene and Public Health. Dr. Henderson also served as dean of the faculty of the Johns Hopkins School of Public Health and directed the World Health Organization's global smallpox eradication campaign.

Jerome M. Hauer, director, New York City's Office of Emergency Management, served on the faculty of the Northeastern University Paramedic Program, joined the Biomedical Division of IBM as clinical research coordinator, and served as a volunteer firefighter and as a member of a HAZMAT team in Connecticut. Mr. Hauer is a member of the New York City Police Department's Honor Legion.

Robert M. Blitzer, associate director of the Center for Counterterrorism, Technology, and Analysis at Science Applications International Corporation, recently retired from the Federal Bureau of Investigation, where he served as the chief of the bureau's domestic terrorism section.

ENDNOTES

1. The GAO report, due this summer, will be classified. The unclassified version will be available this fall.

2. Includes nerve agents such as Sarin, blister agents such as mustard and Lewisite, and pulmonary agents such as pulmonary phosgene.

3. E. Wagner Stearn and Allen E. Stearn, *The Effects of Smallpox on the Destiny of the American Indian* (Boston: Bruce Humphries, 1945), 44-5.

4. G. W. Christopher et al., "Biological Warfare: A Historical Perspective," *Journal of the American Medical Association*, 278 (August 6, 1997), no. 5: 412.

5. This money cannot be obligated until DHHS submits an operating plan to both the House and Senate Appropriations Committees.

6. The House bill provided for this activity at CDC as non-emergency funding while the Senate bill provided for this activity at the Office of Emergency Preparedness. Additionally, the conference agreement "assumes that within the overall increase provided for NIH, $10,000,000 will be allocated for vaccine research and development activities in support of the bioterrorism initiative."

Table 1-1: Relative Capabilities for Response to Civilian Chemical and Biological Incidents at Four Levels of Medical Care

Capability	Local Responders		Initial Treatment Facilities		State		Federal	
	Chemical	Biological	Chemical	Biological	Chemical	Biological	Chemical	Biological
Receipt of pre-incident intelligence	L	L	L	L	S	S	S	S
Detection, identification, and quantification of agents in the environment	S	L	L	L	S	S	H	S
Personal protective equipment	S	S	L	S	L	S	S	S
Safe and effective patient extraction	S	S	N/A	N/A	N/A	N/A	S	S
Methods for recognizing symptoms and signs in patients	S	S	S	S	L	L	S	S
Detection and measurement of agent exposure in clinical samples	L	L	L	S	L	S	H	H
Methods for recognizing covert exposure in populations	N/A	N/A	S	S	S	S	S	S
Mass-casualty triage techniques and procedures	S	S	S	S	L	L	S	S
Methods/procedures for decontamination of exposed individuals	S	S	L	L	L	L	S	S
Availability, safety, and efficacy of drugs and other therapies	L	L	S	S	L	L	S	S
Prevention, assessment, and treatment of psychological effects	S	S	S	S	S	S	S	S

NOTE: H = highly capable; S = some capability; L = little or no capability; and N/A = not applicable.

Source: Institute of Medicine, *Chemical and Biological Terrorism: Research and Development to Improve Civilian Medical Response* (Washington, D.C.: National Academy of Sciences, January 1999), 20.