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HOSPITAL PREPAREDNESS

Most Urban Hospitals Have Emergency Plans but Lack Certain Capacities for Bioterrorism Response



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Highlights of [GAO-03-924](#), a report to the Senate Committee on Health, Education, Labor, and Pensions; the Senate and House Committees on Appropriations; and the House Committee on Energy and Commerce

Why GAO Did This Study

In the event of a large-scale infectious disease outbreak, as could be seen with a bioterrorist attack, hospitals and their emergency departments would be on the front line. Federal, state, and local officials are concerned, however, that hospitals may not have the capacity to accept and treat a sudden, large increase in the number of patients, as might be seen in a bioterrorist attack. In the Public Health Improvement Act that was passed in 2000, Congress directed GAO to examine preparedness for a bioterrorist attack. In this report GAO provides information on the extent of bioterrorism preparedness among hospitals in urban areas in the United States.

To conduct this work, GAO surveyed over 2,000 urban hospitals and about 73 percent provided responses addressing emergency preparedness. The survey collected information on hospital preparedness for bioterrorism, such as data on planning activities, staff training, and capacity for response.

What GAO Found

While most urban hospitals across the country reported participating in basic planning and coordination activities for bioterrorism response, they did not have the medical equipment to handle the number of patients that would be likely to result from a bioterrorist incident. Four out of five hospitals reported having a written emergency response plan addressing bioterrorism, but many plans omitted some key contacts, such as other laboratories. Almost all hospitals reported participating in a local, state, or regional interagency disaster preparedness committee. In addition, most hospitals reported having provided at least some training to their personnel on identification and diagnosis of disease caused by biological agents considered likely to be used in a bioterrorist attack, such as anthrax or botulism. In contrast, fewer than half of hospitals have conducted drills or exercises simulating response to a bioterrorist incident. Hospitals also reported that they lacked the medical equipment necessary for a large influx of patients. For example, if a large number of patients with severe respiratory problems associated with anthrax or botulism were to arrive at a hospital, a comparable number of ventilators would be required to treat them. Yet half of hospitals reported having fewer than six ventilators per 100 staffed beds. In general, larger hospitals reported more planning and training activities than smaller hospitals.

Representatives from the American Hospital Association provided oral comments on a draft of this report, which GAO incorporated as appropriate. They generally agreed with the findings.

Urban Hospitals with Ventilator Capabilities, per 100 Staffed Beds

Ventilators	Percentage of hospitals
Less than 2 ventilators	9.0
2 to less than 5 ventilators	33.9
5 to less than 10 ventilators	39.7
10 or more ventilators	17.4
Total	100.0

Source: GAO.

Note: Data are from GAO's 2002 survey of hospitals and their emergency departments. Responses were weighted to provide estimates for the universe of hospitals.

www.gao.gov/cgi-bin/getrpt?GAO-03-924.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Marcia Crosse on (202) 512-7119.

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Abbreviations

EMS	emergency medical services
HAZMAT	hazardous materials
HHS	Department of Health and Human Services
HRSA	Health Resources and Services Administration
MSA	metropolitan statistical area
PPE	personal protective equipment
SARS	Severe Acute Respiratory Syndrome

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United States General Accounting Office
Washington, DC 20548

August 6, 2003

Congressional Committees

In the event of a large-scale infectious disease outbreak, as could be seen with a bioterrorist attack, hospitals and their emergency departments would be on the front line. The release of a biological agent by a terrorist might not be recognized for several days, during which time a communicable disease could be spread to many people who were not initially exposed. Because hospitals are open 24 hours a day, 7 days a week, victims would be likely to seek treatment of their symptoms there, putting hospital personnel in the role of first responders. Federal, state, and local officials are concerned, however, that hospitals may not have the capacity to accept and treat a sudden, large increase in the number of patients, as might be seen in a bioterrorist attack.¹ For example, these officials are concerned that this surge in patients would be likely to overwhelm emergency departments in urban areas, many of which are already operating at or above capacity.²

The Public Health Improvement Act directed that we examine state and local levels of preparedness for a bioterrorist attack.³ We have previously reported on activities by federal agencies and state and local public health agencies and health care organizations, including hospitals, to prepare for and respond to bioterrorism.⁴ In this report we are providing you with additional information on the extent of bioterrorism preparedness among urban hospitals in the United States, specifically with respect to planning activities, staff training, and capacity for response.

¹U.S. General Accounting Office, *Bioterrorism: Preparedness Varied Across State and Local Jurisdictions*, [GAO-03-373](#) (Washington, D.C.: Apr. 7, 2003).

²For information on emergency department capacity, see U.S. General Accounting Office, *Hospital Emergency Departments: Crowded Conditions Vary among Hospitals and Communities*, [GAO-03-460](#) (Washington, D.C.: Mar. 14, 2003) and The Lewin Group, *Emergency Department Overload: A Growing Crisis; The Results of the AHA Survey of Emergency Department (ED) and Hospital Capacity*, April 2002.

³Pub. L. No. 106-505, § 102, 114 Stat. 2314, 2323 (2000).

⁴U.S. General Accounting Office, *Bioterrorism: Federal Research and Preparedness Activities*, [GAO-01-915](#) (Washington, D.C.: Sept. 28, 2001) and [GAO-03-373](#).

To obtain information on the extent of hospital bioterrorism preparedness, we conducted a survey between May and September 2002 of 2,041 urban hospitals across the country that have emergency departments. (See app. I for a description of the hospitals we surveyed.) The survey asked questions relating to emergency room functioning and hospital bioterrorism preparedness. We reported our survey findings on emergency room functioning in March 2003.⁵ We obtained responses to the survey addressing bioterrorism preparedness from 1,482 hospitals, for a response rate of 73 percent and we are providing our survey findings in the current report. The survey covered key components of hospital preparedness for bioterrorism, including planning activities related to communication and coordination with community and state organizations (e.g., participation in an interagency disaster preparedness committee); staff training; and the response capacity of the facility (e.g., number of isolation beds) and of the equipment (e.g., number of ventilators⁶). We weighted responses to adjust for a lower response rate from investor-owned (for-profit) hospitals to provide estimates representative of the entire universe of urban hospitals we surveyed. Our report reflects hospital preparedness at the time of our survey in 2002. Improvements in hospital preparedness may have occurred since these data were collected. (For more detail on our scope and methodology, see app. II.) We did our work from May 2002 through July 2003 in accordance with generally accepted government auditing standards.

Results in Brief

While most hospitals in urban areas across the country reported participating in basic planning and coordination activities for bioterrorism response, they did not have the medical equipment to handle the large increase in the number of patients that would be likely to result from a bioterrorist incident. Four out of five hospitals reported having a written emergency response plan addressing bioterrorism, but many plans omitted some key contacts, such as laboratories outside the hospital. Almost all hospitals reported participating in a local, state, or regional interagency disaster preparedness committee. In addition, most hospitals reported having provided at least some training to their personnel on identification and diagnosis of disease caused by biological agents considered likely to be used in a bioterrorist attack, such as anthrax or botulism. In contrast,

⁵GAO-03-460.

⁶A ventilator is a mechanical device designed to perform part or all of the work of the lungs.

fewer than half of hospitals have conducted drills or exercises simulating response to a bioterrorist incident. Hospitals also reported that they lacked the medical equipment necessary for a large influx of patients. For example, if a large number of patients were to arrive at a hospital with severe respiratory problems associated with anthrax or botulism, a comparable number of ventilators would be required to treat them. Yet half of hospitals reported having fewer than six ventilators per 100 staffed beds. In general, larger hospitals reported more planning and training activities than smaller hospitals.

Representatives of the American Hospital Association provided oral comments on a draft of this report, which we incorporated as appropriate. They generally agreed with our findings.

Background

The resources that hospitals and their emergency departments would require for responding to a large-scale bioterrorist attack are far greater than those needed for everyday performance. The specific equipment, supplies, and facilities needed could vary depending upon what type of attack occurred, but many scenarios anticipate that the demand for health care could quickly outstrip the ability of hospitals to respond. For example, the TOPOFF 2000 exercise⁷ testing terrorism preparedness included a bioterrorism scenario of an attack using pneumonic plague⁸ released at a public event in a single location in one city. In this exercise, officials found that by the third day following the covert release, 500 persons with symptoms had been reported and antibiotic and ventilator shortages were beginning to occur. By the end of this day, nearly 800 cases were identified and over 100 persons had died. In each of the succeeding 2 days, the situation worsened and medical care in the city was described as beginning to shut down, with insufficient hospital staff, beds, ventilators, and drugs. At the conclusion of the exercise, 1 week after the attack, an estimated 3,700 cases of plague had been reported, with 950 to 2,000 deaths, including cases in other cities and abroad. In the early stages of the epidemic, hospitals were seeing 2 to 3 times their normal volume of

⁷TOPOFF, so named for the involvement of top officials of the U.S. government, was a set of exercises assessing readiness to respond to terrorist attacks.

⁸Pneumonic plague is a contagious disease that can be spread from person to person by respiratory droplet. Its symptoms include cough and fever, progressing to respiratory failure and shock. Pneumonic plague can be treated with some success by antibiotics if treatment is given within 24 hours of the first symptoms. For untreated pneumonic plague, mortality approaches 100 percent.

patients and later in the exercise up to 10 times normal volumes were arriving at hospitals. Hospitals were not able to effectively isolate patients to prevent the spread of the disease to hospital staff.

In order to be adequately prepared for bioterrorism, hospitals would need to have several basic capabilities, whether they possess them directly or have access to them through regional agreements. Plans that describe how hospitals would work with state and local officials to manage and coordinate an emergency response would need to be in place and to have been tested in an exercise, both at the state and local levels and at the regional level. Regional plans can help address capacity deficiencies by providing for the sharing, among hospitals and other community and state agencies and organizations, of resources that, while adequate for everyday needs, may be in short supply on a local level in an emergency. In addition, hospitals would need to be able to communicate easily with all organizations involved in the response as events unfold and critical information is acquired. Staff would need to be able to recognize and report to their state or local health department any illness patterns or diagnostic clues that might indicate an outbreak of a disease caused by a biological agent likely to be used by a terrorist.⁹ Finally, hospitals would need to have the capacity and staff necessary to treat large numbers of severely ill patients and limit the spread of infectious disease. They would need adequate stores of equipment and supplies, including medications, personal protective equipment, quarantine and isolation facilities,¹⁰ and air handling and filtration equipment.

Many of the capabilities required for responding to a large-scale bioterrorist attack are also required for response to naturally occurring disease outbreaks. Such a “dual-use” response infrastructure improves the capacity of local public health agencies to respond to all hazards. For example, a large-scale outbreak of Severe Acute Respiratory Syndrome

⁹The Centers for Disease Control and Prevention (CDC) considers anthrax, botulism, plague, smallpox, tularemia, and hemorrhagic fever viruses as the six biological agents that pose the greatest potential threat for adverse public health impact and have a moderate to high potential for large-scale dissemination.

¹⁰Quarantine facilities limit the freedom of movement of an individual and restrict visitors to prevent the spread of a disease to other members of the population, and could be created by separately housing affected individuals in an existing portion of a hospital. Isolation facilities provide a treatment setting that includes special or separate equipment such as air filters to limit the possibility of disease spread.

(SARS) would require many of the same capabilities that would be needed to respond to an intentionally caused epidemic.¹¹

Prior to our survey, efforts had been made by organizations to assist hospitals in preparing for bioterrorism. For example, the American Hospital Association distributed a checklist to help hospitals describe and assess their state of preparedness for chemical and biological incidents.¹² This checklist covered, for example, emergency response plans for hospital operations during a biological or chemical disaster; emergency preparedness training of the workers; and the hospital's ability to increase its capacity—for example, in terms of such items as ventilators and decontamination equipment—in the event of a large number of patients seeking care. Another organization, the Association for Professionals in Infection Control and Epidemiology, developed a mass casualty disaster plan checklist for health care facilities, including hospitals.¹³ This checklist included disease surveillance activities,¹⁴ communication systems, plans for receiving and treating casualties, and plans for the organized discharge of nonemergency patients on short notice.

Nevertheless, in our April 2003 report,¹⁵ we noted the general lack of guidance on what capacities hospitals should have to be prepared for bioterrorism. We also noted that efforts to improve hospitals' bioterrorism response capacities must be mindful that hospitals face multiple

¹¹U.S. General Accounting Office, *Infectious Disease Outbreaks: Bioterrorism Preparedness Efforts Have Improved Public Health Response Capacity, but Gaps Remain*, [GAO-03-654T](#) (Washington, D.C.: Apr. 9, 2003), U.S. General Accounting Office, *SARS Outbreak: Improvements to Public Health Capacity Are Needed for Responding to Bioterrorism and Emerging Infectious Diseases*, [GAO-03-769T](#) (Washington, D.C.: May 7, 2003), and *Severe Acute Respiratory Syndrome: Established Infectious Disease Control Measures Helped Contain Spread, But a Large-Scale Resurgence May Pose Challenges*, [GAO-03-1058T](#). Washington, D.C.: July 30, 2003.

¹²A. David Mangelsdorff, *Chemical and Bioterrorism Preparedness Checklist* (Chicago: American Hospital Association, Oct. 3, 2001), http://hospitalconnect.com/aha/key_issues/disaster_readiness/resources/HospitalReady.html (downloaded Apr. 22, 2003).

¹³Center for the Study of Bioterrorism & Emerging Infections, *Mass Casualty Disaster Plan Checklist: A Template for Healthcare Facilities* (Washington, D.C.: Association for Professionals in Infection Control and Epidemiology, Inc., Oct. 1, 2001), <http://www.apic.org/bioterror/checklist.doc> (downloaded Apr. 23, 2003).

¹⁴Disease surveillance is the monitoring of health-related data to identify, prevent, and control disease.

¹⁵[GAO-03-373](#).

challenges, including having to prepare for other types of disasters and continuing to meet the everyday needs of cities for emergency care. In that report, among other things, we recommended that the Department of Health and Human Services (HHS) develop specific benchmarks that define adequate preparedness for a bioterrorist attack and can be used to guide preparedness efforts.

Since our survey, there have been continuing efforts to assist hospitals in bioterrorism preparedness. For example, the Joint Commission on Accreditation of Healthcare Organizations released a report in 2003 on strategies for creating and sustaining communitywide preparedness systems for health care organizations, including hospitals.¹⁶ The report outlined critical issues to be addressed in developing communitywide preparedness and discussed federal and state responsibilities for eliminating barriers to preparedness and for facilitating and sustaining hospital and community-based emergency preparedness. It called for hospitals to address the full range of potential disasters, including terrorism, in their planning and to be aware of the specific hazards applicable to their communities.

The federal government has also provided assistance for improving the bioterrorism preparedness of hospitals. In January 2002 HHS announced the availability of funding for that purpose.¹⁷ The Bioterrorism Hospital Preparedness Program, administered by HHS's Health Resources and Services Administration (HRSA), provided funding in fiscal year 2002 of approximately \$125 million through cooperative agreements to states and eligible municipalities to enhance the capacity of hospitals and associated health care entities to respond to bioterrorism.¹⁸

¹⁶Joint Commission on Accreditation of Healthcare Organizations, *Health Care at the Crossroads: Strategies for Creating and Sustaining Community-wide Emergency Preparedness Systems* (Oakbrook Terrace, IL: 2003).

¹⁷The funds were primarily appropriated by the Department of Defense and Emergency Supplemental Appropriations for Recovery from and Response to Terrorist Attacks on the United States Act, Pub. L. No. 107-117, 115 Stat. 2230, 2314 (2002), and Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act of Fiscal Year 2002, Pub. L. No. 107-116, 115 Stat. 2186, 2198.

¹⁸The four eligible municipalities were Chicago, the District of Columbia, Los Angeles County, and New York City. Funding was also provided to five American territories: American Samoa, Guam, the Northern Marianas Islands, Puerto Rico, and the U.S. Virgin Islands.

These noncompetitive cooperative agreements covered two phases. In the first phase, states and municipalities applying for this funding were required to develop a needs assessment for a comprehensive bioterrorism preparedness program for hospitals and other health care entities, such as community health centers, and an implementation plan, as well as to begin initial implementation of the plan. Applications for the first phase were due to HHS by February 25, 2002, and funding for this phase, approximately \$25 million, was awarded shortly after receipt of applications. For the second phase, jurisdictions were required to submit more detailed implementation plans, in which they addressed three “critical benchmarks,” including a regional hospital plan for dealing with a potential epidemic involving at least 500 patients. In addition, applicants were to address four top-priority planning areas: medications and vaccines; personal protection, quarantine, and decontamination; communications; and biological disaster drills. Applications for the second phase were due April 15, 2002, and the additional funding, approximately \$100 million, was awarded after HHS’s review and approval of the plans. In March 2003, HHS announced that HRSA’s National Bioterrorism Hospital Preparedness Program would provide funding in fiscal year 2003 of approximately \$498 million through cooperative agreements to states and eligible municipalities.¹⁹ In response to our recommendations concerning additional guidance, HHS noted that it is developing some additional guidelines and templates to assist in preparedness efforts.²⁰

In addition, the federal government has established a stockpile of pharmaceuticals, antidotes, and medical supplies that can be delivered to the site of a bioterrorist (or other) attack. This Strategic National Stockpile has recently been expanded and HHS disclosed that it is planning to purchase 2,700 ventilators by September 2003 to supplement those now available in the stockpile. These supplies could be deployed to the site of an attack within 12 to 36 hours following a declaration of an emergency.

¹⁹The four eligible municipalities are Chicago, the District of Columbia, Los Angeles County, and New York City. Funding will also be provided to five American territories: American Samoa, Guam, the Northern Marianas Islands, Puerto Rico, and the U.S. Virgin Islands, and to three freely associated states of the Pacific: Marshall Islands, Micronesia, and Palau.

²⁰[GAO-03-373](#).

Hospitals Reported Planning for Bioterrorism Response but Do Not Have Certain Medical Capacities to Handle a Large Increase in Patient Load

Most hospitals in urban areas across the country reported participating in basic planning and coordination activities for bioterrorism response. Although most hospitals reported providing at least some training to their personnel on identification and diagnosis of disease caused by biological agents considered likely to be used in a bioterrorist attack, only about half report they have conducted drills or exercises simulating response to a bioterrorist incident. Further, few reported having acquired the medical equipment to handle the large increase in the number of patients that would be likely to result from a bioterrorist incident.

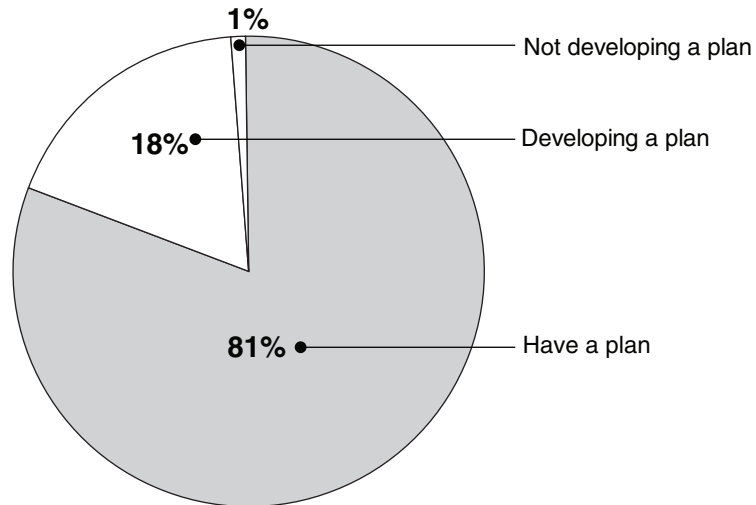
Most Hospitals Have Emergency Response Plans Addressing Bioterrorism and Are Participating in Local, State, or Regional Planning and Coordination Activities

Our survey showed that hospitals have engaged in a variety of planning and coordination activities, with most having prepared an emergency response plan addressing bioterrorism; participated in a local, state, or regional interagency disaster preparedness committee; and made agreements with at least one other organization to share personnel or equipment in the event of a bioterrorist or other mass casualty incident.

Four out of five hospitals reported having a written emergency response plan that specifically addresses bioterrorism (see fig. 1). Hospitals that had a plan were on average around 15 percent larger than those that did not in terms of number of staffed beds.²¹ Of those hospitals that reported not having such a plan, almost all were currently developing one.

²¹Staffed beds are the total facility beds set up and staffed as reported by hospitals in the American Hospital Association Annual Survey of Hospitals Database 2000.

Figure 1: Percentage of Urban Hospitals with a Written Emergency Response Plan Addressing Bioterrorism



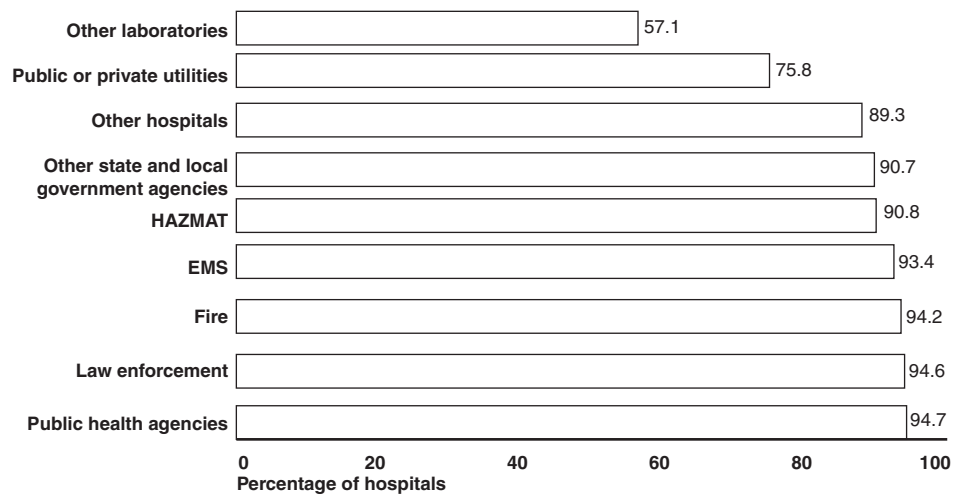
Source: GAO.

Note: Data are from our 2002 survey of hospitals and their emergency departments. Responses were weighted to provide estimates for the universe of hospitals.

We asked hospitals whether certain elements were specified in their emergency response plan: contacting other response agencies and organizations in the event of a bioterrorist incident and managing various critical functions such as decontamination of victims. As shown in figure 2, of the hospitals that reported having an emergency response plan for bioterrorism, approximately 90 percent reported specifying in their plan to contact state and local government agencies, public health agencies, other hospitals, hazardous materials (HAZMAT) teams, emergency medical services (EMS), fire departments, or law enforcement. These entities would be critical to mounting a larger communitywide response, communicating with the public, investigating and controlling sources of the outbreak, transporting patients, maintaining order, and investigating those responsible for the bioterrorism. Hospitals that planned to contact HAZMAT teams or public health agencies were on average around 15 and 20 percent larger, respectively, than those that did not. There were no significant differences in average sizes of hospitals with respect to contacting any of the other entities. Approximately 75 percent of hospitals reported planning to contact public or private utilities, whose assistance could be needed to increase or maintain power supplies to critical equipment or to control water- or sewer-borne pathogens. Although establishing contact with other laboratories that could potentially provide

additional capacity for overstretched hospital laboratories would be critical, the percentage of hospitals planning to make that link was lowest, at approximately 60 percent. Approximately 40 percent of hospitals reported specifying contacting all nine types of entities listed in figure 2.

Figure 2: Percentage of Urban Hospitals That Reported Specifying in Emergency Response Plan to Contact the Specified Entity during an Emergency



Source: GAO.

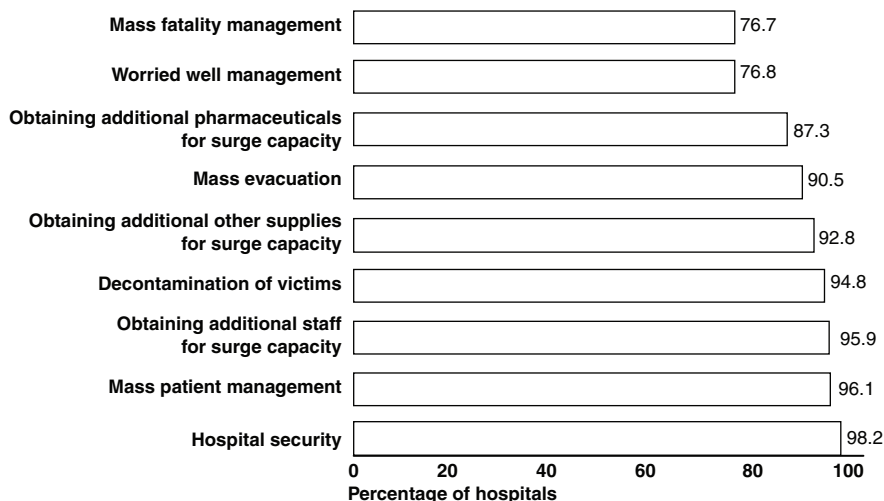
Note: Data are from our 2002 survey of hospitals and their emergency departments. Responses were weighted to provide estimates for the universe of hospitals. Data are presented for hospitals that reported having an emergency response plan that addresses bioterrorism.

As shown in figure 3, most of the hospitals that reported having an emergency response plan for bioterrorism indicated that they specified in that plan how certain critical functions were to be managed. The functions specified by more than 87 percent of hospitals included providing for hospital security to control entry to and exit from all parts of the hospital; obtaining additional staff, supplies, and pharmaceuticals to increase the hospital’s capacity to handle a surge of patients; or planning for mass evacuation of nonemergency patients on short notice. In general, larger hospitals had emergency response plans that covered more of these functions than the plans of smaller hospitals. Hospitals that reported addressing how to obtain additional pharmaceuticals for surge capacity, “worried well”²² management, and mass fatalities were on average around

²²The “worried well” are people who think they may be infected but in fact are not.

15 percent larger than those that did not. There were no significant differences in average sizes of hospitals with respect to any of the other functions. Approximately 77 percent of the hospitals reported addressing the question of how to manage a large influx of the worried well and distinguish them from victims who may be in the early stages of illness. Approximately 50 percent of hospitals addressed the management of all of the critical functions listed in figure 3.

Figure 3: Percentage of Urban Hospitals Whose Emergency Response Plans Addressed Bioterrorism and Included a Description of How to Manage the Specified Function



Source: GAO.

Note: Data are from our 2002 survey of hospitals and their emergency departments. Responses were weighted to provide estimates for the universe of hospitals. Data are presented for hospitals that reported having an emergency response plan that addressed bioterrorism.

Whether they had an emergency response plan addressing bioterrorism or not, more than 95 percent of hospitals reported participating in a local, state, or regional interagency disaster preparedness committee, task force, or working group. Most commonly, these committees also included representatives from city and county emergency medical services organizations, fire departments, city and county offices of emergency management, other local hospitals or medical institutions, city and county public health or health departments and agencies, and law enforcement organizations (see table 1). As we have previously reported,²³ it was not

²³GAO-03-373.

until after September 11, 2001, that government and hospital officials came to view hospitals as an integral component in local planning for responding to a terrorist event.

Table 1: Percentage of Urban Hospitals Participating in an Interagency Disaster Preparedness Committee That Also Includes Members from Specified Organization

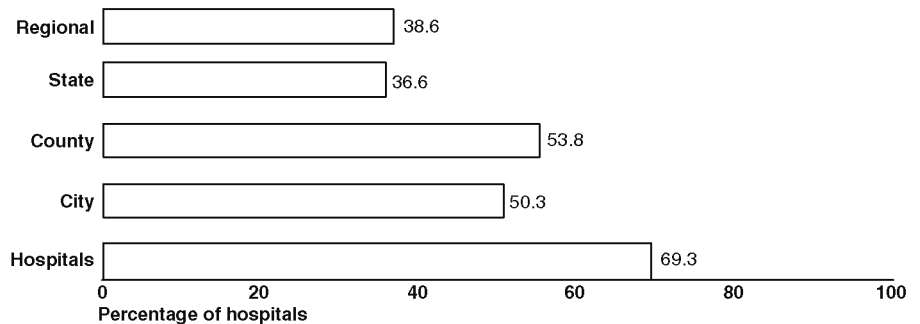
	Percentage
City and county emergency medical services organizations	94.0
Fire departments	91.2
City and county offices of emergency management	88.3
Other local hospitals or other medical institutions	86.8
City and county public health or health departments and agencies	86.6
Law enforcement organizations	84.0
State health or public health departments and agencies	47.0
Professional organizations (e.g., emergency medicine organization, local medical society, hospital association)	46.6
State office of emergency management	46.6
Surrounding area mutual aid response organizations	43.9
Public or private utilities (such as water and power)	37.6
State law enforcement organizations	36.7
Board of supervisors or other elected officials	34.4
Freestanding HAZMAT organizations	33.2
Public or private transportation organizations	31.1
State office of emergency medical services	29.8
Federal Bureau of Investigation	24.8
Federal Emergency Management Agency	21.2
National Guard	18.3
Centers for Disease Control and Prevention	11.3
State office of fire control	10.7
Department of Justice	8.4

Source: GAO.

Note: Data are from our 2002 survey of hospitals and their emergency departments. Responses were weighted to provide estimates for the universe of hospitals. Data are presented for hospitals that reported participating on an interagency disaster preparedness committee, task force, or working group.

Another planning and coordination activity that hospitals reported on in our survey was their participation in agreements to share or provide resources in the event of a bioterrorist or other mass casualty incident. We asked about agreements at the hospital, city, county, state, and regional levels. The survey results indicated that hospitals mostly coordinated with other hospitals, about half coordinated with the local government, and about one-third coordinated at the state or regional level to provide or share resources. About 70 percent of hospitals reported that they had agreements, such as memoranda of understanding or mutual aid agreements, with other hospitals to provide or share personnel, equipment, or other resources (see fig. 4). Fewer (between 37 and 54 percent) hospitals had agreements with regional, state, county, or city organizations (fig. 4). In general, hospitals that had agreements with other organizations were larger than those that did not. Hospitals that had agreements with other hospitals or with city organizations were on average around 10 percent larger than hospitals that did not. Fewer than 20 percent of hospitals had agreements with entities at all five levels.

Figure 4: Percentage of Urban Hospitals That Have Agreements with Other Hospitals or City, County, State, or Regional Organizations to Provide or Share Resources in the Event of Bioterrorism



Source: GAO.

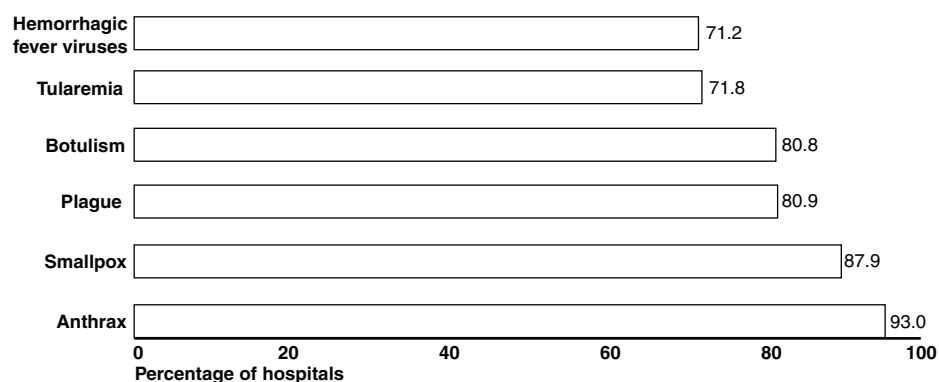
Note: Data are from our 2002 survey of hospitals and their emergency departments. Responses were weighted to provide estimates for the universe of hospitals.

Staff Training on Biological Agents Was Reported to Be Widespread, While Hospital Participation in Drills Was Less Common

Approximately 7 out of 10 hospitals reported that their staff had received training (services, courses, or self-learning materials) for identifying and diagnosing illness caused by all six biological agents that CDC has stated would be most likely to be used in a bioterrorist incident (see fig. 5). Hospitals that reported training activities for all of the biological agents were on average around 15 percent larger than hospitals that did not. A greater percentage of hospitals reported that staff had received training for anthrax or smallpox (around 90 percent or more) than for plague or

botulism (approximately 80 percent) or tularemia or hemorrhagic fever viruses (approximately 70 percent). However, the extensiveness of the reported training cannot be determined from our survey.

Figure 5: Percentage of Urban Hospitals That Have Provided Staff with Training (Services, Courses, or Self-Learning Materials) about Identifying and Diagnosing Symptoms for Each of the Following Biological Agents



Source: GAO.

Note: Data are from our 2002 survey of hospitals and their emergency departments. Responses were weighted to provide estimates for the universe of hospitals.

About half of all hospitals reported participating in drills or tabletop exercises simulating a biological attack during the past 2 years.²⁴ Hospitals that reported participating in biological drills were on average around 20 percent larger than hospitals that did not. Of all of the hospitals that participated in biological drills or exercises, approximately 80 percent carried out these activities with other organizations.

Hospitals Reported Insufficient Medical Equipment to Handle a Large Increase in Patients

The availability of medical equipment needed for bioterrorism response varied greatly among hospitals, and hospitals reported that they did not have the capacity to respond to the large increase in the number of patients that would be likely to result from a bioterrorist incident with mass casualties (see table 2). For example, if a large number of patients were to arrive at a hospital with severe respiratory problems associated with anthrax or botulism, a comparable number of ventilators would be required to treat them. However, half of the hospitals had, per 100 staffed

²⁴A tabletop exercise is a type of simulation in which participants discuss scenarios and responses around a table or similar setting.

beds, fewer than six ventilators, three or fewer personal protective equipment (PPE) suits, fewer than four isolation beds, or the ability to handle fewer than six patients per hour through a 5-minute decontamination shower. More specifically, fewer than 31 percent of hospitals could handle 10 or more patients per hour through a 5-minute decontamination shower per 100 staffed beds, and fewer than 10 percent had 10 or more isolation beds per 100 staffed beds. Almost 40 percent of the hospitals had fewer than two PPE suits per 100 staffed beds, and almost 10 percent had fewer than two ventilators per 100 staffed beds. Hospital officials have told us that bioterrorism preparedness is expensive and they are reluctant to create capacity that is not needed on a routine basis and may never be needed at a particular facility.²⁵

Table 2: Urban Hospitals with Medical Equipment Capabilities, per 100 Staffed Beds

	Percentage of hospitals
Ventilators	
Less than 2 ventilators	9.0
2 to less than 5 ventilators	33.9
5 to less than 10 ventilators	39.7
10 or more ventilators	17.4
Total percentage of hospitals	100
Personal protective equipment (PPE) suits	
Less than 2 PPE suits	38.2
2 to less than 5 PPE suits	24.8
5 to less than 10 PPE suits	16.6
10 or more PPE suits	20.3
Total percentage of hospitals	100^a
Isolation beds	
Less than 2 isolation beds	18.6
2 to less than 5 isolation beds	47.3
5 to less than 10 isolation beds	24.6
10 or more isolation beds	9.5
Total percentage of hospitals	100

²⁵ [GAO-03-373](#).

	Percentage of hospitals
Number of patients per hour through 5 minute decontamination shower	
Less than 2 patients per hour	15.3
2 to less than 5 patients per hour	25.8
5 to less than 10 patients per hour	28.4
10 or more patients per hour	30.5
Total percentage of hospitals	100

Source: GAO.

Note: Data are from our 2002 survey of hospitals and their emergency departments. Responses were weighted to provide estimates for the universe of hospitals.

^aDoes not total to 100 percent due to rounding.

Concluding Observations

As concerns about bioterrorism have intensified over the past few years, hospitals across the nation have been working to increase their preparedness for responding to such events. The staff and equipment that hospitals would require to respond to a bioterrorist attack with mass casualties are far greater than what are needed for everyday performance. Meeting those needs fully could be extremely difficult because bioterrorism preparedness is expensive and hospitals are reluctant to create capacity that is not needed on a routine basis and may never be used. In addition, along with a hospital's ability to meet the routine needs of the community, needs for additional capacity for responding to bioterrorism emergencies must be balanced with the need to be prepared for all types of emergencies. Hospital officials have recognized that their facilities are an essential component of our nation's bioterrorism preparedness and have begun planning and training efforts to increase their response capacity. Most hospitals, however, still lack equipment, medical stockpiles, and quarantine and isolation facilities for even a small-scale response. The additional funding that is to be provided under the National Bioterrorism Hospital Preparedness Program in fiscal year 2003 can be used to help hospitals address these issues. The additional guidance from HHS, in response to our earlier recommendations, may also be helpful in assisting hospitals to better determine what specific response capacities they need to ensure.

Comments from the American Hospital Association

Representatives from the American Hospital Association provided oral comments on a draft of this report. The officials generally agreed with our findings and stated that this was a good and useful report providing helpful information on hospital preparedness. They commended us for the high response rate to the survey, stating that this provided a more comprehensive picture of hospital activities than was available elsewhere. The officials suggested that the report make greater reference to the lack of specific benchmarks for hospitals to use in planning, provide additional context on the range of possible events that hospitals must consider in their planning, and refer readers more specifically to prior GAO recommendations on bioterrorism preparedness. We have added additional material to clarify these points. The officials also provided technical remarks, which we have incorporated where appropriate.

We are sending copies of this report to the Secretary of HHS, the Administrator of HRSA, and other interested officials. We will also provide copies to others upon request. In addition, the report will be available at no charge on GAO's Web site at <http://www.gao.gov>.

If you or your staffs have any questions about this report, please call me at (202) 512-7119. Key contributors are listed in appendix III.



Marcia Crosse
Acting Director, Health Care—Public
Health and Science Issues

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Appendix I: Selected Results of GAO Survey of Hospitals Regarding Hospital Preparedness for Bioterrorism

This appendix describes the characteristics of the short-term, nonfederal, general medical and surgical hospitals in metropolitan statistical areas (MSA) in the United States that had emergency departments in 2000 that we surveyed, and summarizes results by state. We sent the questionnaires to 2,041 hospitals that met these criteria—20 did not have emergency departments in fiscal year 2001 or were closed, for a total of 2,021 hospitals. We obtained responses to the survey from 1,489 hospitals, for an overall response rate of about 74 percent. However, 7 of these hospitals did not return the section of the survey addressing emergency preparedness, leaving 1,482, for a response rate of about 73 percent for the questions of concern for the current report. We weighted responses to adjust for a lower response rate from investor-owned (for-profit) hospitals to provide estimates representative of the entire universe of 2,021 hospitals in MSAs.

The following tables show selected survey information on the characteristics of the survey universe (table 3), response rates for hospitals by state for all states and the District of Columbia (table 4), planning and coordination activities (tables 5 through 8), and training activities (tables 9 and 10), for states that had at least 10 hospitals respond and a response rate of at least 50 percent (tables 4-10). All data in tables are weighted to provide estimates for the universe of 2,021 hospitals in MSAs.

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Table 3: Characteristics of Hospitals in Survey

	Number of hospitals	Percentage
Population of hospital's MSA		
2.5 million or more	545	27
1 million to less than 2.5 million	584	29
Less than 1 million	892	44
Total number of hospitals	2,021	100
Ownership type		
Private, not-for-profit	1,460	72
Investor-owned (for-profit)	311	15
Public (nonfederal)	250	12
Total number of hospitals	2,021	100
Teaching hospital		
Yes	713	35
No	1,308	65
Total number of hospitals	2,021	100
Number of staffed beds^a		
Less than 100	331	16
100 to less than 200	617	31
200 to less than 300	453	22
300 or more	620	31
Total number of hospitals	2,021	100

Source: GAO.

Note: Data are from our 2002 survey of hospitals and their emergency departments. Responses were weighted to provide estimates for the universe of hospitals. Percentages may not total 100 owing to rounding.

^aStaffed beds are total facility beds set up and staffed at the end of the reporting period as reported by hospitals in the American Hospital Association Annual Survey Database 2000.

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Table 4: Number of Hospitals That Were Sent Survey, Number That Responded to Survey, and Percentage of Hospitals That Responded to Survey, by State and District of Columbia

State	Number of hospitals that were sent surveys	Number of hospitals that responded to survey	Percentage of hospitals that responded to survey
Alabama	34	24	71
Alaska	3	2	67
Arizona	27	19	70
Arkansas	21	15	71
California	173	109	63
Colorado	25	19	76
Connecticut	24	21	88
Delaware	1	1	100
DC	7	6	86
Florida	129	89	69
Georgia	58	41	71
Hawaii	6	4	67
Idaho	5	5	100
Illinois	106	83	78
Indiana	52	42	81
Iowa	20	13	65
Kansas	19	12	63
Kentucky	26	21	81
Louisiana	58	28	48
Maine	7	5	71
Maryland	36	26	72
Massachusetts	44	37	84
Michigan	74	53	72
Minnesota	33	25	76
Mississippi	16	12	75
Missouri	57	37	65
Montana	3	2	67
Nebraska	9	8	89
Nevada	5	4	80
New Hampshire	9	7	78
New Jersey	60	48	80
New Mexico	10	6	60

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State	Number of hospitals that were sent surveys	Number of hospitals that responded to survey	Percentage of hospitals that responded to survey
New York	125	94	75
North Carolina	39	31	79
North Dakota	4	3	75
Ohio	96	71	74
Oklahoma	24	16	67
Oregon	23	19	83
Pennsylvania	117	93	79
Rhode Island	9	4	44
South Carolina	32	24	75
South Dakota	5	4	80
Tennessee	40	36	90
Texas	189	134	71
Utah	18	14	78
Vermont	2	2	100
Virginia	40	33	83
Washington	33	26	79
West Virginia	15	11	73
Wisconsin	51	41	80
Wyoming	2	2	100

Source: GAO.

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Table 5: Percentage of Urban Hospitals with a Written Emergency Response Plan Addressing Bioterrorism, by State

State	Percentage of hospitals
Alabama	80.9
Arizona	89.9
Arkansas	100.0
California	88.9
Colorado	89.2
Connecticut	85.7
Florida	90.4
Georgia	85.2
Illinois	81.4
Indiana	85.3
Iowa	76.9
Kansas	66.7
Kentucky	90.1
Maryland	80.8
Massachusetts	88.9
Michigan	78.0
Minnesota	68.0
Mississippi	91.8
Missouri	77.3
New Jersey	93.5
New York	74.1
North Carolina	80.0
Ohio	81.7
Oklahoma	79.6
Oregon	71.1
Pennsylvania	77.0
South Carolina	83.3
Tennessee	83.2
Texas	74.2
Utah	93.5
Virginia	73.8
Washington	84.8

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State	Percentage of hospitals
West Virginia	63.0
Wisconsin	78.0

Source: GAO.

Note: Responses were weighted to provide estimates for the universe of hospitals. Data are presented for states that had at least 10 hospitals respond to survey and a response rate of at least 50 percent.

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Table 6: Percentage of Urban Hospitals That Reported Specifying in Emergency Response Plan to Contact the Specified Entities during an Emergency, by State

State	Law enforcement	Fire	EMS	HAZMAT	Other hospitals	Public health agencies	Other state and local government agencies	Other laboratories	Public private utilities
Alabama	94.5	89.0	89.0	89.0	89.0	81.9	94.5	48.8	63.3
Arizona	100.0	100.0	94.4	81.6	94.4	94.4	83.2	74.1	81.6
Arkansas	93.7	93.7	93.7	87.4	93.7	93.7	87.4	40.4	85.6
California	94.1	92.9	96.4	89.9	86.3	97.2	85.8	45.8	70.0
Colorado	93.5	94.0	68.1	94.0	87.9	100.0	94.0	45.8	80.4
Connecticut	100.0	100.0	100.0	100.0	100.0	94.4	77.8	70.6	83.3
Florida	95.9	97.3	94.7	95.9	91.4	93.9	97.0	58.8	73.0
Georgia	93.7	100.0	96.5	94.5	89.8	90.9	93.5	64.1	78.6
Illinois	92.5	88.1	92.6	84.6	94.1	94.1	78.8	58.5	66.2
Indiana	91.4	94.3	94.3	91.1	91.4	94.3	91.1	60.2	79.9
Iowa	90.0	90.0	90.0	90.0	90.0	80.0	80.0	80.0	100.0
Kansas	100.0	100.0	100.0	100.0	87.5	100.0	100.0	62.5	87.5
Kentucky	89.1	83.6	83.6	76.6	83.6	89.1	100.0	61.7	67.2
Maryland	100.0	95.2	100.0	90.5	81.0	100.0	95.2	57.1	85.0
Massachusetts	100.0	96.8	96.8	96.8	77.4	100.0	93.3	71.0	80.6
Michigan	92.1	100.0	88.9	89.5	92.1	97.4	92.3	62.2	81.6
Minnesota	100.0	100.0	100.0	94.1	94.1	94.1	76.5	41.2	56.3
Mississippi	91.0	91.0	100.0	70.5	100.0	100.0	100.0	67.6	70.5
Missouri	82.3	89.4	88.4	81.3	84.3	88.4	81.3	46.0	70.7
New Jersey	97.7	95.3	95.3	95.3	90.7	88.1	90.7	61.9	86.0
New York	100.0	100.0	95.1	91.8	86.1	98.5	95.6	58.9	70.1
North Carolina	95.8	95.8	91.7	83.3	87.5	87.0	91.7	47.6	82.6
Ohio	96.4	92.7	94.5	90.9	94.4	94.5	92.7	57.7	81.5
Oklahoma	92.2	92.2	92.2	92.2	100.0	100.0	92.2	81.6	92.2
Oregon	75.6	75.6	75.6	100.0	67.4	100.0	67.4	34.9	59.3
Pennsylvania	92.7	97.1	95.7	95.7	86.8	95.6	95.7	58.0	80.0
South Carolina	100.0	93.0	100.0	93.0	100.0	93.9	100.0	38.3	87.8
Tennessee	100.0	90.4	93.6	89.5	90.4	100.0	96.8	75.7	74.9
Texas	90.0	90.4	90.3	88.3	80.3	90.6	86.8	56.2	76.3
Utah	100.0	100.0	91.1	100.0	93.1	100.0	84.2	34.0	84.2
Virginia	96.1	92.1	100.0	88.2	100.0	95.9	92.1	64.9	81.3
Washington	91.0	91.0	86.5	86.5	95.3	100.0	85.9	53.3	53.3

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State	Law enforcement	Fire	EMS	HAZMAT	Other hospitals	Public health agencies	Other state and local government agencies	Other laboratories	Public private utilities
West Virginia	100.0	100.0	100.0	100.0	100.0	86.3	100.0	63.7	54.9
Wisconsin	96.8	96.8	90.3	93.5	87.5	90.0	90.6	45.2	65.6

Source: GAO.

Note: Responses were weighted to provide estimates for the universe of hospitals. Data are presented for states that had at least 10 hospitals respond to survey and a response rate of at least 50 percent.

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Table 7: Percentage of Urban Hospitals Whose Mass Casualty Plans Address Bioterrorism and Describe How to Manage the Specified Function, by State

State	Decontamination of victims	Mass patient	Worried well	Mass fatality	Mass evacuation	Obtaining additional pharmaceuticals	Obtaining additional staff for surge capacity	Obtaining additional other supplies for surge capacity	Hospital security
Alabama	100.0	94.5	76.3	68.5	92.9	94.2	100.0	94.5	100.0
Arizona	88.8	100.0	69.3	76.0	92.4	92.4	100.0	84.8	92.4
Arkansas	87.4	93.7	85.6	66.7	93.3	93.7	100.0	93.7	100.0
California	94.7	95.5	82.9	75.3	95.6	91.1	97.9	97.8	98.9
Colorado	100.0	100.0	81.9	86.2	87.9	94.0	91.8	100.0	100.0
Connecticut	100.0	100.0	88.9	66.7	100.0	88.9	94.4	94.4	100.0
Florida	95.0	95.5	69.7	77.6	88.9	98.5	98.8	100.0	100.0
Georgia	94.5	97.2	84.2	79.9	86.9	86.2	93.7	91.5	96.5
Illinois	97.0	98.5	77.6	77.3	91.0	97.0	97.0	97.0	100.0
Indiana	94.1	94.3	78.5	79.9	85.7	77.0	97.1	94.3	94.3
Iowa	100.0	100.0	80.0	100.0	90.0	100.0	100.0	100.0	100.0
Kansas	100.0	87.5	71.4	75.0	100.0	87.5	87.5	87.5	100.0
Kentucky	89.1	100.0	83.6	100.0	94.5	100.0	100.0	94.5	100.0
Maryland	100.0	100.0	95.0	95.0	94.4	100.0	100.0	100.0	100.0
Massachusetts	96.9	93.8	77.4	75.0	87.5	81.3	100.0	87.5	100.0
Michigan	92.3	94.9	66.7	65.8	87.2	73.7	92.3	89.7	94.9
Minnesota	76.5	88.2	52.9	52.9	64.7	94.1	100.0	94.1	100.0
Mississippi	79.5	100.0	79.5	82.0	91.0	100.0	91.0	91.0	91.0
Missouri	96.5	96.5	80.6	78.8	89.4	82.3	96.5	82.3	96.5
New Jersey	100.0	93.0	65.9	75.0	90.7	97.7	93.0	95.3	100.0
New York	91.1	98.5	77.1	65.4	92.4	80.2	97.0	92.2	98.5
North Carolina	95.8	87.5	62.5	58.3	79.2	72.7	91.7	75.0	95.8
Ohio	100.0	96.4	75.9	81.8	94.4	83.6	96.4	92.7	98.2
Oklahoma	100.0	100.0	90.8	91.6	88.9	91.6	100.0	100.0	100.0
Oregon	100.0	100.0	100.0	91.9	100.0	91.9	83.7	91.9	100.0
Pennsylvania	94.2	94.3	71.8	59.3	90.0	82.3	95.7	92.9	100.0
South Carolina	100.0	100.0	78.7	90.7	95.3	100.0	100.0	100.0	100.0
Tennessee	93.6	96.8	79.8	86.2	96.8	90.4	93.6	93.6	92.7
Texas	89.8	98.1	74.8	77.4	88.1	74.5	91.2	86.9	97.1
Utah	100.0	100.0	100.0	100.0	100.0	77.2	93.1	91.1	100.0
Virginia	91.0	91.0	82.0	75.3	91.0	87.1	96.1	95.0	95.0

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State	Decontamination of victims	Mass patient	Worried well	Mass fatality	Mass evacuation	Obtaining additional pharmaceuticals	Obtaining additional staff for surge capacity	Obtaining additional other supplies for surge capacity	Hospital security
Washington	100.0	86.5	73.1	73.1	91.0	86.5	100.0	86.5	100.0
West Virginia	100.0	100.0	68.7	86.3	86.3	86.3	100.0	86.3	100.0
Wisconsin	100.0	96.9	70.0	84.4	93.8	75.0	93.8	87.5	100.0

Source: GAO.

Note: Responses were weighted to provide estimates for the universe of hospitals. Data are presented for states that had at least 10 hospitals respond to survey and a response rate of at least 50 percent.

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Table 8: Percentage of Urban Hospitals That Had Agreements with Other Hospitals or City, County, State, and Regional Organizations to Provide or Share Resources in the Event of Bioterrorism, by State

State	Hospitals	City	County	State	Regional
Alabama	73.1	51.1	45.5	35.7	30.8
Arizona	73.1	52.8	58.5	21.1	21.1
Arkansas	75.6	70.8	52.7	48.6	35.4
California	55.5	36.8	58.9	33.6	32.2
Colorado	74.4	43.8	38.3	21.9	32.8
Connecticut	45.0	57.9	14.3	33.3	35.3
Florida	75.8	49.8	64.5	39.3	34.7
Georgia	76.3	55.1	62.6	38.4	42.9
Illinois	61.0	55.2	45.6	55.6	49.3
Indiana	70.8	60.5	68.5	41.5	34.4
Iowa	84.6	72.7	72.7	50.0	40.0
Kansas	58.3	44.4	54.5	33.3	40.0
Kentucky	76.5	58.5	67.2	14.0	34.7
Maryland	52.4	33.3	66.7	43.8	43.8
Massachusetts	50.0	57.1	21.9	34.4	45.5
Michigan	73.6	53.1	70.0	40.0	57.4
Minnesota	72.7	42.9	47.6	35.0	35.0
Mississippi	84.8	48.2	48.2	45.9	48.2
Missouri	70.7	54.2	39.6	27.7	39.6
New Jersey	73.3	42.9	59.5	38.5	31.6
New York	58.7	27.6	44.3	21.1	20.8
North Carolina	64.5	35.5	45.2	33.3	43.3
Ohio	82.4	68.3	71.3	45.8	46.6
Oklahoma	92.0	83.5	83.5	69.1	64.5
Oregon	88.2	65.6	57.9	18.4	40.5
Pennsylvania	60.6	39.2	52.1	26.1	41.5
South Carolina	91.1	69.6	81.6	69.7	41.0
Tennessee	82.5	72.8	72.8	58.7	39.5
Texas	57.2	40.5	31.5	17.1	24.2
Utah	82.6	45.9	45.9	50.0	53.6
Virginia	93.8	59.2	59.2	50.3	84.6
Washington	92.4	73.1	76.5	50.7	43.6

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State	Hospitals	City	County	State	Regional
West Virginia	91.4	71.6	65.4	45.7	25.9
Wisconsin	62.2	44.4	48.6	16.7	24.1

Source: GAO.

Note: Responses were weighted to provide estimates for the universe of hospitals. Data are presented for states that had at least 10 hospitals respond to survey and a response rate of at least 50 percent.

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Table 9: Percentage of Urban Hospitals That Have Provided Training to Staff (Services, Courses, or Self-Learning Materials) to Identify and Diagnose Symptoms for the Following Biological Agents, by State

State	Smallpox	Anthrax	Plague	Botulism	Tularemia	Hemorrhagic fever viruses
Alabama	88.2	92.1	79.2	71.3	62.4	71.3
Arizona	73.4	78.4	73.4	73.4	68.3	73.4
Arkansas	93.7	93.7	79.3	87.4	79.3	73.0
California	89.2	91.0	87.4	86.5	82.8	84.6
Colorado	84.7	89.8	79.6	73.0	67.9	73.0
Connecticut	85.7	95.2	81.0	85.0	80.0	70.0
Florida	86.2	94.3	74.2	78.2	65.7	69.1
Georgia	88.5	100.0	88.5	88.5	86.2	83.2
Illinois	95.2	96.4	78.5	83.7	72.7	73.4
Indiana	81.6	89.8	76.7	74.3	63.9	62.2
Iowa	92.3	92.3	76.9	84.6	66.7	83.3
Kansas	83.3	91.7	66.7	66.7	66.7	58.3
Kentucky	90.1	100.0	90.1	90.1	85.2	80.3
Maryland	88.5	96.2	84.6	84.6	84.0	80.0
Massachusetts	89.2	91.9	77.1	75.0	75.0	71.4
Michigan	88.7	92.5	81.1	79.2	64.7	65.4
Minnesota	91.7	91.7	82.6	87.0	65.2	59.1
Mississippi	92.4	92.4	92.4	92.4	92.4	82.6
Missouri	83.3	91.3	70.0	70.0	70.0	67.3
New Jersey	97.8	100.0	95.6	95.5	86.4	86.4
New York	89.3	94.6	87.8	85.0	76.3	77.9
North Carolina	87.1	93.5	77.4	77.4	64.5	58.1
Ohio	88.8	91.6	84.6	77.6	65.9	67.3
Oklahoma	87.6	93.8	87.6	87.6	76.8	78.3
Oregon	94.2	94.5	76.9	82.6	69.4	63.6
Pennsylvania	87.0	91.3	82.3	82.3	74.2	72.5
South Carolina	96.1	96.1	76.0	76.0	52.5	42.7
Tennessee	91.0	93.7	85.5	82.0	78.6	78.6
Texas	83.1	92.5	75.9	77.0	64.6	62.5
Utah	85.2	100.0	85.2	85.2	85.2	85.2
Virginia	85.5	85.5	85.0	78.2	64.1	60.0
Washington	84.8	92.4	77.2	77.2	65.8	69.6

**Appendix I: Selected Results of GAO Survey
of Hospitals Regarding Hospital Preparedness
for Bioterrorism**

State	Smallpox	Anthrax	Plague	Botulism	Tularemia	Hemorrhagic fever viruses
West Virginia	90.5	100.0	90.5	78.4	78.4	68.9
Wisconsin	92.5	95.0	82.5	87.5	72.5	72.5

Source: GAO.

Note: Responses were weighted to provide estimates for the universe of hospitals. Data are presented for states that had at least 10 hospitals respond to survey and a response rate of at least 50 percent.

**Appendix I: Selected Results of GAO Survey
of Hospitals Regarding Hospital Preparedness
for Bioterrorism**

**Table 10: Percentage of Urban Hospitals That Participated in Mass Casualty Drills
Related to Biological Incidents by State**

State	Percentage of hospitals
Alabama	54.5
Arizona	36.7
Arkansas	41.4
California	57.3
Colorado	35.8
Connecticut	47.6
Florida	58.4
Georgia	44.6
Illinois	38.3
Indiana	61.6
Iowa	53.8
Kansas	41.7
Kentucky	57.7
Maryland	38.5
Massachusetts	35.1
Michigan	43.4
Minnesota	32.0
Mississippi	65.2
Missouri	39.9
New Jersey	50.0
New York	33.6
North Carolina	45.2
Ohio	66.3
Oklahoma	51.7
Oregon	48.1
Pennsylvania	39.7
South Carolina	33.3
Tennessee	40.1
Texas	44.2
Utah	60.2
Virginia	70.9
Washington	54.3

**Appendix I: Selected Results of GAO Survey
of Hospitals Regarding Hospital Preparedness
for Bioterrorism**

State	Percentage of hospitals
West Virginia	17.3
Wisconsin	48.8

Source: GAO.

Note: Responses were weighted to provide estimates for the universe of hospitals. Data are presented for states that had at least 10 hospitals respond to survey and a response rate of at least 50 percent.

Appendix II: Scope and Methodology

Between May and September 2002 we surveyed more than 2,000 short-term,¹ nonfederal, general medical and surgical hospitals with emergency departments located in metropolitan statistical areas (MSAs).² Survey hospitals were located in the 50 states and the District of Columbia.

The survey questionnaire contained three parts. The first and second parts addressed emergency room functioning, and the third part addressed hospital preparedness for bioterrorism. We reported our survey findings on emergency room functioning in March 2003.³ We conducted our work between May 2002 and July 2003 in accordance with generally accepted government auditing standards.

Of the initial universe of 2,041 hospitals that met the selection criteria, 18 had closed by 2002 and 2 did not have emergency departments in fiscal year 2001, resulting in a final universe of 2,021 hospitals. We sent our questionnaire to these hospitals and conducted follow-up mailings and telephone follow-up calls to nonrespondents. We obtained responses to the survey from 1,489 hospitals, for an overall response rate of about 74 percent. However, 7 of these hospitals did not return the section of the survey addressing emergency preparedness, leaving 1,482, for a response rate of about 73 percent for the questions of concern for the current report.⁴

We analyzed the response rates by hospital size, type of ownership, and teaching status to assess if there was differential response among various categories of hospitals. The only statistically significant disproportionate response was from for-profit hospitals. Therefore we weighted responses to adjust for a lower response rate from investor-owned (for-profit) hospitals to provide estimates representative of the entire universe of 2,021 hospitals in MSAs. Using the information provided by surveyed hospitals, we described the extent of emergency preparedness for

¹We excluded federal hospitals, specialty hospitals, long-term care facilities, and hospitals located outside the 50 states or the District of Columbia.

²We focused on hospitals located in metropolitan areas designated as MSAs and Primary MSAs by the U.S. Census Bureau. For purposes of this report, we will refer to both types of areas as MSAs. In 2000, about 80 percent of the nation's population lived in MSAs.

³U.S. General Accounting Office, *Hospital Emergency Departments: Crowded Conditions Vary among Hospitals and Communities*, [GAO-03-460](#) (Washington, D.C.: Mar. 14, 2003).

⁴Questionnaires received after September 3, 2002, were not included in calculating our response rate and were excluded from our analyses.

bioterrorist incidents. We also examined the relationships between the extent of hospital bioterrorism preparedness and size of hospital as indicated by the number of inpatient staffed beds.

Questions in the survey focused on preparedness to respond to a bioterrorist event. Some of the responses are applicable more broadly to preparedness for all types of terrorist events, as well as for natural disasters or naturally occurring disease outbreaks. However, because the focus of this work was bioterrorism preparedness, we did not ask more detailed questions on other types of preparedness.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Marcia Crosse, (202) 512-7119

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