

# Public Health Preparedness:

## Strengthening CDC's Emergency Response



A CDC Report on Terrorism Preparedness and  
Emergency Response (TPER) – Funded Activities



January 2009



## CDC Preparedness Goals

CDC has established nine goals for achieving the overarching preparedness goal, “*People prepared for emerging health threats – people in all communities will be protected from infectious, occupational, environmental, and terrorist threats.*”

Pre-Event	<b>Prevent</b>	
	Goal 1	Increase the use and development of interventions known to prevent human illness from chemical, biological, or radiological agents, and naturally occurring health threats.
Event	<b>Detect and Report</b>	
	Goal 2	Decrease the time needed to classify health events as terrorism or naturally occurring in partnership with other agencies.
	Goal 3	Decrease the time needed to detect and report chemical, biological, or radiological agents in tissue, food or environmental samples that cause threats to the public's health.
	Goal 4	Improve the timeliness and accuracy of communications regarding threats to the public's health.
	<b>Investigate</b>	
	Goal 5	Decrease the time to identify causes, risk factors, and appropriate interventions for those affected by threats to the public's health.
	<b>Control</b>	
Goal 6	Decrease the time needed to provide countermeasures and health guidance to those affected by threats to the public's health.	
Post-Event	<b>Recover</b>	
	Goal 7	Decrease the time needed to restore health services and environmental safety to pre-event levels.
	Goal 8	Improve the long-term follow-up provided to those affected by threats to the public's health.
	<b>Improve</b>	
Goal 9	Decrease the time needed to implement recommendations from after-action reports following threats to the public's health.	

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# Strengthening CDC's Emergency Response

*A CDC report on Terrorism Preparedness and Emergency Response (TPER)-funded activities  
for fiscal year 2007*

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The report is an important part of CDC's overall focus on demonstrating results, driving program improvements, and increasing accountability for the nation's investment in public health preparedness activities.

## Preface

**P**ublic Health Preparedness: Strengthening CDC's Emergency Response describes the range of fiscal year (FY) 2007<sup>1</sup> Centers for Disease Control and Prevention (CDC) projects that received Terrorism Preparedness and Emergency Response (TPER) funding. Although there are other funding sources for preparedness activities at CDC, such as pandemic influenza, this report focuses on the activities supported by TPER funding. This funding represents significant preparedness investments by CDC, and supports a range of activities at CDC and at state and local levels to help develop the building blocks to respond to public health threats.

This report builds on the analysis of state public health preparedness presented in the February 2008 CDC report, *Public Health Preparedness: Mobilizing State by State*.<sup>2</sup> Both reports are an important part of CDC's overall focus on demonstrating results, driving program improvements, and increasing accountability for the nation's investment in public health preparedness activities.

### How the Report Is Organized

The report is designed to provide easily accessible information about CDC activities within five core public health functions: Health Monitoring and Surveillance, Epidemiology and Other Assessment Sciences, Public Health Laboratory Science and Service, Response and Recovery Operations, and Public Health System Support.

The report begins with a chapter describing CDC's unique role in preparing the nation to respond to a range of health threats and how this role fits into the framework of federal response activities. Each of the five chapters that follow describes preparedness activities and accomplishments and ends with a summary of challenges. The report concludes with the

"Moving Forward" chapter, describing priorities for future preparedness activities.

### How Different Audiences Can Use This Report

*Public Health Preparedness: Strengthening CDC's Emergency Response* is written for a variety of audiences. Policymakers can use the report to examine the activities carried out using TPER funding in FY 2007 and the results that were achieved; they may be particularly interested in the "Moving Forward" chapter, which outlines the CDC priorities for addressing many of the challenges presented in the report.

Within CDC, programs can use the report to gain a better understanding of how their work fits into the overall preparedness framework at CDC, and they may also consider the challenges presented to examine how their future work can help address these challenges.

This report can be used by other federal departments and agencies, and by CDC partners (e.g., state and local health officials and key public health associations) to learn more about the scope of CDC activities. Additionally, the report can be used by our partners to examine CDC-funded projects in the areas in which our partners work and to generate new ideas for collaboration.

### Future Updates on Preparedness Investments

This report provides a snapshot of TPER-funded activities, most of which are long-term investments that will continue in future years. To continue to promote the highest standards of accountability for TPER preparedness funds, future updates from CDC will assess the progress of preparedness at CDC and at local, state, tribal, territorial, and international levels.

# Executive Summary

## **P**ublic health threats are always present.

Whether caused by diseases, natural disasters, or terrorist events, these threats can lead to the onset of public health emergencies. The effects these emergencies can have on the well-being of our nation became increasingly evident in the aftermath of such events as Hurricane Katrina in 2005, the outbreak of severe acute respiratory syndrome (SARS) in 2003, and the terrorist attacks of 2001. Being prepared to prevent, respond to, and recover rapidly from public health emergencies can save lives and protect the health and safety of the public and emergency responders.

The Centers for Disease Control and Prevention (CDC) plays a key role in preparing our nation for public health threats that include natural, biological, chemical, radiological, and nuclear incidents. The vast majority of CDC preparedness and response activities use an all-hazards approach; however, activities have begun that will expand critical capabilities needed for specific public health threats.

**CDC preparedness goals, objectives, and core public health functions.** CDC's work in preparedness builds upon decades of science developed to promote public health. "People prepared for emerging health threats – people in all communities will be protected from infectious, occupational, environmental, and terrorist threats" is one of CDC's four overarching health protection goals. CDC has identified nine specific outcome goals aimed at measuring progress toward this overarching goal (see inside front cover).

To achieve the preparedness goals, CDC established five objectives that emerge from CDC's core public health functions. The functions are Health Monitoring and Surveillance, Epidemiology and Other Assessment Sciences, Public Health Laboratory Science and Service, Response and Recovery Operations, and Public Health System Support. For more information on each of the objectives, see Table 1 on page 8.

**Preparedness funding.** Each year, Congress appropriates Terrorism Preparedness and Emergency Response (TPER) funds to CDC.

This funding supports a range of activities at CDC and state and local levels to help develop the capabilities and capacities needed to respond to public health threats. This report focuses on activities supported by fiscal year (FY) 2007 TPER funding at CDC which totaled approximately \$1.5 billion.<sup>3</sup> CDC has other funding sources for preparedness activities associated with pandemic influenza; infectious disease research and response; and surveillance, investigation, and response to clarify and reduce the impact of the environment on human health.

**Purpose of this report.** This report provides an overview of FY 2007 TPER-funded public health preparedness activities, most of which are long-term investments that are planned to continue in future years, depending on funding. In addition, the report details accomplishments as well as the challenges faced by CDC as it continues to reach for its preparedness goals.

## **Progress Continues**

TPER funding has supported significant accomplishments in public health preparedness over the past decade. The following are highlights of these accomplishments:

- Before 1999, there was no national stockpile of medical supplies, and now CDC's Strategic National Stockpile ensures that key medical supplies are available during emergencies. This approximately \$3.5 billion resource has drugs, vaccines, and other medical supplies needed to protect the public from bioterrorist attacks.<sup>4</sup>



Source: CDC

The Centers for Disease Control and Prevention plays a key role in preparing our nation for public health threats that include natural, biological, chemical, radiological, and nuclear incidents.

- Before 1999, CDC performed all tests to detect and confirm the presence of biological threat agents. In 1999, CDC created the Laboratory Response Network (LRN), which has grown to more than 160 laboratories nationwide that can perform these tests. In 2007, 90% of the U.S. population lived within 100 miles of an LRN laboratory, decreasing the time needed to begin responding to a terrorist attack or naturally occurring outbreak.
- Before 1999, CDC provided no funding to states and localities for public health preparedness; as of FY 2007, CDC had provided more than \$5 billion in funding and technical assistance to help states improve their response capabilities through activities such as planning and readiness assessment, conducting exercises, increasing laboratory capacity, and enhancing communications. For a detailed description of the tremendous accomplishments at state and local public health departments, refer to the 2008 CDC report, *Public Health Preparedness: Mobilizing State by State*.<sup>5</sup>
- Before 2000, no secure system was available to share information about emerging health threats. Now, CDC's Epidemic Information Exchange (*Epi-X*) provides a secure, web-based communication system that allows CDC officials, state and local health departments, poison control centers, and other public health professionals to quickly and securely share preliminary health surveillance information. *Epi-X* helps ensure that local problems are contained and national events are detected sooner.



Source: CDC

- In 2001, CDC headquarters for response activities consisted of available conference rooms with limited equipment; since 2003, CDC has operated a state-of-the-art

command center to monitor health threats and coordinate emergency response around-the-clock. The facility provides the tools for improved communication, faster detection, and coordinated response.

- Before 2006, no data were immediately available to systematically track the spread of health threats in emergency situations. Now BioSense obtains data from hospitals and healthcare organizations to support decision-making during health emergencies. As part of a national strategy for biosurveillance, BioSense has the potential to improve recognition and response to a wide range of public health threats.

CDC continued to build on these accomplishments in FY 2007. Major CDC activities and accomplishments for FY 2007 are outlined in Table 1 on page 8. For more details on each of these accomplishments, see the chapters listed in that table.

### Challenges Remain

**Challenges within each of the core public health functions.** While much has been accomplished to enhance public health preparedness, many challenges remain. Specific challenges include the following:

*Health Monitoring and Surveillance (see Chapter 2 for details)*

- Implementing the next generation of surveillance systems so that critical information is available to decision makers during an emergency
- Enhancing surveillance of long-term health effects so the impact of public health emergencies is understood and can be addressed

*Epidemiology and Other Assessment Sciences (see Chapter 3 for details)*

- Enhancing research into the medicines and medical supplies needed to combat infectious agents, screening guidelines for healthcare professionals, and protective equipment for first responders



Source: CDC

- Assisting vulnerable populations by developing optimal strategies to protect against and respond to emergencies
- Increasing the epidemiology and other assessment sciences workforce to improve the nation's ability to conduct disease investigations at local, state, and federal levels
- Managing and enhancing data effectively during an emergency so that data can be analyzed from multiple jurisdictions and multiple areas of expertise

*Public Health Laboratory Science and Service (see Chapter 4 for details)*

- Adopting interoperable laboratory systems to exchange data more quickly and accurately, reducing the time needed to detect and report health threats
- Increasing radiological capacity to respond effectively following a radiological incident (e.g., a dirty bomb or nuclear detonation)
- Increasing personnel for laboratory surge capacity so that the appropriate numbers of trained personnel can handle additional tests for extended periods of time during an emergency
- Developing and enhancing laboratory methods to decrease the time needed to identify, track, and respond to health threats



Source: CDC

*Response and Recovery Operations (see Chapter 5 for details)*

- Exercising for potential public health threat scenarios to enhance emergency response
- Building surge capacity for CDC response personnel so that CDC has sufficient numbers of qualified personnel to sustain operations for an effective response
- Expanding the quarantine system to address the growing concern about the threat of infectious diseases crossing U.S. borders
- Improving emergency responder safety and health by meeting their short- and long-term healthcare needs
- Defining a research agenda for public health preparedness, including vulnerable populations, to drive system improvements and initiate a comprehensive evaluation program for public health activities

*Public Health System Support (see Chapter 6 for details)*

- Conducting program activities with decreasing resources and deciding which activities can no longer be supported
- Continuing technical assistance on preparedness activities so that state and local health departments are supported at all stages of their preparedness work
- Retaining experienced public health response personnel at state and local health departments so that qualified personnel are available to staff a sustained emergency response
- Bolstering legal preparedness for public health so that states impacted by a disaster can request and receive assistance quickly and efficiently
- Continuing to measure public health preparedness to assist CDC and public health departments in identifying specific improvements for response to and recovery from emergencies

## Moving Forward

CDC is prioritizing the allocation of resources for ongoing and future projects that respond to challenges that cut across multiple core public health functions. Below are priorities of particular note that address cross-cutting challenges as we move forward.



Source: CDC

**Strengthening public health preparedness at federal, state, and local levels in a climate of decreasing resources.** With the anticipated decline in TPER funding in FY 2009, CDC and state and local health departments must find new ways, including enhanced collaborations, to conduct program activities. CDC may also have to make difficult decisions about what the highest priority preparedness activities are and what must be postponed. Public health departments at state and local levels may have to make similar choices.

**Integrating biosurveillance systems and activities.** Health professionals must be able to recognize potential health emergencies as early as possible to prevent human deaths and mitigate suffering. This capability requires surveillance and integration of timely health-related information to enable early detection and characterization of health threats and to maintain situational awareness. This level of biosurveillance can be accomplished through the development of a near real-time, electronic, common operating picture of routine and emerging acute health problems that can be shared at all levels of the public health system.

In response to Homeland Security Presidential Directive - 21, CDC established a Biosurveillance Coordination Unit to lead the development of a national strategy and implementation plan for

next generation biosurveillance capabilities, in collaboration with a wide range of public and private sector partners. These capabilities will demand new tools, methods, and analytical abilities to integrate data from multiple sources and create more actionable information.

Other priorities include advancing the availability of electronic health information across the health system; enhancing global capability for early detection and situational awareness; developing greater laboratory innovation and connectivity to support enhanced detection and a more rapid response; and enhancing the public health workforce so that biosurveillance information can be collected, managed, analyzed, and disseminated.

**Improving public health workforce surge capacity.** The cornerstone of effective preparedness and response consists of skilled personnel with the right expertise and a sufficient number of these qualified personnel to sustain surge operations during an incident. Although some progress has been made to build surge capacity (e.g., increased numbers of epidemiology staff at state and territorial health departments, and increased numbers of CDC personnel identified, trained, and medically cleared to deploy to an event), improvements in surge capacity need to continue.

CDC priorities for ongoing and future TPER-funded projects include support for public health laboratory staff surge capacity, and continued expansion of CDC's pool of trained and available responders with expertise in epidemiology, emergency communications, informatics, emergency management, and other specialties.

**Helping vulnerable populations.** Successful planning and response to public health hazards requires protecting the health and safety of vulnerable populations<sup>6</sup> before, during, and after emergencies. Identifying effective strategies that provide interventions to protect vulnerable populations is an ongoing effort.

To strengthen assistance to vulnerable populations, CDC priorities include research projects that focus on helping vulnerable populations, such as developing an evidence base of public health interventions.



An additional priority is ensuring that vulnerable population needs are included in CDC response planning and exercising. Ethical planning and response require meaningful engagement of the entire population, particularly those who are most vulnerable to the impact of the event, as early in the planning process as possible. CDC requested that the Ethics Subcommittee of the CDC Advisory Committee to the Director develop a white paper examining ethical issues and considerations for public health emergency preparedness and response. These issues include meeting the special needs of vulnerable populations in preparedness planning and response activities.

In addition, CDC commissioned five focus papers that explore issues related to professional, civic, and personal obligations; research in emergency settings; vulnerable populations; ethical issues relating to stockpiling; and public engagement. The white paper and focus papers are scheduled to be published in 2009.



Source: CDC

**Enhancing capabilities for specific public health emergency scenarios.** CDC must address gaps in its response capabilities for specific public health emergencies. CDC's priorities for ongoing and future preparedness and response projects include expanding key capabilities for specific public health emergency scenarios. These priorities promote projects that support response planning and exercising, particularly for threats that have not been included in previous exercises.

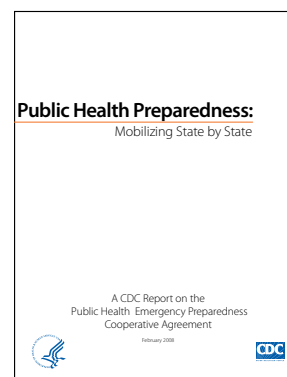
Additional priorities that address scenario-specific response include improving laboratory

methods and capabilities for chemical and infectious agents, radiological materials, and the testing of environmental samples. Priorities also include support for improving laboratory surge capacity for scenario-specific events, particularly for radiation emergencies and environmental investigations.

### A Continuing Commitment to Preparedness

CDC's investments in preparedness have resulted in significant accomplishments, but there is much left to do. To have a strong platform for rapid and effective public health emergency response, CDC will continue to strengthen its own internal response capabilities, as well as build external response capabilities through its financial and/or technical support of partners at local, state, tribal, territorial, federal, and international levels.

This report builds on the analysis of state public health preparedness presented in the February 2008 CDC report, *Public Health Preparedness: Mobilizing State by State*.<sup>7</sup> Future updates from CDC will assess the progress in preparedness at CDC and at local, state, tribal, territorial, and international levels.



**Table 1: CDC Public Health Preparedness**

<b>Public Health Preparedness Objectives</b>	<b>Major CDC Preparedness Activities and Accomplishments</b>
<p><b>Health Monitoring and Surveillance</b></p> <p>Integrate and enhance the existing surveillance systems at the local, state, national, and international levels to detect, monitor, report, and evaluate public health threats.</p>	<ul style="list-style-type: none"> <li>• Enhancing nationwide surveillance of emerging health threats</li> <li>• Providing surveillance tools to state and local epidemiologists for detecting potential health threats</li> <li>• Tracking hazardous substances and alerting emergency partners about accidental releases</li> <li>• Developing tools to conduct surveillance during disasters</li> </ul> <p><i>See Chapter 2 for details</i></p>
<p><b>Epidemiology and Other Assessment Sciences</b></p> <p>Support and strengthen human and technological epidemiologic resources to prevent, investigate, mitigate, and control current, emerging, and new public health threats and to conduct research and development that lead to interventions for such threats.</p>	<ul style="list-style-type: none"> <li>• Assessing the vaccine and treatment options for anthrax</li> <li>• Developing methods to detect the presence of anthrax in potentially contaminated areas</li> <li>• Evaluating emergency medicine kits for at-home use</li> <li>• Enabling secure and rapid communication to detect health threats</li> <li>• Supplementing the epidemiology workforce in states and localities</li> </ul> <p><i>See Chapter 3 for details</i></p>
<p><b>Public Health Laboratory Science and Service</b></p> <p>Enhance and sustain nationwide and international laboratory capacity to gather, ship, screen, and test samples for public health threats and to conduct research and development that lead to interventions for such threats.</p>	<ul style="list-style-type: none"> <li>• Collaborating to detect health threats through laboratory networks</li> <li>• Developing new laboratory methods and refining existing methods</li> <li>• Promoting safety and security for entities that possess, use, or transfer select agents and toxins</li> <li>• Providing CDC laboratory capability and capacity</li> <li>• Deploying skilled personnel to investigate international health threats</li> <li>• Protecting the public and responders during emergencies</li> </ul> <p><i>See Chapter 4 for details</i></p>
<p><b>Response and Recovery Operations</b></p> <p>Assure an integrated, sustainable, nationwide response and recovery capacity to limit morbidity and mortality from public health threats.</p>	<ul style="list-style-type: none"> <li>• Operating a command center for monitoring and coordinating emergency response</li> <li>• Planning, training, exercising, and evaluating to improve emergency response</li> <li>• Responding to hazardous substance emergencies</li> <li>• Ensuring availability of key medical supplies during emergencies</li> <li>• Restricting the spread of health threats at U.S. borders</li> <li>• Providing risk and emergency communication capabilities</li> <li>• Supporting the protection of vulnerable populations</li> <li>• Protecting the health, safety, and resiliency of emergency responders during an event</li> </ul> <p><i>See Chapter 5 for details</i></p>
<p><b>Public Health System Support</b></p> <p>Expand and strengthen integrated, sustained, national, foundational and surge capacities capable of reaching all individuals with effective assistance to address public health threats.</p>	<ul style="list-style-type: none"> <li>• Supporting state and local health departments through funding and technical assistance</li> <li>• Collaborating, training, and providing educational tools to enhance preparedness</li> <li>• Strengthening legal preparedness for public health emergencies</li> </ul> <p><i>See Chapter 6 for details</i></p>

# Chapter 1: Public Health Preparedness and CDC



Source: CDC

“Building a strong platform for public health preparedness is no easy endeavor. It requires a commitment to continuously plan, train, and exercise to improve our preparedness and response. Much work remains to be done to improve our internal and external response capabilities and to reduce our vulnerabilities to all types of public health threats.”

- Richard E. Besser, MD  
Director, Coordinating Office for Terrorism Preparedness and Emergency Response

**P**ublic health threats are always present. Whether caused by diseases, natural disasters, or terrorists, there are continual threats that can lead to public health emergencies. The effects that emergencies have on the well-being of our nation are obvious in the aftermath of such events as Hurricane Katrina in 2005, the outbreak of severe acute respiratory syndrome (SARS) in 2003, and the terrorist attacks of 2001. Being prepared to prevent, respond to, and recover rapidly from public health threats can save lives and protect the health and safety of the public and emergency responders. The Centers for Disease Control and Prevention (CDC)<sup>8</sup> plays a key role in preparing our nation for all types of threats to public health.<sup>9</sup>

This report provides an overview of activities funded by CDC's Terrorism Preparedness and Emergency Response (TPER) federal allocation

## Public Health Preparedness

The capability of the public health system, communities, and individuals to prevent, protect against, quickly respond to, and recover from health emergencies, particularly those in which scale, timing, or unpredictability threatens to overwhelm routine capabilities.<sup>11</sup>

for fiscal year (FY) 2007,<sup>10</sup> and some important accomplishments that have been made. The report also highlights the key challenges that remain on the path to achieving CDC's overarching preparedness goal: "People prepared for emerging health threats – people in all communities will be protected from infectious, occupational, environmental, and terrorist threats." Additional funding sources support other CDC preparedness



### National Response Framework

The National Response Framework presents the guiding principles that enable all response partners to prepare for and provide a unified national response to disasters and emergencies – from the smallest incident to the largest catastrophe. The Framework, which replaced the National Response Plan in 2008, establishes a comprehensive, national, all-hazards approach to domestic incident response ([www.fema.gov/emergency/nrf/aboutNRF.htm](http://www.fema.gov/emergency/nrf/aboutNRF.htm)).

activities, including those for pandemic influenza and environmental health. This report focuses on TPER-funded activities, which are a significant part of preparedness investments at CDC.

#### Federal response to public health emergencies.

The overall responsibility for emergency response lies with the U.S. Department of Homeland Security (DHS). Since 2001, 21 Homeland Security Presidential Directives have been issued. These directives have set in motion DHS initiatives, including publication of the National Response Framework (see box above), establishing a single, comprehensive structure for an all-hazards approach to domestic incident response. In addition, the National Preparedness Guidelines provide vision, capabilities, and priorities for national preparedness. These two documents constitute the core of the nation's preparedness policies.

Under the National Response Framework, the U.S. Department of Health and Human Services (HHS) has the responsibility to coordinate federal assistance that supplements state, tribal, and local resources in response to public health and medical disasters.<sup>12</sup> The Assistant Secretary for Preparedness and Response (ASPR) is the principal advisor to the HHS Secretary on all matters related to bioterrorism and other public health emergencies.<sup>13</sup> ASPR works with other federal departments and agencies and is charged with the overall coordination and oversight functions of emergency preparedness and response activities within HHS, including activities involving vulnerable populations.<sup>14</sup> ASPR responsibilities include the coordination of activities related to CDC, which is an operating division of HHS. CDC executes public health response activities.

#### CDC's mission and response capabilities.

CDC's mission is "to collaborate to create the expertise, information, and tools that people and communities need to protect their health." CDC achieves this mission by building capabilities that can be applied universally to all hazards, whether

due to biological agents, natural disasters or environmental exposures, chemical and radiological materials, or explosions (see figure 1). In addition, CDC must build capabilities that are scenario-specific, such as quickly and accurately testing for radioactive materials to determine appropriate medical treatment following the explosion of a dirty bomb (i.e., radiological dispersal device).

Figure 1: All-hazards approach maximizes available resources.



**CDC preparedness goals.** CDC's preparedness activities address one of the agency's overarching health protection goals: "People prepared for emerging health threats – people in all communities will be protected from infectious, occupational, environmental, and terrorist threats." CDC identified nine outcome goals aimed at measuring progress toward this overarching goal (see inside front cover).

#### Coordination of CDC Preparedness Activities

##### CDC core public health functions and

**preparedness objectives.** CDC established five objectives that emerge from CDC's core functions to form a foundation for preparedness. The

Coordinating Office for Terrorism Preparedness and Emergency Response (COTPER) was established in August 2002<sup>15</sup> and strategically coordinates CDC’s activities to meet the following five objectives:

- *Health Monitoring and Surveillance*  
Objective: Integrate and enhance the existing surveillance systems at the local, state, national, and international levels to detect, monitor, report, and evaluate public health threats.
- *Epidemiology and Other Assessment Sciences*  
Objective: Support and strengthen human and technological epidemiologic resources to prevent, investigate, mitigate, and control current, emerging, and new public health threats and to conduct research and development that lead to interventions for such threats.
- *Public Health Laboratory Science and Service*  
Objective: Enhance and sustain nationwide and international laboratory capacity to gather, ship, screen, and test samples for public health threats and to conduct research and development that lead to interventions for such threats.
- *Response and Recovery Operations*  
Objective: Assure an integrated, sustainable, nationwide response and recovery capacity to limit morbidity and mortality from public health threats.
- *Public Health System Support*  
Objective: Expand and strengthen integrated, sustained, national, foundational and surge capacities capable of reaching all individuals with effective assistance to address public health threats.

**COTPER’s role.** COTPER is responsible for TPER funding that is appropriated by Congress, which was approximately \$1.5 billion in FY 2007.<sup>16</sup> TPER funding supports a range of activities at CDC and state and local levels that help develop the building blocks to respond to public health threats. Approximately 90% of this funding is allocated to specific

preparedness areas (Public Health Emergency Preparedness cooperative agreement, Strategic National Stockpile, BioSense, Centers for Public Health Preparedness, All Other State and Local Capacity, Anthrax, Quarantine, Real Time Lab Reporting, and Advanced Practice Centers).

COTPER uses the five objectives to set priorities for allocating the remaining funds to programs across CDC.<sup>17</sup> CDC programs receiving TPER resources assume responsibility for these projects. This coordinated approach enables CDC to leverage preparedness capabilities and scientific expertise and to avoid duplicating strategies and activities. See Appendix 2 for more detailed funding information.

### About This Report

Data in this report come primarily from CDC programs and are also supplemented by external sources, such as the Council of State and Territorial Epidemiologists. See Appendix 3 for more information about data sources.

The purpose of this report is to provide an overview of TPER-funded public health activities, specific accomplishments, and the challenges faced by CDC as it strives to achieve its preparedness goals. The report includes a chapter for each of the five core public health functions; major activities, accomplishments, and challenges are presented within each section. This report concludes with a “Moving Forward” chapter that describes how COTPER is prioritizing future preparedness resources to address many of the cross-cutting challenges presented in the report.

TPER-funded preparedness activities build upon decades of CDC scientific expertise, strengthening both CDC’s internal response capabilities as well as external response capabilities at local, state, tribal, territorial, and international levels. This report builds on the analysis of state public health preparedness presented in the CDC report, *Public Health Preparedness: Mobilizing State by State*.<sup>18</sup> Future updates from CDC will assess the progress in preparedness at CDC and at local, state, tribal, territorial, and international levels.

The purpose of this report is to provide an overview of TPER-funded public health activities, specific accomplishments, and the challenges faced by CDC as it strives to achieve its preparedness goals.

# The Range of Public Health Threats

**P**ublic health threats come from diverse sources – biological agents, natural disasters, chemical and radiological incidents, or explosions. The impact of these threats varies and can range from local outbreaks to incidents with global ramifications. Storms and disease outbreaks occur frequently and are usually resolved locally. In contrast, widespread diseases like pandemic influenza outbreaks, multistate outbreaks, major weather events, or incidents involving radiological materials require national and sometimes global resources for response. Some of these health threats are intentional, such as bombings and other types of terrorist attacks, and put additional demands on preparation and resources.



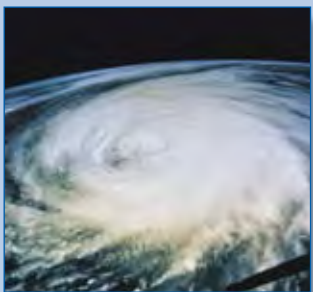
**Biological agents.** These agents include viruses, bacteria, parasites, and fungi (or their toxins) that can cause illness or death in people, animals, or plants and are spread through the air, water, or in food. Dramatic increases in the volume and speed of global travel mean that infectious diseases caused by biological agents are now spreading faster. New diseases are constantly emerging, while others re-emerge in drug-resistant or other forms that threaten human health. A highly infectious and lethal strain of influenza, for example, is now infecting millions of birds across Asia, Europe, and Africa. There is growing concern that the causative virus (H5N1) may develop the ability to infect humans

and spread easily from person to person, causing an influenza pandemic. Some biological agents may also be intentionally released, as happened with the 2001 anthrax attacks in the United States.



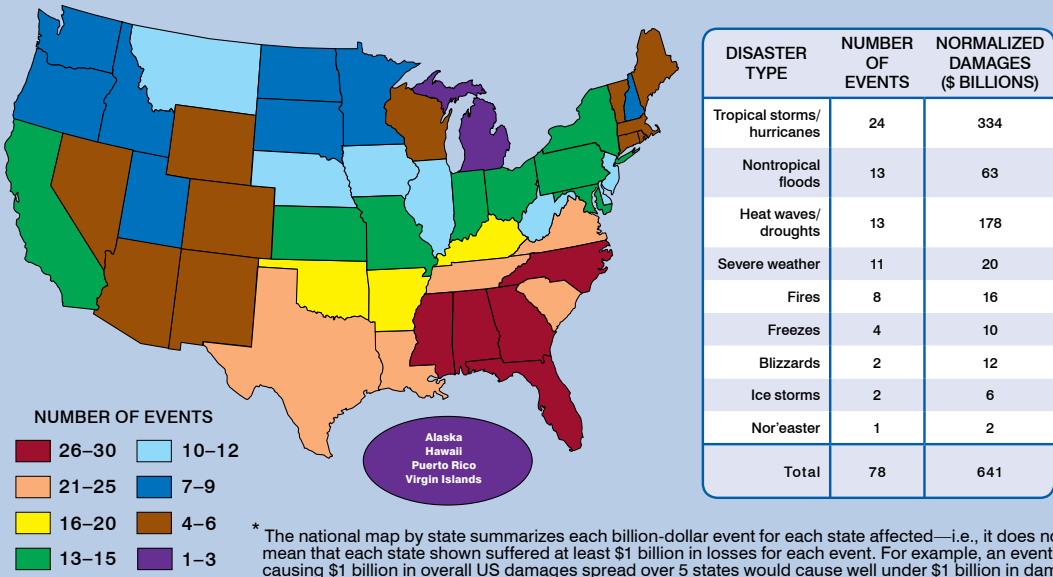
**Chemical and radiological materials.** Inadvertent or intentional releases of chemicals or radiation could create large-scale public health emergencies, especially if these releases occurred in densely populated areas. Chemicals and radiological materials are manufactured, transported, stored, and used broadly across the United States. Each year, 1.7 million to 1.8 million carloads of hazardous materials are shipped on 170,000 miles of U.S. railway.<sup>1</sup> An estimated 15,000 industrial plants handle substantial quantities of extremely hazardous chemicals, presenting the potential for accidental releases.<sup>2</sup>

Radiological releases could have massive health and economic consequences, depending on dispersal conditions. If an improvised nuclear device were exploded in a large city, government estimates predict that at least 450,000 people would be displaced or need to be evacuated, tens of thousands would require decontamination and both short-term and long-term treatment, and the economic impact would be hundreds of billions of dollars.<sup>3</sup>



**Natural disasters and other environmental exposures.** Natural disasters like extended heat waves, severe snow or ice storms, catastrophic hurricanes, and extensive floods leave enormous public health, individual, and economic burdens in their wake. These disasters can have multiple effects on health – traumatic injuries, mental health effects, or difficulty managing chronic diseases because of evacuation or damaged healthcare facilities. The economic costs also are great; natural disasters have cost the United States more than \$600 billion in a 27-year period (see figure on page 13).

**BILLION-DOLLAR CLIMATE AND WEATHER DISASTERS BY STATE, 1980–2007\***



\* The national map by state summarizes each billion-dollar event for each state affected—i.e., it does not mean that each state shown suffered at least \$1 billion in losses for each event. For example, an event causing \$1 billion in overall US damages spread over 5 states would cause well under \$1 billion in damage in each affected state. However, larger multibillion-dollar events would sometimes cause more than \$1 billion in damages in one or more states.

Source: National Oceanic and Atmospheric Administration. Available at [www.ncdc.noaa.gov/img/reports/billion/state2007.pdf](http://www.ncdc.noaa.gov/img/reports/billion/state2007.pdf)

The health and economic risks posed by natural disasters could increase in number and severity as the earth's climate changes, causing more precipitation and other weather extremes. Possible health effects resulting from climate change include increases in diseases caused by allergies, respiratory problems, illnesses carried by insects or in water, and threats to the safety and availability of our food and water supplies. In addition to the threats from natural disasters, the general public and occupational workers are exposed to hundreds of environmental chemicals that enter their bodies and that have shown the potential for carcinogenic, reproductive, developmental, and neurologic risk.



**Explosions.** Explosives are the weapon of choice for most terrorists.<sup>4</sup> Explosions and resulting blast waves can wreak havoc in an instant and result in large numbers of casualties with complex injuries not commonly seen after natural disasters such as floods or hurricanes. The types of injuries they cause present unique triage, diagnostic, and treatment challenges that are unfamiliar to most civilian healthcare providers. Terrorist incidents also increase stress and can lead to behavioral changes that result in additional health and economic consequences.

<sup>1</sup> Testimony of Joseph H. Boardman, Administrator, Federal Railroad Administration, U.S. Department of Transportation, before the Committee on Commerce, Science, and Transportation, United States Senate, January 18, 2007.  
<sup>2</sup> Statement of Thomas P. Dunne, Deputy Assistant Administrator, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, before the Committee on Homeland Security and Government Affairs, United States Senate, June 15, 2005.  
<sup>3</sup> Planning Scenarios, Executive Summaries, Created for Use in National, Federal, State, and Local Homeland Security Preparedness Activities, The Homeland Security Council, David Howe, Senior Director for Response and Planning, July 2004.  
<sup>4</sup> Institute of Medicine. *The Future of Emergency Care in the United States Health System: Emergency Medical Services at the Crossroads*. Washington DC: The National Academies Press; 2006. Available at [http://www.nap.edu/catalog.php?record\\_id=11629](http://www.nap.edu/catalog.php?record_id=11629).





# Chapter 2: Health Monitoring and Surveillance

Quickly recognizing and assessing the causes of health threats are crucial to protecting the American public. Public health officials rely on accurate and complete data to detect and estimate the effect of threats and determine the spread of illness. Public health surveillance – the ongoing, systematic collection, analysis, interpretation, and dissemination of data about a health-related event – is conducted to protect the public and improve health. Surveillance for public health emergencies must occur locally by public health professionals.

CDC's health monitoring and surveillance preparedness objective is to integrate and enhance the existing surveillance systems at local, state, national, and international levels to detect, monitor, report, and evaluate public health threats. TPER activities in this area consisted of six projects in three of CDC's major offices and centers. FY 2007 funding for activities supporting this objective was more than \$50 million, with more than 90% allocated to BioSense.

Major CDC activities and accomplishments that focus on achieving the public health monitoring and surveillance objective include:

- Enhancing nationwide surveillance of emerging health threats through BioSense and the National Poison Data System,
- Providing surveillance tools to state and local epidemiologists for detecting potential health threats,
- Tracking hazardous substances and alerting emergency partners about accidental releases, and
- Developing tools to conduct surveillance during disasters.

**Enhancing nationwide surveillance of emerging health threats through BioSense and the National Poison Data System.** Infectious disease threats, natural disasters, and potential terrorist attacks demonstrate that the United States needs surveillance capability that provides a real-time, national picture of emerging health threats. Early identification of potential threats allows for earlier responses. For example, to respond effectively

during the influenza season we need to know the timing of the onset of illness, how it is spreading across the country, and which influenza virus strains are causing illness. Two of the tools supporting CDC efforts to create a real-time picture for surveillance are BioSense and the National Poison Data System.

*BioSense.* CDC developed the BioSense system to receive and share real-time data from healthcare organizations, including hospitals, clinical laboratories, and outpatient facilities. As part of a national strategy for biosurveillance, BioSense has the potential for improved recognition and response to a wide range of public health threats. BioSense began displaying near real-time hospital data in 2006.

As of September 30, 2007, more than 460 hospitals and more than 1,500 federal military and veterans' outpatient facilities covering all 50 states transmitted near real-time data to BioSense. The Laboratory Corporation of America, which tests approximately 400,000 samples daily, also transmitted data on a daily basis. A team of CDC staff analyze and display the data on a secure Internet-based application within 2 hours of receipt. These reports are provided to the CDC Director's Emergency Operations Center (see page 31) and local, state, and private entities, enabling immediate, critical decision making to identify and control the spread of health threats.

In FY 2007, BioSense provided situational awareness during events such as the Super Bowl and the State of the Union Address. In addition, BioSense detected data anomalies of potential public health importance in a variety of incidents during 2007, including:

- An outbreak of gastrointestinal disease at a U.S. Department of Defense base caused by a norovirus,
- Rash illness among elementary school students,
- Multiple spikes in heat-related illness in metropolitan areas, and
- Respiratory problems associated with the southern California wildfires (see box on page 16).

CDC's health monitoring and surveillance preparedness objective is to integrate and enhance the existing surveillance systems at local, state, national, and international levels to detect, monitor, report, and evaluate public health threats.

## BioSense: A Useful Tool During California Wildfires



NASA Aqua satellite image from 705 km above California's wildfires. (Source: NASA)

In the fall of 2007, devastating southern California wildfires provided a unique opportunity to use BioSense. About 20 million people living in the Los Angeles, San Diego, and surrounding areas were affected by this massive event.

While the fires were burning, the CDC BioIntelligence Center provided California and San Diego County public health officials with daily reports of health activity related to the wildfires. The BioSense system noted large increases in respiratory visits to hospitals for respiratory conditions, especially visits for asthma and dyspnea (difficulty in breathing/shortness of breath), as well as increases in total visits. California and San Diego County public health officials found the BioSense information to be a useful addition to their surveillance efforts because it facilitated their ability to quickly and automatically assess the adequacy of their

response. In the event that there had been a greater increase in respiratory diseases or increases in infectious diseases or injuries, local authorities would have been better equipped to design and deploy further public health measures as a result of the BioSense reports. Lessons learned from this experience will help not only the next time wildfires strike, but in other large-scale exposures to environmental hazards. [For more information see *Morbidity and Mortality Weekly Report* 2008;57(27):741-7.]

*National Poison Data System.* CDC supports the American Association of Poison Control Centers in collecting national data on toxic exposures through the National Poison Data System (NPDS). Annually, poison control centers receive more than 2 million calls from the general public and healthcare providers seeking expert advice. Poison control centers submit data to the system every 4 minutes to 10 minutes. Currently, CDC epidemiologists and toxicologists review these data and can quickly detect and alert public health officials of chemical or toxin exposures, both unintentional and intentional (e.g., deliberate poisoning of food or water).

In FY 2007, CDC used this system to monitor the outbreak of melamine in pet food and toothpaste. CDC tracked the outbreak and alerted the U.S. Food and Drug Administration about severity of cases and geographic extent of the outbreak, enhancing government response. CDC also staged mock events evaluating the system, which performed successfully in these nationwide drills as well as in events staged by poison centers in California and Texas. As a result of the real-life and mock events, CDC determined that NPDS is an important component of the national capacity to mount effective public health response to intentional

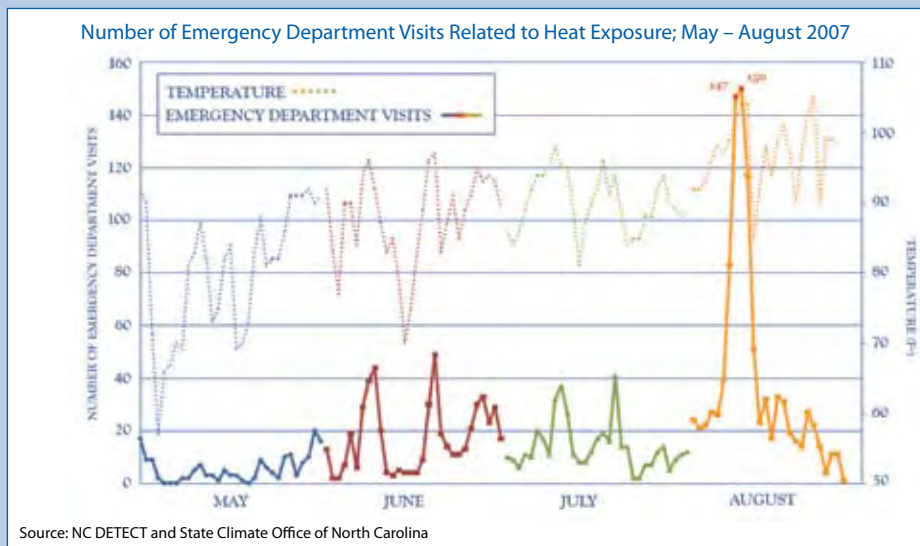
and unintentional chemical exposures and poisonings.

**Providing surveillance tools to state and local epidemiologists for detecting potential health threats.** CDC provides surveillance tools, such as the Early Aberration Reporting System (EARS), to help state and local epidemiologists improve health threat detection. This system is accessible on CDC's website at no cost for use by city, county, state, federal, and international public health officials; the system allows users to analyze data for unusual spikes from sources such as emergency departments, 911 calls, physician offices, and over-the-counter drug sales. In 2007, approximately 100 organizations used the system (see box on page 17). CDC continues to improve communications and facilitate knowledge exchange among EARS users and advance the science of how to detect aberrations in health data. Early detection should translate to earlier response, thereby preventing illness and saving lives.

**Tracking hazardous substances and alerting emergency partners about accidental releases.** CDC has cooperative agreements with 14 states to collect data on hazardous substance releases and track subsequent health effects through the Hazardous Substances Emergency Events

## Surveillance Tool in North Carolina Impacts Future Warnings about Heat Waves

During a 2007 heat wave, North Carolina public health officials used their surveillance system, which uses the Early Aberration Reporting System (EARS), to track heat-related visits to hospital emergency departments. What they found led them to modify their warnings during future heat waves.



The North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC-DETECT), which is funded by the state and CDC’s Public Health Emergency Preparedness cooperative agreement and BioSense, tracks emergency department patient visits and Carolinas Poison Center calls to monitor public health and environmental health threats. Although it is usually used to track communicable disease, it can also be programmed to look for symptoms of other kinds of illnesses, including heat-related illnesses. During the heat wave, NC-DETECT found an average of 84 heat-related emergency department visits per day, more than seven times the average before the heat wave. The peak day brought 150 visits.

The surveillance system provided some surprising results. The state usually issues heat-related warnings that focus on the very young and the very old. NC-DETECT found 15- to 19-year-olds and 25- to 44-year-olds had the highest rate of heat-related emergency department visits during the heat wave. Public health officials suspect that the overheating probably occurred as a result of exertion during outdoor work or exercise. In the future, North Carolina public health officials will target these groups to alert them of the dangers from excessive heat.

Surveillance (HSEES) program. The program allows CDC and state public health officials to assess vulnerabilities and proactively plan for prevention and timely response.

HSEES is used to:

- Identify high risk chemicals, industries, and locations for local and state emergency planners (e.g., regional hazardous materials teams),
- Alert state and local response agencies to handle emergencies, and

- Provide scenarios for emergency event planning and drills.

In FY 2007, there were 7,130 instances of hazardous substance releases in the 14 participating states. For the releases that were potentially dangerous – including a chlorine leak in a Florida water treatment facility and the largest oil spill in Wisconsin history – the system provided more than 1,600 alerts to emergency partners in these states. Of the 7,130 incidents, 501 led to an ordered evacuation, with a total of 35,094 people evacuated.

**Developing tools to conduct surveillance during disasters.** Working with several public health partners (including the Florida, Georgia, Texas, and North Carolina health departments; the American Red Cross; and the National Disaster Medical System<sup>19</sup>), CDC developed tools to improve surveillance data obtained during disasters. These data are critical for describing the distribution of injuries and illnesses, rapidly detecting outbreaks in evacuation shelters, communicating with public health partners, and implementing timely interventions. In previous disasters, such as Hurricanes Katrina and Rita, responders did not have tools to collect standard information to coordinate surveillance across local, state, and federal levels.

In FY 2007, specific accomplishments that support surveillance during disasters included:

- Developing a standard, field-tested form for collecting data from healthcare facilities and evacuation shelters;
- Implementing electronic methods for data collection in the field (e.g., on a personal digital assistant or through scannable forms);
- Developing a toolkit for collecting common data elements regarding mental/behavioral surveillance including needs assessments and survey forms; and
- Conducting a pilot study of the data analysis tools in an emergency department setting in collaboration with the Georgia Division of Public Health.

CDC is continuing to improve disaster surveillance by evaluating and revising the disaster surveillance materials based on the pilot study in Georgia, developing interactive online forms for disaster surveillance, and providing more information on injuries, worker health, and mental health.

### Challenges for Health Monitoring and Surveillance

**Implementing the next generation of surveillance systems.** Historically, public health surveillance was conducted through paper systems before evolving to computerized systems. Despite improved technologies, these systems today remain fragmented and slow in exchanging information between clinical care providers and public health authorities. In some cases, surveillance systems collect data from a limited number of states, not

allowing for a nationwide picture. (e.g., HSEES collects data from only 14 states), or need to provide additional data (e.g., BioSense). This presents a challenge in ensuring a coordinated, comprehensive nationwide capability for real-time surveillance. Increasing critical information available to decision makers during an emergency (i.e., enhancing situational awareness) is essential.

CDC is taking steps to enhance BioSense data available to decision makers. Collaborating with stakeholders, partners, and customers, CDC has outlined a redesign of the BioSense program, which includes the use of federated database technologies<sup>20</sup> to allow states and jurisdictions to see across borders using BioSense technologies and determine if local conditions are part of a larger regional situation. Future plans for BioSense also include the expansion of available case detection technologies so that clinical data can be automatically analyzed to detect cases or possible cases of infectious diseases. Incentives will also be increased for clinical care providers to provide real-time data to public health authorities.

**Enhancing surveillance of long-term health effects.** The long-term health effects of disasters are not fully understood. Certain disasters, such as those related to radiation, have health effects that may not emerge for many years. Current surveillance systems do not capture health information to clarify the long-term effects of radiation, such as the level of contamination and whether contamination was internal or external.<sup>21</sup> To begin this process, CDC convened a meeting of national and international experts in November 2008 to collaborate on developing guidelines for establishing registries for disasters and other emergency events.



Implementing next-generation surveillance systems and enhancing surveillance of long-term health effects are among the many issues contributing to the broader challenge of having integrated biosurveillance systems and activities. For more information about the broader, cross-cutting challenges that CDC faces and priorities to address these challenges, see Chapter 7, “Moving Forward,” on page 47.

# Chapter 3: Epidemiology and Other Assessment Sciences

**A**ppplied epidemiology is the science of conducting investigations to determine the cause and breadth of public health problems, including those caused by emergencies. CDC continues to focus on developing faster and more accurate methods of disease investigation to control the spread of public health threats. Other assessment sciences refer to a broad group of disciplines involved in research to understand and predict how demographic, behavioral, cultural, and environmental factors influence health. Research activities can include developing effective interventions and assessing how best to provide health information to the public.

CDC's preparedness objective for epidemiology and other assessment sciences is to support and strengthen human and technological epidemiologic resources to prevent, investigate, mitigate, and control current, emerging, and new public health threats and to conduct research and development that lead to interventions for such threats. TPER activities in this area consisted of 12 projects in 7 of CDC's major offices and centers. FY 2007 funding for activities supporting this objective was more than \$20 million; the major category of investment in this area included research assessing the safety and effectiveness of the U.S. licensed anthrax vaccine.

Major CDC activities and accomplishments that focus on achieving the epidemiology and other assessment sciences objective include:

- Assessing the vaccine and treatment options for anthrax,
- Developing methods to detect the presence of anthrax in potentially contaminated areas,
- Evaluating emergency medicine kits for at-home use,
- Enabling secure and rapid communication to detect health threats, and
- Supplementing the epidemiology workforce in states and localities.

**Assessing the vaccine and treatment options for anthrax.** Through clinical trials and research, CDC is assessing use of the only licensed anthrax vaccine in the United States, called anthrax vaccine adsorbed (AVA), or BioThrax. The focus of this work is a large clinical trial evaluating whether changing the route of vaccine administration<sup>22</sup> and reducing the number of primary doses in the vaccination series will lead to fewer side effects while maintaining effectiveness. In addition, primate studies are being conducted to determine the factors associated with protection against anthrax; these studies have already informed future improvements to second-generation anthrax vaccines.

During the 2001 anthrax bioterrorism attack, 5 of 11 patients (45%) with inhalation anthrax died, despite use of modern intensive care units and antibiotics. To reduce the mortality of future inhalation anthrax patients, CDC is researching the effectiveness of a serum containing anthrax antibodies (anthrax immune globulin or AIG) to assess its usefulness as a treatment option for severe anthrax disease and its possible effectiveness in preventing anthrax infection.

**Developing methods to detect the presence of anthrax in potentially contaminated areas.** During the anthrax investigations of 2001, CDC collected samples from potentially contaminated areas. CDC sampled areas where anthrax would most likely be found to quickly identify contamination. This strategy supported public health measures, such as decisions about whether to provide antibiotics. However, CDC could not definitively conclude if the entire area was safe.

Since even low levels of anthrax could harm susceptible individuals (see box on page 20), CDC developed a new sampling strategy to more definitively conclude that areas are not contaminated. The strategy has been field tested and will continue to be refined. The U.S. Environmental Protection Agency plans to use this strategy for environmental sampling.

CDC's preparedness objective for epidemiology and other assessment sciences is to support and strengthen human and technological epidemiologic resources to prevent, investigate, mitigate, and control current, emerging, and new public health threats and to conduct research and development that lead to interventions for such threats.

## Focus on Anthrax

Anthrax, caused by infection with *Bacillus anthracis*, is a serious disease that occurs naturally in animals and can be deadly to humans. *Bacillus anthracis* has significant potential to be used as a bioterrorist agent because it forms spores, which can survive in the environment for several years. Fatality rates from anthrax depend on whether infection is through the skin (cutaneous anthrax), digestive system, or respiratory system (inhalation anthrax); early treatment of all forms is important



*Bacillus anthracis* (Source: CDC)

for recovery. Fatality rates range from less than 1% for cutaneous anthrax treated with antibiotics to approximately 75% for inhalation anthrax, even with all possible supportive care including appropriate antibiotics. If an anthrax threat is recognized quickly, people who may have been exposed can receive antibiotics and a vaccine to prevent onset of the disease. There is no screening test for anthrax that indicates whether a person has been exposed to or has the disease. The only way exposure can be determined is through a public health investigation and laboratory tests.

**Evaluating emergency medicine kits for at-home use.** In partnership with the Missouri Department of Health and Senior Services, CDC evaluated a strategy to provide an emergency MedKit containing antibiotics for families to keep in their homes should a release of anthrax occur. CDC, with U.S. Food and Drug Administration approval, designed the MedKit prototype, which consisted of a five-day supply of medicine and instructions for use. An overwhelming majority of study participants followed instructions regarding storage and reserving the emergency MedKit for appropriate use. A similarly large proportion of participants reported that they would like to have emergency MedKits and would be willing to purchase them. The MedKit prototype is currently undergoing additional testing before being licensed for use.<sup>23</sup>

**Enabling secure and rapid communication to detect health threats.** Since December 2000, CDC's Epidemic Information Exchange (*Epi-X*) has enabled rapid detection of health threats. *Epi-X* can help ensure that local problems are contained and national events are detected sooner. *Epi-X* is a secure, web-based communication system that allows CDC officials, state and local health departments, poison control centers, and other public health professionals to quickly and securely share preliminary health surveillance information. Through *Epi-X*, users report outbreaks and other public health events to CDC and receive notifications about developing health threats through daily electronic summaries. When needed, users receive immediate emergency notification via e-mail, pager, "land line" phone, or cell phone.

In FY 2007, *Epi-X* alerted health officials about incidents including:

- An outbreak of *Salmonella* infections caused by peanut butter;
- Foodborne botulism in Texas, Indiana, and California;
- Travel-related measles in multiple states and Canada; and
- An outbreak among military personnel of a rare type of adenovirus that can cause severe and sometimes fatal respiratory illness.

**Supplementing the epidemiology workforce in states and localities.** Epidemiologists detect and investigate health threats and disease patterns. Ongoing shortages in the epidemiology workforce can affect the ability to effectively respond during an emergency. A 2006 Council of State and Territorial Epidemiologists assessment indicated that 2,502 epidemiologists were working in state and territorial health departments. An estimated 34% increase in the number of epidemiologists was needed at that time to carry out essential functions.<sup>24</sup> Both CDC's Epidemic Intelligence Service and the Career Epidemiology Field Officer program supplement the epidemiology workforce.

*Epidemic Intelligence Service (EIS).* The EIS program expands the epidemiology workforce through a two-year epidemiology training program modeled on a traditional medical fellowship. EIS officers serve as a critical component of CDC's response to routine public health incidents and large-scale national

## CDC's Epidemic Intelligence Service in Action: Investigating a *Salmonella* Outbreak



Source: Pennsylvania Department of Health

In February 2007, two *Salmonella* cases with identical DNA patterns were identified in Pennsylvania through routine electronic laboratory reporting. *Salmonella* bacteria, which can cause diarrhea, fever, and abdominal cramps, are responsible for an estimated 1.4 million illnesses in the United States every year.

To prevent the disease from spreading further, the CDC Epidemic Intelligence Service officer assigned to the Pennsylvania Department of Health worked with other investigators to determine the outbreak source. Using a variety of methods, the group identified 29 more *Salmonella* cases from five counties. Interviews with these patients revealed that each had consumed raw (unpasteurized) milk or milk products from the same dairy. After isolating the *Salmonella* outbreak strain from raw milk at the dairy as well as from two of the patients' households, investigators confirmed the dairy as the outbreak source. Consequently, the state revoked the dairy's raw milk permit, and legislators reviewed the regulation of dairies that sell raw milk. [For more information see *Morbidity and Mortality Weekly Report* 2007;56(44):1161-4.]

emergencies. EIS officers assigned to CDC in Atlanta responded to 68 requests for assistance through the formal EPI-AID mechanism.<sup>25</sup>

CDC also places EIS officers in state and local health departments. In FY 2007, 10 new TPER-funded officers were placed, for a total of 26 officers in state and local health departments. During FY 2007, field EIS officers assigned to state or local health departments conducted 395 epidemiologic field investigations in 43 states and three other countries, including 26 multistate investigations.

In FY 2007, EIS officer contributions to public health responses included:

- Responding to a multistate measles outbreak associated with an international youth sporting event;
- Investigating a multistate outbreak of *E. coli* O157:H7 infections associated with frozen pizza;
- Determining the source of a *Salmonella* outbreak in Pennsylvania (see box above); and
- Investigating two cases of swine influenza in children, resulting in collaboration between CDC, Iowa Department of Public Health, Iowa's state veterinarian, and the U.S. Department of Agriculture in Iowa.

*Career Epidemiology Field Officer (CEFO) Program.* CDC places experienced epidemiologists in state and local public health departments through the CEFO

program. These epidemiologists enhance state and local response efforts for public health emergencies and function as liaisons and consultants between CDC and public health departments. Members of the CEFO program have led innovative pandemic influenza planning and response efforts in their assigned jurisdictions. As of September 30, 2007, 23 CEFOs were located in 18 states and 1 U.S. territory, an increase from 12 CEFOs in FY 2003.

In FY 2007, examples of CEFOs contributions to preparedness included:

- Planning for avian influenza in Pennsylvania in partnership with the poultry industry, universities, and federal and state health and agricultural agencies;
- Emergency response planning on the Wind River Indian Reservation in Wyoming through training, interagency coordination, exercises, and outbreak investigations; and
- Responding to a botulism outbreak.

### Challenges for Epidemiology and Other Assessment Services

**Enhancing research.** Although CDC is continually working to enhance its ability to prevent, prepare for, investigate, mitigate, and control public health threats, a number of priority areas for research still remain unmet.

These areas include the following:

- Current recommendations for antimicrobial use during a deliberate release of several infectious threats, such as plague and anthrax, are based on limited knowledge with few published trials. Additional studies are needed to validate the effectiveness of current medicines and medical supplies for use against infectious agents.
- Further evaluation of screening guidelines is needed to maximize the sensitivity and specificity of these guidelines, which are used by healthcare professionals to determine if patients have been exposed to bioterrorism agents. CDC needs to increase physicians' and other healthcare professionals' awareness to accurately diagnose suspected cases of bioterrorism agent illnesses.
- The relative effectiveness of personal protective equipment in preventing the transmission of some infectious agents such as anthrax and plague is unknown. Research is needed to improve the proper selection and use of this equipment for first responders.

**Assisting vulnerable populations.** Information is incomplete on the optimal strategies for interventions to protect vulnerable populations<sup>26</sup> during emergencies. Additional research on vulnerable populations and community resilience is needed to identify preventive factors for disease spread; social deterioration; and injury, violence, and death related to human migration and global mobility. Strategies are particularly important to address interventions for children (see box below) who are vulnerable to disease and injury following emergencies.

#### Children and Emergencies

“Children have important physical, physiologic, developmental, and mental differences from adults that can and must be anticipated in the disaster planning process. Plans must ensure that healthcare facilities and medical providers are prepared to meet the medical needs of children of all ages and developmental stages.”

Source: *The Youngest Victims: Disaster Preparedness to Meet Children's Needs*. American Academy of Pediatrics Disaster Preparedness Advisory Council. (Available at [www.aap.org/disasters/pdf/Youngest-Victims-Final.pdf](http://www.aap.org/disasters/pdf/Youngest-Victims-Final.pdf))

**Increasing the epidemiology and assessment sciences workforce.** Additional epidemiologists and assessment sciences professionals would further improve the nation's ability to conduct disease investigations at the local, state, and federal levels. The need for these workers is anticipated to only increase. For example, as the likelihood of natural disasters and environmental emergencies increases as climate change occurs, there is a need for more environmental health personnel at the state and local levels. Staff also need training to ensure they are ready to respond to public health emergencies. Data and surveillance systems, no matter how sophisticated, are not enough. Human judgment and expertise are key to effective preparedness and response.

**Managing and enhancing data effectively during an emergency.** During a public health emergency, no standard system exists to collect, manage, and link data to identify, investigate, analyze, monitor, and respond to the threat. This makes it difficult to analyze data from an investigation involving multiple jurisdictions and multiple areas of expertise, such as epidemiology and laboratory science.

To help address this challenge, CDC is enhancing the Outbreak Management System (OMS), a standardized informatics tool designed to assist public health professionals at local, state, and federal levels manage disease investigations. CDC plans to implement OMS for selected state and local jurisdictions in the field and at CDC and to incorporate recommendations from internal and external stakeholders.



Most of the challenges for epidemiology and other assessment sciences contribute to broader issues that cut across CDC's core public health functions. Assisting vulnerable populations effectively and having sufficient numbers of trained staff are challenges that are faced within epidemiology in addition to other core public health functions. Managing and enhancing data effectively during an emergency is one of many issues contributing to the broader challenge of having integrated biosurveillance systems and activities. For more information about the broader, cross-cutting challenges that CDC faces and priorities to address these challenges, see Chapter 7, “Moving Forward,” on page 47.



# Chapter 4: Public Health Laboratory Science and Service

**C**DC conducts extensive work in laboratory research and investigations, workforce development, support services, and support to laboratory partners. Public health laboratories are critical in identifying disease agents, toxins, and other health threats found in tissue, food, or other substances. Rapid detection is essential for the implementation of appropriate control measures. Detecting and characterizing health threats in a timely manner depends on the availability of laboratory resources (including personnel), methods, and quick and accurate data exchange systems.

CDC's public health laboratory science and service preparedness objective is to enhance and sustain nationwide and international laboratory capacity to gather, ship, screen, and test samples for public health threats and to conduct research and development that lead to interventions for such threats. TPER activities in this area consisted of 42 projects in 6 of CDC's major offices and centers. FY 2007 funding for activities supporting this objective was more than \$70 million, not including state and local Laboratory Response Network (LRN) funding received from the Public Health Emergency

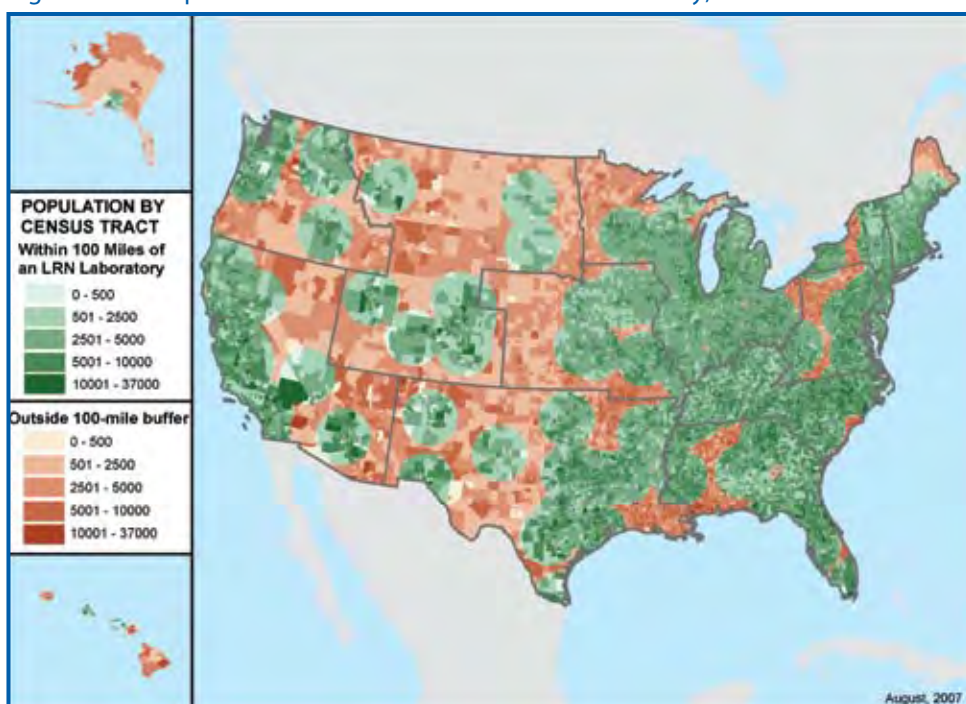
Preparedness cooperative agreement. Major categories of investment in this area include LRN support and developing and refining laboratory methods.

Key CDC activities and accomplishments that focus on achieving the public health laboratory science and service objective include:

- Collaborating to detect health threats through laboratory networks;
- Developing new laboratory methods and refining existing methods;
- Promoting safety and security for entities that possess, use, or transfer select agents and toxins;
- Providing CDC capability and capacity for laboratory testing of biological and chemical agents;
- Deploying skilled personnel to investigate international health threats; and
- Protecting the public and responders during emergencies.

CDC's public health laboratory science and service preparedness objective is to enhance and sustain nationwide and international laboratory capacity to gather, ship, screen, and test samples for public health threats and to conduct research and development that lead to interventions for such threats.

Figure 2: U.S. Population Within 100 Miles of an LRN Laboratory; 2007



Source: CDC

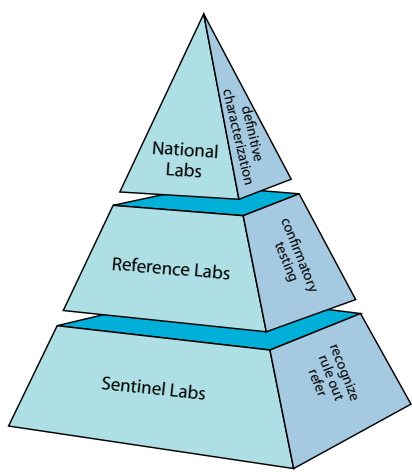
**Collaborating to detect health threats through laboratory networks.** CDC manages the LRN, a national network of local, state, federal, and international laboratories (see box below). The LRN was established in 1999 to create national laboratory capacity for biological agents; a chemical testing component was added in 2003.<sup>27</sup> In 2007, there were 163 member laboratories capable of testing biological agents and 62 LRN laboratories that could test for and/or handle chemical agents. LRN is a critical public health laboratory infrastructure to detect, characterize, and communicate about confirmed threat agents. In 2007, 90% of the U.S. population lived within 100 miles of an LRN lab, decreasing the time needed to begin the response to a terrorist attack or naturally occurring outbreak (see figure 2 on page 23).

LRN member laboratories perform standardized tests yielding reliable results within hours. Recent advancements in emergency procedures allow CDC to produce enough materials (DNA reagents) in less than

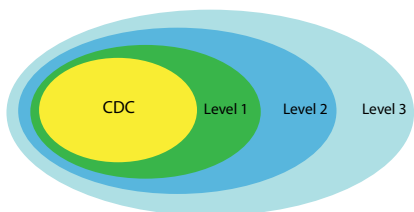
a week to enable LRN laboratories to perform 500,000 tests using novel, real-time DNA-based methods. To decrease the time needed to detect and respond to public health threats, LRN Real Time Laboratory Information Exchange equips LRN laboratories to securely share data with public health partners in real time.

CDC is working with public health laboratories in states, territories, cities, and counties to assist them in expanding their chemical laboratory capacity to prepare and respond to chemical terrorism incidents or other emergencies involving chemicals. CDC provides extensive training, technology transfer, and testing for analytical proficiency for all participating laboratories. In FY 2007, staff trained 84 LRN laboratories via hands-on training classes and e-learning and computer-based training. In addition, CDC coordinated the purchase and installation of high throughput analytical capability in the 10 laboratories that provide CDC with surge capacity.

### The Laboratory Response Network



LRN structure for biological laboratories



LRN structure for chemical laboratories

#### Biological laboratories

- *Sentinel laboratories* consist primarily of hospital-based, clinical institutions, and commercial diagnostic laboratories. These laboratories can test samples to determine whether the samples should be shipped to reference or national laboratories for further testing.
- *Reference laboratories* perform tests to detect and confirm the presence of a threat agent. In 2007, 90% of the U.S. population lived within 100 miles of a reference laboratory, enabling emergency responders across the country to act quickly to mitigate the effects of a potential biological attack or outbreak, rather than having to ship samples to CDC.
- *National laboratories*, including those at CDC, have the unique resources to handle highly infectious agents and the ability to identify specific agent strains.

#### Chemical laboratories

- *Level 3 laboratories* work with hospitals and other first responders within their jurisdictions to maintain competency in clinical specimen collections, storage, and shipment. These laboratories ship samples primarily to CDC. Level 3 laboratories also have the option of shipping samples to a Level 2 or a Level 1 laboratory that has shown proficiency in a particular method that is needed, if the agent is known.
- *Level 2 laboratories* can test for a limited panel of toxic chemical agents, in addition to maintaining the competencies of Level 3 laboratories.
- *Level 1 laboratories* are surge capacity laboratories that can test for an expanded number of agents, including nerve agents, mustard agents, and toxic industrial chemicals, in addition to maintaining the competencies of Level 2 and Level 3 laboratories.

As a result, analytical capability in the LRN has increased from 24 to 38 chemical terrorism agents. CDC also partners with the Association of Public Health Laboratories to ensure support for public health laboratories involved in responding to chemical-exposure events from all sources, including those related to terrorism.

CDC works with a global laboratory network as part of the Global Health Security Action Group, established in November 2001 to coordinate responses to acts of biological or chemical terrorism. Member countries are the United States, Canada, France, Germany, Italy, Japan, Mexico, and the United Kingdom. This global laboratory network coordinates communications, laboratory testing, proficiency testing, safety, sample transport, and other laboratory activities related to diagnosis of potential bioterrorist agents. In FY 2007, the group conducted an exercise to demonstrate the capability of member countries to ship a potential smallpox specimen to CDC. The exercise provided valuable information that was used to improve systems supporting a global response to bioterrorism.

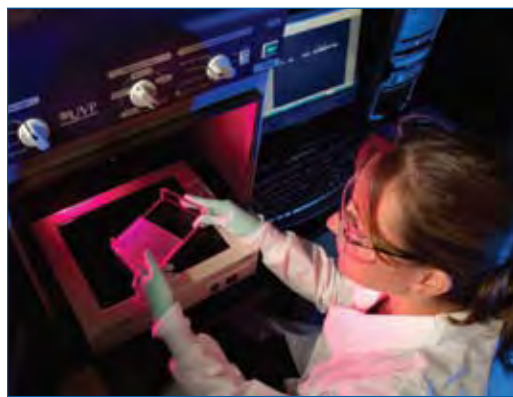
**Developing new laboratory methods and refining existing methods.** CDC is developing laboratory tests to more quickly and accurately identify health threats, including naturally occurring diseases, biological threat agents, and dangerous toxins. Some tests allow more rapid identification (e.g., a new DNA-based method to identify biological threat agents in clinical samples), while others allow more detailed characterization of the health threat (see box on page 26). Public health and other first responders must know what the threat is during an emergency to take effective action.

In FY 2007, specific accomplishments supporting the development or refinement of laboratory methods included:

- *Developing methods and maintaining readiness for identifying chemical agents.* This allows CDC to respond more quickly and effectively to emergencies involving chemical warfare agents. In FY 2007, CDC developed new methods for identifying chemical agents (neosaxitoxin, volatile organic compounds in blood, and the sesqui- and oxymustards). CDC completed proficiency testing for multiple chemical agents such as cyanide, nitrogen mustards, nerve agent metabolites, ricinine, and toxic metals.

- *Mapping the DNA of biological agents.* Rapidly assessing the DNA of suspect disease strains allows CDC to better respond to bioterrorism threats deliberately engineered to evade usual testing methods. Clues may be present in the organism's DNA regarding where it came from and whether it is resistant to vaccines or antibiotics. In FY 2007, CDC mapped DNA of the vaccinia virus, which is similar to smallpox, and of tularemia bacteria. CDC also expanded its capability to perform real-time DNA tests to detect the viruses that cause smallpox, monkeypox, and related diseases.

#### CDC scientist examines the results of a DNA test.



Source: CDC

- *Developing methods to detect toxins.* Toxic chemicals can pose a threat to the public health of the United States. CDC is regularly refining priorities for chemical response capabilities based on information from intelligence, military, and law enforcement agencies. In 2007, CDC filled critical gaps in its response capability related to chemical terrorism by developing methods for analyzing and measuring metabolites of total mustards, fluoroacetate, chloropicrin, neosaxitoxin, tetranitromethane, and phosgene. In FY 2007, CDC developed methods to differentiate among different types of botulinum toxin and to process samples at the rate of 500 per day. Rapid identification of toxins allows for more accurate diagnosis and faster treatment and can mean the difference between life and death. This and continuing work will allow CDC to improve vaccines, to diagnose illness, and to treat people exposed to toxins. CDC has also developed a rapid test for botulism, decreasing testing time from more than 5 days to less than 24 hours. CDC hopes to transfer this technology to the LRN in the near future.

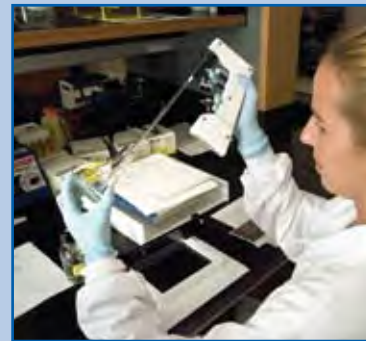
## CDC Uses DNA Fingerprinting to Identify the Source of Outbreaks



*E. coli* (Source: CDC)

DNA “fingerprinting” tests (using pulsed-field gel electrophoresis) can provide a unique pattern for different strains of isolates. This process can frequently provide clues about the geographic origin of a strain or whether a strain is common or rare, helping to determine if biological threats or disease outbreaks occurred naturally or as a result of an attack. Differentiating between a natural and an intentional event is a critical component of effective response to a bioterrorist attack. CDC works with federal, state, and local public health laboratories to use the DNA fingerprints to detect health threats nationwide from both foodborne diseases and other biological agents. In 2007, the efficiency of DNA fingerprints was demonstrated in several high profile botulism cases.

CDC coordinates PulseNet, a national network of laboratories at state health departments, local health departments, and federal agencies. PulseNet is on the alert for both common bacteria that cause disease outbreaks (e.g., *Salmonella*), as well as agents that can be used in a bioterrorist attack through the food supply (e.g., *Francisella*). PulseNet member laboratories submit DNA fingerprints electronically to a dynamic database at CDC, which is available to members for rapid comparison of patterns to evaluate if outbreaks are natural or intentional and help trace outbreaks to the source. For example, PulseNet identified spinach and lettuce as the vehicles for serious outbreaks of *E. coli* 0157 in fall 2006. In an outbreak setting where speed matters, the linkage of spinach to *E. coli* cases led to a product recall by U.S. Food and Drug Administration that prevented future illnesses and possibly saved lives. [For more information see *Morbidity and Mortality Weekly Report* 2006;55(38):1045-6.] CDC is working to expand the system in the PulseNet database to establish links between human or environmental samples of the agents that cause plague and tularemia.



Source: CDC

- *Developing methods to detect plague and tularemia.* CDC developed blood tests to see if someone has contracted plague, rapid tests (polymerase chain reaction) to identify subspecies of *Francisella tularensis*, and tests to determine which subtypes are most likely to cause severe tularemia. These methods also test antimicrobial susceptibility of *Francisella tularensis*, providing the framework for early identification of any unusual antimicrobial susceptibility patterns associated with bioterrorism. CDC continues to refine these tests as they are used and evaluated.
- *Developing methods to detect biothreat agents in water.* Before 2007, multiple methods were required to detect viral, bacterial, and parasitic agents in water. Now CDC has a single sampling procedure to detect each of

these types of agents. The new procedure allows CDC to respond to these health threats more quickly and efficiently. CDC has demonstrated both the method's effectiveness for drinking water collected from different regions of the United States and the method's robustness for capturing and recovering pathogens in nonpotable surface water (e.g., lakes and rivers) and ground water.

### Promoting safety and security for entities that possess, use, or transfer select agents and toxins.

To protect against accidental or intentional release of harmful biological agents, Congress authorized HHS and the U.S. Department of Agriculture to regulate the possession, use, and transfer of biological agents and toxins that have the potential to pose a severe threat to public health and safety, animal or

plant health, or animal or plant products — select agents.<sup>28</sup> Through the Select Agent Program, CDC carries out these regulatory responsibilities and has oversight of the biosafety, security, and training for entities<sup>29</sup> that possess select agents that have the potential to pose a severe threat to human health. Select agents include the bacteria that cause anthrax and plague and the virus that causes smallpox.<sup>30</sup>

In FY 2007, 326 entities were registered with CDC for the possession, use, or transfer of select agents. To promote safety and security at these entities, CDC inspects these entities to ensure compliance with select agent regulations and provides guidance to the regulated community. All registered entities are inspected at least once every three years. In FY 2007, CDC inspected 110 entities registered to possess select agents. These assessments allow inspectors to confirm that registered entities had the appropriate security and safety measures in place to prevent theft, loss, or release of select agents. The inspections also help ensure that laboratorians were adequately trained to work safely with the agents and that accountability records were maintained.

The CDC Select Agent Program promotes laboratory safety and security by providing guidance to entities possessing select agents. In 2007, CDC collaborated with the U.S. Department of Agriculture to develop guidance related to a security plan template; inspection checklists; theft, loss, and release; and videos describing the facility inspection process. CDC also works with entities to ensure that all select agents are properly secured in the event of a natural disaster (see box above).

**CDC provides oversight of entities that possess, use, or transfer select agents that may pose a severe threat to human health.**



Source: CDC

### Preparing Facilities Registered with CDC for Emergencies

CDC has proactively worked with registered entities in advance of natural disasters to ensure that all select agents are properly secured. Before the landfall of Hurricane Katrina in 2005, CDC contacted all registered entities located in Louisiana, Mississippi, and Alabama. CDC collected information regarding the entities' plans to safeguard select agents during and after the storm and informed the entities that CDC stood ready to expedite the emergency transfer of select agents as needed.

CDC took similar action in 2006 and 2007 in anticipation of other hurricanes and predictable natural disasters (such as floods) to minimize risk and any impact on public health and safety. CDC contacts all registered entities at risk of damage and offers assistance in identifying registered entities in safe areas that can receive select agents so that entities at risk can protect their agents from loss.

CDC scientists support other federal agencies through agreements when these agencies are faced with testing demands outside their capabilities.

A fundamental element of the select agent regulations is to keep select agents out of the possession of persons seeking to misuse them. CDC works closely with the Department of Justice's Criminal Justice Information Service (CJIS) to identify those individuals who are prohibited from having access to select agents based on the restrictions identified in the USA PATRIOT Act. CJIS conducts security risk assessments of all individuals and nongovernmental entities that request to possess, use, or transfer select agents. Based on the results of the CJIS security risk assessments, CDC approves individuals and nongovernmental entities to access select agents.

**Providing CDC capability and capacity for laboratory testing of biological and chemical agents.** CDC can test for a variety of agents, including biosafety level 4 agents (e.g., smallpox virus and Ebola viruses). These agents pose a high individual risk of aerosol-transmitted laboratory infections and life-threatening disease. CDC consults regularly with public health authorities and clinicians from the United States and around the world about suspected high-hazard pathogens. Clinical materials are sent to CDC for laboratory testing. Some particularly virulent agents have included Ebola, Marburg, Lassa, and Crimean-Congo hemorrhagic fever viruses. In addition to

## CDC Scientists Help Solve Panama Mystery Illness

In FY 2007, CDC scientists were deployed to the Republic of Panama to investigate the cause of numerous deaths and serious illness in almost two-dozen patients. The illness, which initially seemed to strike mostly men over 60, began with diarrhea and fever and progressed to acute kidney failure, paralysis, and death.

Upon arrival in Panama, the CDC team quickly gathered medical samples from patients – as well as from a variety of possible poisoning sources – and sent them back to the agency’s infectious-disease and environmental laboratories in Atlanta, sometimes within hours because of immediate access to CDC’s airplane. At CDC, teams of experts tested specimens for infectious diseases while simultaneously conducting urgent laboratory examinations of products found in patients’ homes.

Just nine days after the CDC team landed in Panama, the CDC environmental health laboratory identified the culprit. Somehow, diethylene glycol (DEG) had been introduced into government-made, generic-label, sugar-free cough and anti-allergy syrups. Exposure to large amounts of DEG – a clear liquid commonly found in brake fluids, antifreeze, and fuel additives – can



Source: CDC

damage the kidneys, heart, and nervous system. The incident ultimately led to the deaths of at least 100 people. Panamanian health authorities acted quickly, withdrawing the contaminated medications from clinics, and people were notified to immediately discontinue their use. [For more information see *Journal of the American Medical Association* 2007;297:2577 and *Journal of Analytical Toxicology* 2007;31(6):295-303.]

these known infectious agents, CDC frequently serves as the initial diagnostic laboratory for new and unknown diseases. Recent examples have included a fifth strain of Ebola virus and a new arenavirus that caused fatal infections.

CDC scientists support other federal agencies through agreements when these agencies are faced with testing demands outside their capabilities. In 2007, CDC and its laboratory network supported requests from the U.S. Department of Defense to test clinical samples for biomarkers of nerve agents, sulfur mustard,

**CDC scientists are deployed to assist other countries in investigating disease outbreaks.**



Source: CDC

hydrazine, and depleted uranium from people with suspected exposure.

**Deploying skilled personnel to investigate international health threats.** CDC personnel qualified to work with deadly organisms such as the viruses that cause highly fatal hemorrhagic fevers can be deployed to assist other countries in laboratory testing and disease investigation. In 2007, these staff investigated three major outbreaks in Africa: Rift Valley fever virus in Kenya, Marburg virus in Uganda, and Ebola virus in the Democratic Republic of the Congo. These dangerous viruses are not native to the United States, but they can be introduced if infected people travel internationally, as occurred with Lassa fever in 2004 in New Jersey.

**Protecting the public and responders during emergencies.** CDC laboratories are also engaged in long-term projects to help protect responders and the public during emergencies. Examples include:

- *Assessing how to make water safe for human consumption after a biological agent contaminates the water supply.* A safe water source is crucial for both responders and the public.

- *Assessing how long certain threats persist in the environment after contamination.* This knowledge is essential for understanding if people should be evacuated and for how long.
- *Evaluating smallpox vaccines and treatments to determine how effectively they can prevent or lessen the effects of smallpox.* Currently, no antiviral treatments for smallpox infection have been licensed by the U.S. Food and Drug Administration. In 2007, CDC compared the protection provided by two different smallpox vaccines and performed laboratory testing for potential treatments for the smallpox virus. In March 2007, CDC's smallpox expertise was called upon when a toddler became ill with a life-threatening infection from exposure to and infection with smallpox vaccine (vaccinia virus). See box on page 36 for more details.
- *Developing real-time DNA tests to determine if the bacteria causing anthrax, plague, and tularemia are resistant to antibiotics.* In FY 2007, CDC developed real-time tests to detect genes resistant to the antibiotic tetracycline and will continue to develop tests to detect resistance to other antibiotics. The new tests will reduce the detection time of resistance from days to hours.

### Challenges for Public Health Laboratory Science and Service

#### Increasing radiologic response capacity.

To respond effectively following a radiologic incident (e.g., a dirty bomb or nuclear detonation), testing for radioactive materials (radionuclides) is critical. Methods to rapidly and accurately assess internal contamination<sup>31</sup> for a broad array of radionuclides are needed to direct appropriate medical treatment; these methods provide essential information on human exposures to health officials about what agents have been used, who has been exposed, and the extent to which each person has been exposed. Currently, there is no state laboratory capacity and limited federal capacity to test for radionuclides. Only seven radionuclides (of approximately 25 priority radionuclides) can currently be identified within a few hours using CDC's Urine Radionuclide Screen.

CDC is working to increase the number of radionuclides that can be identified with the

Radionuclide Screen to include all priority radionuclides. CDC would like to eventually expand radiologic and nuclear laboratory capability and capacity by providing the Radionuclide Screen to selected state public health laboratories as part of the LRN. This will include the technology transfer of analytic methods, training, a proficiency-testing program, and response exercises with state and federal partners. The radiologic LRN would provide laboratory data to support health physicists and others in activities including field investigations and response.

#### Increasing personnel for laboratory surge capacity.

The number of qualified laboratory personnel is typically the determining factor for the number of samples that can be tested in a given period of time (i.e., throughput). During a public health emergency, more personnel are often needed to test samples quickly and handle additional tests for extended periods of time. During the SARS outbreak in 2003, many CDC laboratorians reported exhaustion from the long work hours, and many routine public health laboratory activities came to a standstill.

At the state level, public health laboratories may be unable to sustain surge operations for prolonged periods because of the inadequate number of highly skilled personnel. In 2007, more than half (59%) of all state public health laboratories experienced difficulty in recruiting or retaining staff, and 65% experienced hiring difficulties.<sup>32</sup>

#### Developing new laboratory methods and enhancing existing methods.

More specific and timely characterization of known threat agents is needed to determine their virulence or resistance to treatment. Research is also needed to develop laboratory methods to identify, characterize, and track emerging threats, especially in environmental settings. Existing methods for measuring exposure to chemical agents need to be improved and new methods for chemical agents of concern need to be developed. Developing more rapid screening methods used at the point of care and moving approved diagnostic tests to hospital-based laboratories will decrease the time needed to diagnose disease, ensure appropriate use of limited available treatments, and reduce costs and infrastructure needs currently in place.

CDC laboratory scientists were the first to identify the newly emerged Nipah virus, Ebola outbreaks including a new Ebola virus in Uganda in 2007, continuing Hantavirus outbreaks, and a new coronavirus that was the cause of severe acute respiratory syndrome (SARS).



The challenges for public health laboratory science and service contribute to challenges that cut across CDC's core public health functions. Adopting interoperable laboratory systems is one of many issues contributing to the broader challenge of having integrated biosurveillance systems and activities. In addition, the challenges of increasing radiologic capacity and developing additional and improved laboratory methods are part of the broader challenge of enhancing CDC's scenario-specific response capabilities. Finally, having sufficient numbers of trained staff is a challenge faced within public health laboratory science in addition to other core public health functions. For more information about the broader, cross-cutting challenges that CDC faces and priorities in place to address these challenges, see Chapter 7, "Moving Forward," on page 47.



# Chapter 5: Response and Recovery Operations

**W**hen a disaster occurs, CDC must respond effectively and support national, state, and local partners. A critical component of the agency's work during an event is to coordinate response activities and provide resources to state and local public health departments. Effective response and recovery requires that extensive planning and ongoing operational activities occur.

CDC's response and recovery preparedness objective is to assure an integrated, sustainable, nationwide response and recovery capacity to limit morbidity and mortality from public health threats. TPER activities in this area consisted of 32 projects, which occur in 7 of CDC's major offices and centers. FY 2007 funding for activities supporting this objective was more than \$550 million, approximately 90% of which was allocated to ensure the availability of key medical supplies through the Strategic National Stockpile.

Major CDC activities and accomplishments that focus on achieving the response and recovery operations objective include:

- Operating a command center for monitoring and coordinating emergency response;
- Planning, training, exercising, and evaluating to improve emergency response;
- Responding to hazardous substance emergencies;
- Ensuring availability of key medical supplies during emergencies;
- Restricting the spread of health threats at U.S. borders;
- Providing risk and emergency communication capabilities;
- Supporting the protection of vulnerable populations; and
- Protecting the health, safety, and resiliency of emergency responders during an event.

## **Operating a command center for monitoring and coordinating emergency response.**

In 2001, CDC headquarters for response activities consisted of available conference rooms with limited equipment. The Director's Emergency Operations Center (DEOC) now enables CDC to maintain situational awareness of public health-related events or incidents at the international, national, state, and local levels. The DEOC serves as the contact point for reporting public health threats and supports the HHS Secretary's Operations Center.

The DEOC was established in 2003 to coordinate emergency responses to public health threats in the United States and abroad.<sup>33</sup> Staffed around-the-clock, the facility provides CDC with the ability to detect public health threats more quickly. The DEOC organizes CDC scientific experts in one location during an emergency response to efficiently exchange information and connect with local, state, federal, and international partners. For multistate or severe emergencies, CDC can provide additional public health resources and coordinate response efforts across multiple jurisdictions, both domestically and abroad.<sup>34</sup>

To support state and local efforts during an emergency response, the DEOC coordinates deployment of CDC staff and equipment. This coordination includes the procurement and management of all the equipment and

**CDC Director's Emergency Operations Center is staffed around-the-clock to monitor public health emergency events.**



Source: CDC

CDC's response and recovery preparedness objective is to assure an integrated, sustainable, nationwide response and recovery capacity to limit morbidity and mortality from public health threats.

supplies that CDC responders need during their deployment. In addition, the DEOC has the capability to transport life-supporting medications, samples/specimens, and personnel at any time anywhere in the world via aircraft that can be launched within 4 hours of notification for domestic and 6 hours for international responses.<sup>35</sup>

In FY 2007, specific accomplishments for monitoring and coordinating emergency response included:

- Responding to 33 domestic and 12 international events for a total of 326 days in which the DEOC was activated or engaged, including responding to incidents such as Hurricane Dean and a suspected case of extremely drug-resistant tuberculosis traveling on an international flight.
- Deploying CDC personnel to Kenya and Tanzania to investigate a Rift Valley fever outbreak, to Uganda to investigate a Marburg outbreak, to the Democratic Republic of the Congo to investigate an Ebola outbreak, and to the Republic of Panama to investigate a toxic chemical exposure (see box on page 28).

#### CDC epidemiologist collects an oral swab during a Marburg outbreak investigation in Uganda.



Source: CDC

- Providing the necessary equipment for more than 1,000 CDC deployed personnel for emergency response operations, EPI-AID investigations,<sup>36</sup> and daily operations.
- Developing the Biological Containment System Program in collaboration with CDC's Office of Health and Safety and the U.S. Department of Defense. When completed, this system will provide a MEDEVAC<sup>37</sup> capability for the Emergency Operations aircraft to transport infectious and/or contagious<sup>38</sup> patients requiring isolation.

- Using the Emergency Operations aircraft eight times to support real-world events and exercises.

**Planning, training, exercising, and evaluating to improve emergency response.** CDC is continually working to enhance its preparedness for all-hazard emergencies. A significant part of this work includes planning, training, and conducting exercises, and then evaluating CDC's ability to respond after a simulated exercise or a real-life incident.

*Planning.* CDC develops emergency operation plans that describe the roles and responsibilities of different offices, centers, and institutes across CDC during an emergency event or incident. CDC has an all-hazards base plan, the CDC Emergency Operations Plan, which outlines core roles and responsibilities for all-hazard responses, as well as specific plans outlining roles and responsibilities for scenario-specific events or incidents (e.g., hurricanes or anthrax incidents).

*Training.* In FY 2007, more than 200 CDC employees were trained on the Incident Command System (ICS),<sup>39</sup> the common emergency response operating system that serves as the basis for the National Incident Management System. This training helps to ensure that CDC field response teams are able to operate effectively as part of the state or local response structure they are deployed to assist. It also helps CDC staff assigned to the DEOC as part of the CDC Incident Management System to collaborate more effectively with their counterparts in state and local emergency operations centers. All 50 states have also trained public health officials on their roles and responsibilities during an emergency as outlined by ICS. The widespread use of ICS enables personnel to work together using common terminology, procedures, roles, and responsibilities. In addition to ICS training, CDC staff participating in preparedness exercises often receive training on the CDC emergency operations plans specific to the exercise scenario.

*Exercising.* Exercises are key to enhancing CDC's response capabilities. CDC conducts exercises to practice and evaluate the integration and coordination of its response capabilities. In FY 2007, CDC conducted or participated in exercises addressing CDC response to simulated

## Examples of Strategic National Stockpile Supplies that Help Protect the Nation\*

- Enough smallpox vaccine to protect 300 million people, or every man, woman, and child in America
- Vaccines and antibiotics to prevent and treat anthrax
- Countermeasures to address radiation exposure
- Antiviral drugs and vaccines for an influenza pandemic



CDC's Strategic National Stockpile includes medical countermeasures, equipment, and supplies (Source: CDC)

\*Adapted from the testimony of Gerald W. Parker, Principal Deputy Assistant Secretary for the Office of the Assistant Secretary for Preparedness and Response, before the U.S. House of Representatives Subcommittee on Emerging Threats, Cybersecurity, and Science & Technology, April 2007.

incidents such as hurricanes, the detonation of radiological dispersal devices (e.g., dirty bombs), and an outbreak of pandemic influenza.

*Evaluating.* Planning, training, and exercising prepare CDC for real-world incidents and are evaluated and refined following each major exercise, event, or incident. CDC evaluates its performance through an after action report and an improvement plan process to ensure that appropriate improvements are made in preparedness activities. This process helps assess what worked well during an exercise, event, or incident and what can be improved.

**Responding to hazardous substance emergencies.** CDC's hazardous substance emergency response team supports federal, state, and local responders during an emergency. Hazardous substances include mercury, pesticides, asbestos, chlorine, and unknown chemical agents. The response team is on call to provide scientific expertise on subjects such as chemistry, toxicology, environmental science, and medical treatment for exposure to hazardous substances. Teams are available around-the-clock, and provide an on-site response team anywhere in the continental United States, usually within eight hours of a request.

**Ensuring availability of key medical supplies during emergencies.** Established in 1999, CDC's Strategic National Stockpile has large quantities of medicine, vaccines, and medical supplies to protect the U.S. population if a public health emergency is severe enough to cause local supplies to run out. This approximately \$3.5 billion<sup>40</sup> resource has the drugs and vaccines needed to protect the

public from bioterrorist attacks. In strategic locations around the nation, Stockpile assets are designed to supplement and resupply state and local public health agencies in the event of a large-scale public health emergency anywhere and at anytime within the United States or its territories. Stockpile assets, when combined with federal, state, and local technical expertise to manage and distribute them efficiently, help ensure key medical supplies are available to prepare for and respond during emergencies.

*Types of Stockpile Supplies.* The Stockpile is a national repository of antibiotics, antiviral drugs, chemical antidotes, antitoxins, vaccines, life-supporting medications, and medical supplies (see box above). Stockpile supplies include:

- *Medical supplies from 12-hour Push Packages and Managed Inventory.* Each state has plans to receive Stockpile supplies and distribute them as quickly as possible

**When the threat is ill-defined, 12-hour Push Packages provide the capability to rapidly deliver medical assets early in an event.**



Source: CDC

to local jurisdictions, which dispense to their communities. Once federal and state authorities agree that the Stockpile is needed, pre-configured medicine and medical supplies can be delivered to any state in the continental United States within 12 hours of the decision to deploy. Each 12-hour Push Package contains 50 tons of pharmaceuticals and medical supplies designed to provide rapid delivery of a broad spectrum of assets in the early hours of an event. If the incident requires additional or different pharmaceuticals and/or medical supplies, Managed Inventory supplies can arrive within 24 to 36 hours.

- CHEMPACK supplies.* CHEMPACK is a nationwide program of containers of nerve-agent antidotes at the state and local levels, which increases the capability to respond quickly to a nerve-agent event. These antidotes come in two types of containers: the hospital container, designed for hospital dispensing, with medication available in multidose vials; and the Emergency Medical Services container, designed for use by first responders, with medication available in auto-injectors. Now more than 92% of the U.S. population is within a 1-hour buffer to access these life-sustaining antidotes with containers available in more than 1,300 different sites throughout all 50 states and Washington, D.C.
- Federal Medical Stations.* These stations provide a modular and rapidly deployable medical healthcare platform for the care of displaced persons who have nonacute medical, mental health, or other health-related needs that cannot be accommodated or provided for in a shelter for the general population during an event. These stations are stocked with beds, supplies, and medicine to care for up to 250 nonacute and special-needs patients for up to three days. They are modular, scalable, and modeled for all age populations and can be transported by air or ground for rapid, maximum geographic distribution upon request in an emergency. A standard station must be housed inside an existing structurally intact building with electricity, heating, air conditioning, ventilation, and clean water services (commonly described as a building of opportunity).

Federal Medical Stations provide nonacute and special needs care during catastrophic health events.



Source: CDC

*Management of Stockpile Supplies and Technical Assistance.* Managing the procurement, storage, and transportation of medical supplies in the Stockpile entails ensuring that pharmaceuticals are kept within U.S. Food and Drug Administration potency shelf-life limits, conducting quality assurance practices, and ensuring materials added to the Stockpile are based on the latest scientific data, threat levels, and overall ability to deploy to a public health emergency.<sup>41</sup> This involves quarterly quality assurance and quality control checks on all 12-hour Push Packages; yearly manual counts of Managed Inventory; and inspections of environmental conditions, security, and storage facilities.

CDC provides technical assistance to state and local sites both in preparation for public health emergencies and when Stockpile assets are deployed. Pre-event assistance for public health emergencies is provided by CDC program services consultants, who routinely visit state, local, and large metropolitan public health departments<sup>42</sup> to assist them in planning for the receipt, distribution, and dispensing of critical medicines specific to jurisdictional needs. Technical assistance includes site visits, thorough review of preparedness plans, telephone consultations, training courses, and satellite broadcasts.

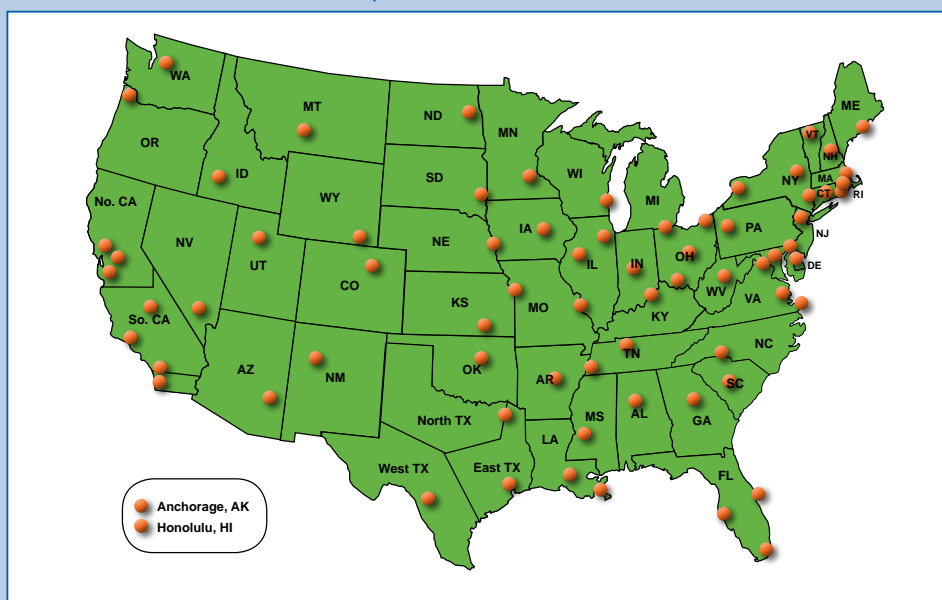
CDC also provides forums for the jurisdictions to share promising practices electronically through a Listserv as well as through regional workshops. States and selected cities are evaluated annually to demonstrate a level of preparedness against standards in key functional areas established by CDC. Annual performance objectives and targets focus assistance and resources on the nation's preparedness needs.

## Cities Readiness Initiative Enhances Preparedness

The Cities Readiness Initiative (CRI) focuses on enhancing preparedness for countermeasure dispensing in the nation's largest metropolitan statistical areas (MSA), where more than half of the U.S. population resides. Through CRI, state and large metropolitan public health departments have been developing plans to dispense medical countermeasures to the entire population of an identified MSA within 48 hours. The CRI project started in 2004 with 21 MSAs and has expanded to 72, with at least one CRI MSA in every state (see [www.emergency.cdc.gov/cri](http://www.emergency.cdc.gov/cri)).

CRI has helped to enhance communication and collaboration between state and local public health departments, resulting in optimal use of shared resources. A significant milestone in FY 2007 has been private sector partnerships to improve Stockpile planning and assessment.

72 CRI Metropolitan Statistical Area Locations; 2007



Source: CDC

When certain Stockpile assets are deployed, technical advisory support is provided through specialized CDC teams. These teams work with state and local officials to ensure efficient receipt and distribution of assets upon arrival.

Building the capability to ensure that key medical supplies are available during emergencies is a continuous process of acquiring and managing assets, providing technical assistance, and evaluating readiness. In FY 2007, specific accomplishments to support this effort included:

- Acquiring critical, life-supporting medicine and medical supplies;
- Conducting 208 site visits to assist state and local public health departments in the planning and implementation stages

for receiving, distributing, and dispensing Stockpile assets in the event of a public health emergency;

- Using Stockpile aircraft 14 times to support real-world events and exercises (see box on page 36);
- Evaluating all 50 states and four metropolitan statistical areas on their ability to demonstrate their level of preparedness against standards in key preparedness functional areas established by CDC;
- Partnering with businesses and other governmental entities to explore alternate methods of providing needed medical supplies to the public and improving existing ones to strengthen readiness;<sup>43</sup> and

## CDC's Rapid Response Provides Critical Support in Life-Threatening Situation

In March 2007, a doctor from the University of Chicago Comer Children's Hospital contacted CDC for help in diagnosing and treating a 2-year-old child who had developed eczema vaccinatum (EV). EV is a life-threatening skin infection caused by the vaccinia virus, the virus which is used as the smallpox vaccine. EV can occur when people who have eczema come into contact with someone who has recently been vaccinated for smallpox. The child, who had severe eczema, inadvertently had contact with his father who had received the smallpox vaccination weeks earlier as part of military deployment preparation.



Source: CDC

CDC and the Illinois Department of Public Health Laboratory – a member of CDC's Laboratory Response Network – collaborated to rapidly identify and confirm the diagnosis. CDC provided medications to the hospital in less than 6 hours after the decision to deploy its Strategic National Stockpile aircraft. During a one-month period, CDC coordinated six trips, three of which used Stockpile aircraft, to deliver 69 vials of vaccinia immune globulin (which was not widely available) to treat the child and his mother, who had developed a less serious infection. In addition, CDC officials worked with the

U.S. Food and Drug Administration to provide a smallpox antiviral drug (ST-246), provided under an Investigational New Drug protocol, to help with the boy's recovery.

The quick activation of CDC Stockpile assets, mobilization of CDC experts, and collaboration with the Illinois Department of Public Health helped save the lives of the child and mother and prevented further medical complications. [For more information see *Morbidity and Mortality Weekly Report* 2007;56(19); 478-481.]

- Providing 31 training courses, with more than 1,000 attendees, to state and local public health departments on how to quickly receive, stage, store, and dispense assets from the Stockpile.

### Restricting the spread of health threats at U.S. borders.

The growing concern about the threat of importing infectious diseases through mobile populations, animals, and cargo emphasizes the need to monitor and protect U.S. borders. CDC's quarantine and migration health system provides the critical infrastructure to support the preparedness and response activities associated with global infectious disease threats that may enter the United States. In collaboration with partners, the quarantine and migration health system and other parts of CDC play a key role in stopping the spread of communicable diseases.

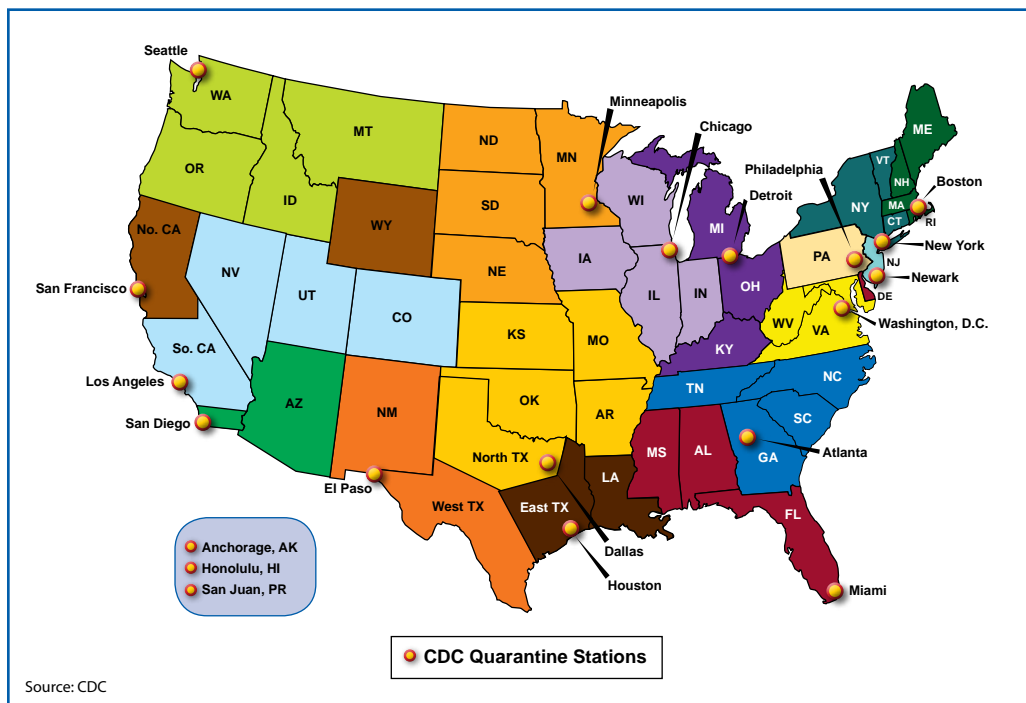
On the global front, the quarantine and migration health system improves the medical screening and disease detection in refugee and immigrant populations prior to their arriving in the United States. The system also responds to

disease outbreaks and other public health needs among U.S.-bound refugees.

Strategically located at ports of entry and land-border crossings where the majority of international travelers arrive in the United States, domestic quarantine stations allow CDC to restrict the spread of health threats in the country. An Institute of Medicine report published in September 2005 recommended that CDC increase the number of quarantine stations from 8 to 25.<sup>44</sup> In response, CDC increased the number of U.S. Quarantine Stations from 8 in 2004 to 20 in 2007 (see figure 3 on page 37). The two newest quarantine stations in Dallas and Philadelphia were opened in FY 2007.

Stations are staffed with quarantine medical and public health officers from CDC who assess whether ill persons may have a communicable disease and take appropriate measures to prevent the spread of the disease. Station staff work with state and local health officials, Customs and Border Patrol, and the Transportation Security Administration to prevent disease spread. CDC

Figure 3: CDC Quarantine Stations and Jurisdictions; 2007



In collaboration with partners, the quarantine and migration health system and other parts of CDC play a key role in stopping the spread of communicable diseases.

has the legal authority to apprehend, detain, examine, and conditionally release individuals arriving in the United States from a foreign country and those individuals traveling between states suspected of carrying certain specified communicable diseases.<sup>45</sup> The communicable diseases are specified through an executive order of the President and currently include cholera, diphtheria, infectious tuberculosis, plague, smallpox, yellow fever, viral hemorrhagic fevers, SARS, and new types of influenza with the potential to cause a pandemic.

In FY 2007, specific accomplishments that support restricting the spread of threats at U.S. borders included:

- Stopping measles, polio, and Rift Valley fever cases from Kenyan refugee camps from entering the United States;
- Ensuring infectious disease response plans were in development with port-of-entry partners at all United States quarantine stations;
- Conducting infectious disease response exercises at quarantine stations; and
- Establishing intergovernmental collaboration with Australia, Canada, New Zealand, and

the United Kingdom for overseas health screening of immigrants and refugees.

**Providing risk and emergency communication capabilities.** Getting accurate information to people quickly is a key component to saving lives during an emergency. Crisis and emergency risk communication provides information for individuals, stakeholders, or an entire community to support the best possible decisions to protect their health. CDC is using a variety of tools to effectively communicate accurate information about public health threats. These tools include the Public Information Contact Center and Clinician Information Line, the Clinician Outreach and Communication Activity, the Emergency Preparedness and Response website, and translation services for emergency information.

*Public Information Contact Center and Clinician Information Line.* CDC expanded the toll-free CDC-INFO public information contact center to ensure that the general public, clinicians, and emergency responders have a place to call and obtain information during a public health emergency.

*Clinician Outreach and Communication Activity.* To facilitate the rapid dissemination

of information to clinicians, CDC operates the Clinician Outreach and Communication Activity (COCA).<sup>46</sup> CDC sends weekly e-mail updates of recent changes to information on emergency preparedness and response topics, and other related health issues to the approximately 40,000 individual members and 145 partner health and medical organizations. CDC also announces new training opportunities related to emergency preparedness and response topics to clinician members. In FY 2007, 105 COCA updates on emergency preparedness and response information were disseminated to clinicians.

*Emergency Preparedness and Response Website.* CDC's Emergency Preparedness and Response website ([www.emergency.cdc.gov](http://www.emergency.cdc.gov)), developed in 2002, provides updated content on natural disasters, terrorist events, national emergencies, and outbreaks within a half-hour of when new, relevant information becomes available. Targeted

information can be accessed by critical audiences such as the general public, first responders, clinicians, laboratorians, and state and local public health workforce. The website contains resources on more than 100 emergency topics.

In 2007, CDC added a new section to the website, titled Emergency Preparedness and You, targeted toward helping members of the general public increase personal preparedness. Podcasts are also available, as well as the option to receive e-mail updates on topics of interest.

*Translation Services for Emergency Information.* CDC can translate information and emergency requests into more than 75 languages. This translation capability enables CDC to provide appropriate communications to a variety of populations, especially in the event of an emergency. Other available services include interpretation, signing, and voice-over in Spanish for any audio or video files.

CDC's Emergency Preparedness and Response website contains resources on more than 100 emergency topics.

Source: CDC



In FY 2007, specific accomplishments included:

- Making the Emergency Preparedness and Response website available in 9 different languages with selected support documents available in another 13 languages;<sup>47</sup>
- Translating public service announcements into American Sign Language, and making video clips available on the Emergency Preparedness and Response website;
- Translating the “Blast Injuries: Essential Facts” fact sheet, used by CDC to respond to terrorist bombings, into seven different languages and making nine additional blast injury fact sheets also available in French, Spanish, and Chinese; and
- Translating CDC Crisis and Emergency Risk Communication training materials into different languages, allowing for global dissemination.

**Supporting the protection of vulnerable populations.** Successful planning and response to public health hazards requires protecting the health and safety of vulnerable populations before, during, and after emergencies. These groups include populations whose circumstances and conditions require distinct, special, and additional attention to ensure safety and well-being in a particular emergency setting. To help state and local public health departments identify these populations, CDC developed an index using a geographic information system and a software application to produce county-based maps of vulnerable populations. More than 20 states are using this software in their preparedness planning.

**Protecting the health, safety, and resiliency of emergency responders during an event.** Emergency responders play a critical role in protecting people during public health emergencies, terrorist acts, and numerous other emergency events. CDC occupational safety experts serve as the focal point of technical expertise, on-site support, and research on safety management practices to enhance preparedness and response efforts for emergency responders.

In FY 2007, specific accomplishments included:

- Establishing a research portfolio outlining strategic goals and research needs regarding worker safety for the emergency response community,

- Coordinating with other federal partners to develop recommendations for protecting response and recovery personnel working extended hours,<sup>48</sup> and
- Publishing information on worker protection during an influenza pandemic.<sup>49</sup>

### Challenges for Response and Recovery Operations

**Enhancing emergency response through preparedness exercises.** Preparation for public health emergencies requires both the successful building of core emergency response capabilities that can be applied to all hazards, as well as specific capabilities unique to individual scenarios. Although CDC has conducted numerous emergency response exercises, there are many potential public health threat scenarios that have not yet been addressed in exercises. Therefore, additional planning and exercising for threats that have not been included in previous exercises would enhance preparedness.

CDC is establishing a five-year calendar of scenario-specific exercises designed to enable CDC responders to practice scenario-specific plans. The overall goal of these exercises is to ensure, expand, and strengthen an integrated, sustainable, nationwide response and recovery capacity to limit morbidity and mortality from public health threats.

**Building surge capacity for CDC response personnel.** Although progress has been made in increasing the number of personnel identified, trained, and medically cleared to deploy in response to an event, CDC must continue to work toward having skilled personnel with the right expertise and a sufficient number of these qualified personnel to sustain surge operations for all domestic and international events. Existing personal protection equipment and pharmaceutical supplies are not sufficient to support deployment personnel for all emergency scenarios.

**Expanding the quarantine system.** To develop coordinated quarantine capacity, CDC needs to continue increasing the number of quarantine stations at major ports of entry, establish initiatives on border security as part of CDC’s discussions with public health counterparts in Mexico and Canada, and address legal and ethical questions regarding isolation and quarantine measures in communities to impede the spread of communicable diseases.

**Improving the safety and health of emergency responders.** Failure to place as much emphasis on responders as is placed on victim rescue and site recovery hampers the ability of federal, state, and local governments to determine responder healthcare needs. Identifying responders needing periodic health monitoring and treatment both in the field and after returning from a deployment, and identifying trends and patterns of illness or injury arising from response activities are critical to improving responder safety and health.

**Defining a research agenda for public health preparedness including vulnerable populations.** Currently, there is no integrated public health preparedness research agenda that focuses future scientific efforts on identifying best practices. A comprehensive research agenda for public health preparedness is needed to drive system improvements and initiate a comprehensive evaluation program for public health activities. Information on the optimal strategies for assisting vulnerable populations during an emergency is also incomplete. Additional research needs to focus on vulnerable

populations and community resilience. At CDC's request, the Institute of Medicine made recommendations regarding research priorities for improving emergency preparedness and response systems in public health.<sup>50</sup>



Several of the challenges for response and recovery operations contribute to challenges that cut across CDC's core public health functions. The challenge of enhancing emergency response through preparedness exercises is part of the broader challenge of enhancing CDC's scenario-specific response capabilities. Also, having sufficient numbers of trained staff for surge capacity is a challenge faced within response and recovery operations in addition to other core public health functions. Finally, defining a research agenda for public health preparedness including vulnerable populations is one of many issues that needs to be addressed to assist vulnerable populations. For more information about the broader, cross-cutting challenges that CDC faces and priorities to address these challenges, see Chapter 7, "Moving Forward," on page 47.

# Chapter 6: Public Health System Support

To enhance preparedness and response, CDC supports state, local, territorial, and tribal public health systems so they are better able to fulfill their responsibilities for the public health and welfare of the people in their jurisdiction. State and local governments are closest to those impacted by incidents and have always had the lead in response and recovery. During a response, states coordinate resources and capabilities throughout the state and obtain additional resources and capabilities from other states and the federal government.

CDC's public health system support preparedness objective is to expand and strengthen integrated, sustained, national, foundational and surge capacities capable of reaching all individuals with effective assistance to address public health threats. TPER activities in this area consisted of 27 projects in 5 of CDC's major offices and centers. FY 2007 funding for activities supporting this objective was more than \$750 million, approximately 90% of which was allocated to support state and local health departments through the Public Health Emergency Preparedness cooperative agreement.

Major CDC activities and accomplishments that focus on achieving the public health system support objective include:

- Supporting state and local health departments through funding and technical assistance;
- Collaborating, training, and providing educational tools to enhance preparedness; and
- Strengthening legal preparedness for public health emergencies.

## Supporting state and local health departments through funding and technical assistance.

CDC's Public Health Emergency Preparedness (PHEP) cooperative agreement is a critical source of technical assistance and funding for state and local health departments. The PHEP cooperative agreement began in 1999 to develop public health infrastructure, capacity, and plans to respond to events of terrorism and related public health emergencies. At first, only a few states and large metropolitan areas were funded. After the terrorist attacks of September 11, 2001, and

the anthrax attacks of October 2001, Congress appropriated supplemental funding to CDC to distribute to 62 state, local, territorial, and tribal public health departments<sup>51</sup> to implement a comprehensive terrorism preparedness and emergency response program. As of FY 2007, CDC had provided more than \$5 billion in funding.

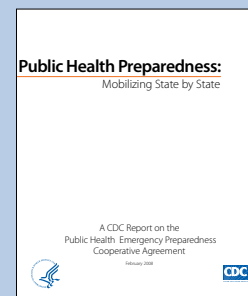
CDC provides technical assistance to each jurisdiction to develop critical public health preparedness capacities, including preparedness planning and readiness assessment, surveillance and epidemiology, biological and chemical laboratory capability and capacity, communications systems and information technology, health information dissemination and risk communication, and education and training. The technical assistance includes sharing CDC public health expertise, identifying promising practices, providing guidance for exercises, and developing performance goals.

With funding support from the PHEP cooperative agreement, public health departments have made progress in preparedness, including developing response plans, implementing a formalized incident command structure, and conducting exercises. In addition, public health departments can better detect and investigate diseases because of improvements in the public health workforce and in data collection and reporting systems.

CDC's public health system support preparedness objective is to expand and strengthen integrated, sustained, national, foundational and surge capacities capable of reaching all individuals with effective assistance to address public health threats.

## CDC Report on State Preparedness Progress

For more information about progress and challenges in state public health preparedness, see CDC's report, *Public Health Preparedness: Mobilizing State by State* at [www.emergency.cdc.gov/publications/feb08phprep](http://www.emergency.cdc.gov/publications/feb08phprep).



Due to PHEP funding, advances have also been made through the Public Health Information Network, a national initiative to improve the capacity of public health to use and exchange information electronically by

### Health Alert Network

CDC's Health Alert Network (HAN) functions as a health alert component to the Public Health Information Network to ensure that each community has prompt access to emergent health information. HAN provides information to state and local public health practitioners, clinicians, and public health laboratories about urgent health events. It also provides opportunities for public health professionals to network and share promising practices and lessons learned related to partner communications and alerting. The HAN messaging systems transmit health alerts, advisories, and updates to more than one million recipients.

promoting the use of standards and defining technical requirements (see box on Health Alert Network). Standards and technical requirements are being determined by best practices to develop certification criteria for state and local public health departments that support both routine public health activities and emergency preparedness and response. Laboratories now have increased capability to test for biological and chemical threats and to communicate information.

In FY 2007, key CDC accomplishments to support state and local health departments included:

- Increasing state and local health departments' access to CDC preparedness subject matter experts through additional field assignments and other customized technical assistance approaches;
- Developing an evaluation framework and related capacity and capability performance measures for incident management and crisis and emergency risk communication in conjunction with representatives from state and local public health agencies, national partner organizations, and others; and
- Establishing an American Indian/Alaska Native working group to strengthen relationships between tribal partners and state health departments and ensure access to CDC resources and programs dealing with preparedness issues.

**Collaborating, training, and providing tools to enhance preparedness.** CDC provides a wide range of resources to enhance preparedness at all levels of government. In FY 2007, TPER funding supported Centers for Public Health Preparedness, Advanced Practice Centers, radiological preparedness tools, Crisis and Emergency Risk Communication courses, products distributed by CDC's Public Health Training Network, Meta-Leadership Summits for Preparedness, and blast injury trainings and materials.

### Rhode Island Responds to a *Mycoplasma* Outbreak

In December 2006, Rhode Island set in motion emergency operation procedures in response to an outbreak of respiratory and neurologic illness due to *Mycoplasma pneumoniae*. The state and the city of Providence, in cooperation with the Rhode Island Department of Health and many state and local partners, used their Medical Emergency Distribution System plans to provide antibiotics to every person needing them. At the school where the infection was first identified, public health personnel dispensed preventive medications to nearly 1,200 students, faculty, staff, and their families. This occurred over the New Year's holiday weekend, making access to personnel and materials more difficult.

The Rhode Island Department of Health's success in containing this disease outbreak was partially due to the investments made in the medication distribution plan, risk communication, and Incident Command System training of all staff as part of its all-hazards approach to public health emergencies.



Source: CDC

*Centers for Public Health Preparedness Program.* CDC manages the Centers for Public Health Preparedness program to strengthen preparedness by linking academic expertise to state and local health agency needs. This program brings together schools of public health and other university programs with a common focus on preparedness to establish a national network of academic-based programs that share expertise and resources across state and local jurisdictions. The Pandemic and All-Hazards Preparedness Act (December 2006) expanded the focus of the Centers for Public Health Preparedness work in FY 2009 to include the development of public health response core curricula and a research agenda. More than \$10 million was recently awarded to seven accredited schools of public health for the establishment of Preparedness and Emergency Response Research Centers. The seven schools will conduct research that will evaluate the structure, capabilities, and performance of public health systems for preparedness and emergency response activities.<sup>52</sup>

In FY 2007, specific accomplishments for the Centers for Public Health Preparedness program included:

- Conducting nearly 600 public health preparedness education and training activities that reached more than 40,000 individuals. Activities included public health preparedness certificate programs, preparedness training for nurses and other hospital-based health professionals, exercise planning and evaluation, all-hazards web-based distance learning, and National Incident Management System/Incident Command System courses.
- Establishing a web-based Resource Center, managed by the Association of Schools of Public Health, which offers nearly 1,500 educational programs and materials for adoption, adaptation, and use by the public.
- Conducting 70 education and training activities addressing tribal preparedness issues.

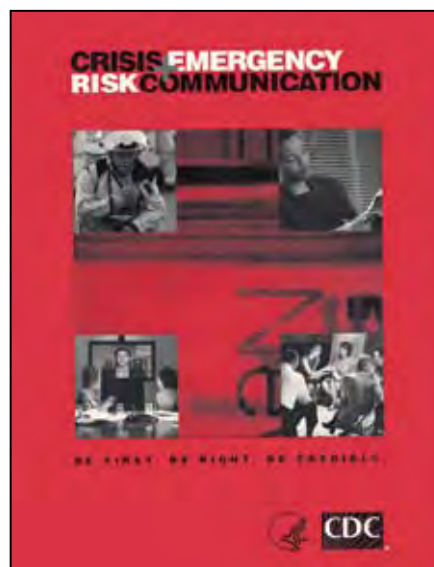
*Advanced Practice Centers.* CDC provides funding and guidance to the National Association of County and City Health Officials to manage and implement the Advanced Practice Centers program. These eight centers participate in developing cutting-edge tools and resources to help local public health departments prepare for, respond to, and recover from emergencies. In FY 2007, these centers provided two-day preparedness trainings to more than 500 local health departments.

*Tools for Radiological Preparedness.* CDC has developed several tools for state and local health

departments to plan and prepare for a radiological emergency. These tools include guidance for radiological monitoring of the affected population; community reception (monitoring) center flow diagrams describing various recommended functional areas (e.g., general registration, medical care and transfer, radiation dose/medical assessment areas), staffing, and equipment needs for reception center operations; and a toolkit with just-in-time and other training on roles and planning considerations for radiological/nuclear emergency preparedness.

*Crisis and Emergency Risk Communication Training.* Emergencies can be chaotic; to avoid confusion and reduce uncertainty, messages communicated to the public must be accurate, fast, consistent, relevant, and empathetic. CDC's Crisis and Emergency Risk Communication course provides essential knowledge and tools to navigate the harsh realities of communicating to the public, media, partners, and stakeholders during an intense public health emergency, including a terrorist event. The training course helps public health leaders understand the psychology of crisis communication. Practical, easy-to-use templates, checklists, and source documents are provided for use before, during, and after a crisis. In addition to 22 training seminars (1,656 participants) conducted at state and local public health departments and CDC in FY 2007, the online version of this training course<sup>53</sup> extends the reach of these materials to the public. For details about a successful response in which emergency risk communications played a role, see box at the bottom of page 42.

CDC-sponsored training courses help public health leaders learn how to communicate effectively during an emergency.



Source: CDC

*Public Health Training Network.* This network distributes educational and communication products to state and local officials who plan, detect, and respond to public health events. Products include interactive multimedia, videotapes, live audio conferences, and live satellite videoconferences as well as print-based self-instructional courses. CDC instructional specialists work with content experts at CDC and university schools of public health to develop these products for the public health workforce. This distance learning network is an efficient, effective, and economical way to share knowledge with public health professionals nationwide. In FY 2007, satellite broadcasts on mass antibiotic dispensing and emergency response for hospitals and treatment centers were conducted, as was training in WEBEOC, a software program used in emergency operation centers to manage crisis information.

*Meta-Leadership Summits for Preparedness.* An effective, integrated response to a public health emergency requires a variety of people and organizations working together. The objective of CDC's Meta-Leadership Summit for Preparedness Initiative<sup>54</sup> is to develop a cadre of business, government and nonprofit "leaders of leaders" who are capable of and committed to taking the reins during a crisis. These leaders learn problem-solving skills to prepare for and respond to a public health emergency. The summits also provide opportunities for leaders to build connections with other organizations to develop collaborative strategies for responding to events. CDC selectively targets leaders who are likely to benefit most due to their organizational position or expertise (approximately 150 people per session).

The initiative is conducted in partnership with the National Preparedness Leadership Initiative from the Harvard School of Public Health, the CDC Foundation, and the Robert Wood Johnson Foundation. In June 2007, the first pilot summit was conducted in Columbus, Georgia. Leaders attending the initial summit and the agencies they represent have already utilized the connections and skills gained from the summit during actual emergency events. The pilot phase<sup>55</sup> is now complete, and summits are being planned to reach leaders in all 50 states.

Dr. Barry Dorn, Harvard School of Public Health, presents the Five Dimensions of Meta-Leadership at the Columbus, Georgia, Summit in June 2007.



Source: CDC Foundation

*Blast Injury Trainings and Materials.* Blast injuries from explosives present unique challenges to healthcare providers; people with blast injuries may not show any obvious external symptoms but may still be in serious danger. To help prepare the emergency medical community, CDC developed a training course for public health workers, "Bombings: Injury Patterns and Care," based on lessons learned from cities such as London, Madrid, and Tel Aviv, that have experienced mass blast injuries. The course, developed as part of the Terrorism Injuries: Information, Dissemination, and Exchange Project and led by the American College of Emergency Physicians, was designed to help inform healthcare providers about blast injuries and their treatment.

A pocket guide on bombing injuries and a poster on blast injury were also developed. More than 10,000 copies of these materials have been disseminated. To increase knowledge about treating injuries from terrorist bombings, fact sheets on topics from crush injuries and burns to the treatment of children and older adults have been posted on the CDC website ([www.emergency.cdc.gov/blastinjuries](http://www.emergency.cdc.gov/blastinjuries)), and have been an integral part of CDC's blast injury response efforts.

**Strengthening legal preparedness for public health emergencies.** Legal preparedness is an integral part of a systemwide response to public health emergencies. Public health officials and their partners in emergency response, which include law enforcement and other key agencies, need to have legal authority to gather and exchange surveillance data, conduct joint investigations, provide and receive assistance across jurisdictional lines, implement social distancing measures,<sup>56</sup> and allocate scarce medical supplies. In addition, mutual aid agreements and memoranda of understanding must be in place to facilitate a coordinated, multijurisdictional response, and to have

ready access to practical information on legal preparedness best practices.

CDC's Public Health Law Program<sup>57</sup> provides expert consultation to federal, state, and local public health agencies and develops products to assess and strengthen legal preparedness. Among these resources are training courses, checklists, public health law bench books for state courts, and the CDC Public Health Emergency Legal Preparedness Clearinghouse. The continually updated Clearinghouse contains the most comprehensive, online collection of information on laws, legal issues, and legal tools relevant to public health emergencies.

In FY 2007, key CDC accomplishments to strengthen public health emergency legal preparedness included:

- Convening the National Summit on Public Health Legal Preparedness where policymakers and public health practitioners shaped the National Action Agenda for Public Health Legal Preparedness. This agenda contained 100 action options for use by state, local, and tribal officials in strengthening their jurisdictions' legal preparedness.
- Updating the "Forensic Epidemiology" training course to help public health and law enforcement agencies strengthen coordination of suspected bioterrorism attack investigations. The training course includes a new CDC-developed case study on coordinated implementation of pandemic influenza social distancing measures.
- Updating the "Public Health Emergency Law" training course for public health practitioners and emergency management professionals to improve understanding of the role of law as a public health tool. The update included a new case study on joint response to a toxic chemical spill.
- Developing the "Model Memorandum of Understanding (MOU) for Joint Public Health-Law Enforcement Investigations" and the "Guide for Developing MOUs for Public Health, Law Enforcement, Corrections, and the Judiciary: Coordinated Implementation of Community Response Measures to Control the Spread of Pandemic Respiratory Disease." Both the Model MOU

and the guide can be used by jurisdictions to strengthen cross-sector coordination in an emergency.

- Developing the "Menu of Suggested Provisions for Public Health Mutual Aid Agreements" and the regularly updated "Inventory of Mutual Aid Agreements and Related Resources."

### Challenges for Public Health System Support

**Conducting program activities with decreasing resources.** The public health system, including local, state, federal, and territorial public health departments and their partners, has made significant progress in preparedness. CDC continues this support but with reduced preparedness resources. Base funding for the Public Health Emergency Preparedness cooperative agreement has declined every year since fiscal year 2005 (see figure 4). This will necessitate increased collaboration and creativity in conducting program activities. Decreasing resources will require difficult decisions as to which activities can no longer be supported.

Figure 4: Public Health Emergency Preparedness (PHEP) cooperative agreement funding is on the decline.

PHEP Cooperative Agreement Funding*	
Fiscal Year 2005 Actual	\$857,337,000
Fiscal Year 2006 Actual	\$760,470,000
Fiscal Year 2007 Actual	\$712,919,000
Fiscal Year 2008 Enacted	\$700,465,000

\*Does not include non-TPER pandemic influenza supplemental funding distributed in fiscal years 2005 through 2007.

Sources: Data from CDC and the *Justification of Estimates for Appropriation Committee, U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Fiscal Years 2006 through 2009.*

**Continuing technical assistance on preparedness activities.** States made progress in 2007, notably on developing pandemic influenza plans. However, exercises are needed to validate these and other response plans and to make additional improvements. CDC plays a primary role in providing technical assistance at all stages of the preparedness cycle – planning, training, exercising, evaluating, and improving – and public health departments need the capability to sustain a preparedness system that includes all these components. This system should be ready to help vulnerable populations as well as the general public.

**Retaining experienced public health response personnel.** Public health preparedness is all about people. Ensuring that public health departments retain qualified response personnel is an ongoing challenge that could jeopardize staffing a sustained emergency response.

**Bolstering legal preparedness for public health.** All states are affected by public health emergencies, which led to the creation of the Emergency Management Assistance Compact (EMAC). EMAC provides form and structure to interstate mutual aid. Through EMAC, a state impacted by a disaster can request and receive assistance from other member states quickly and efficiently, resolving two key issues upfront – liability and reimbursement. Although all states have joined EMAC, gaps remain such as resource sharing with provinces in Canada or Mexico. Appropriate mutual aid agreements with those governments need to be negotiated and implemented.

**Continuing to measure public health preparedness.** To promote accountability as reinforced by the Pandemic and All-Hazards Preparedness Act (December 2006), performance measurement data are needed to assist CDC and public health departments in identifying specific improvements for response to and recovery from emergencies. Working in close collaboration with local, state, and federal partners, CDC has identified priority areas for performance

measurement and is reviewing and revising existing performance measures as well as drafting new measures as needed. These measures will enable evaluation and reporting on the nation’s ability to prepare for and respond to public health emergencies. The measures will support the following:

- Monitoring, for accountability purposes, the extent to which public health departments are able to demonstrate performance on specific preparedness and response capabilities;
- Identification of technical assistance needs for program improvement; and
- Demonstration of public health preparedness and response capabilities through publications and presentations of data.



Addressing these challenges effectively will significantly impact progress in public health preparedness. One of these challenges, having experienced public health response personnel, is a cross-cutting issue faced within public health system support in addition to other core public health functions. For more information about the broader, cross-cutting challenges that CDC faces and priorities to address these challenges, see Chapter 7, “Moving Forward,” on page 47.



# Chapter 7: Moving Forward

**T**he Centers for Disease Control and Prevention (CDC) plays a key role in preparing the nation for all types of public health emergencies. CDC's preparedness efforts include activities receiving Terrorism Preparedness and Emergency Response (TPER) funding, as well as those that receive funding from other sources, such as dedicated funding for infectious diseases or environmental health activities. All CDC's preparedness work builds on decades of science developed to promote public health.

Although much has been accomplished to enhance public health preparedness, many challenges still remain. Challenges within each of the core public health functions have been described in this report. CDC is prioritizing the allocation of resources for ongoing and future projects to respond to challenges that cut across multiple public health functions. Below are priorities of particular note that address cross-cutting challenges as we move forward.

**Strengthening public health preparedness at federal, state, and local levels in a climate of decreasing resources.** With the anticipated decline in TPER funding in FY 2009, CDC and state and local health departments must find new ways, including enhanced collaborations, to conduct program activities. CDC may also have to make difficult decisions about what the highest priority preparedness activities are and what must be postponed. Public health departments at state and local levels may have to make similar choices.

**Integrating biosurveillance systems and activities.** Health professionals must be able to recognize potential health emergencies as early as possible to prevent human deaths and mitigate suffering. This capability requires surveillance and integration of timely health-related information so that situational awareness can be maintained and health threats detected and characterized early.

Biosurveillance activities span across CDC's core public health functions outlined in this report. These activities involve data collection (health monitoring and surveillance); data analysis, fusion, and use, including development of potential interventions (epidemiology

and other assessment sciences); creation and interpretation of laboratory tests to identify health threats (laboratory sciences and service); implementation and evaluation of interventions (response and recovery operations); and integration of all information and resources into every level of the public health system (public health system support). This health intelligence system ultimately will support the production of a near real-time, electronic, common operating picture of routine and emerging acute health problems that can be easily shared across federal, state, and local government public health authorities and clinicians. These capabilities will enhance early detection of, rapid response to, and management of public health emergencies.

Developing the emerging field of biosurveillance will require new tools, methods, and analytic capabilities to integrate data from multiple sources (e.g., from BioSense and the National Poison Data System) and create more actionable information. Other priorities include advancing the availability of electronic health information across the health system; enhancing global capability for early detection and situational awareness; developing greater laboratory innovation and connectivity to support improved detection and faster response; and enhancing the public health workforce so that biosurveillance information can be collected, managed, analyzed, and disseminated.

In response to Homeland Security Presidential Directive - 21 (HSPD-21), CDC established a Biosurveillance Coordination Unit to lead the development of a national strategy and implementation plan for next-generation biosurveillance capabilities, in collaboration with a wide range of public and private sector partners. The plan, expected in FY 2009, will provide a picture of both the current and future states of the nation's biosurveillance capabilities and include a gap analysis to ensure that identified priorities provide the greatest value to stakeholders at all levels of government and the private sector.

**Improving public health workforce surge capacity.** The cornerstone of effective preparedness and response consists of skilled personnel with the right expertise and a sufficient

CDC may have to make difficult decisions about what the highest priority preparedness activities are and what must be postponed. Public health departments at state and local levels may have to make similar choices.

number of qualified personnel to sustain surge operations during an incident. Although some progress has been made to build surge capacity (e.g., increased numbers of epidemiology staff at state and territorial health departments and increased numbers of CDC personnel identified, trained, and medically cleared to deploy to an event), improvements need to continue.

CDC priorities for ongoing and future TPER-funded projects include support for public health laboratory surge capacity and continued expansion of CDC's pool of trained and available responders with expertise in a variety of areas, including epidemiology, emergency communications, informatics, emergency management, and other specialties.

**Helping vulnerable populations.** Successful planning and response to public health hazards require protecting the health and safety of vulnerable populations before, during, and after emergencies. Identifying strategies that provide effective interventions to protect vulnerable populations is an ongoing effort.

To strengthen assistance to these populations, CDC priorities include research projects such as developing an evidence base of effective public health interventions. Another priority is ensuring that the needs of vulnerable populations are included in CDC response planning and exercising. Ethical planning and response require meaningful engagement of the entire population, particularly those who are most vulnerable to the impact of the event, as early in the planning process as possible. CDC requested that the Ethics Subcommittee of the CDC Advisory Committee to the Director develop a white paper examining ethical issues and considerations for public health emergency preparedness and response. These issues include meeting the special needs of vulnerable populations in preparedness

planning and response activities. In addition, CDC commissioned five focus papers that explore issues related to professional, civic, and personal obligations; research in emergency settings; vulnerable populations; ethical issues related to stockpiling; and public engagement. The white paper and focus papers are scheduled to be published in 2009.<sup>58</sup>

**Enhancing capabilities for specific public health emergency scenarios.** CDC's priorities for ongoing and future preparedness and response projects include expanding key capabilities for specific scenarios. Some of these priorities promote projects that support response planning and exercising, particularly for threats that have not been included in previous exercises.

Other priorities address scenario-specific response including improved laboratory methods and capabilities for chemical and infectious agents and radiological materials, and for testing environmental samples. Also, CDC's priorities include support for improving laboratory surge capacity for scenario-specific events, particularly for radiation emergencies and environmental investigations.

### **A Continuing Commitment to Preparedness**

CDC's work in preparedness continues to evolve as improvements are made across the core public health functions and as new challenges emerge. CDC's investments in preparedness resulted in significant accomplishments in FY 2007, but there is much left to do. To have a strong platform for rapid and effective public health emergency response, CDC will continue to build its internal response capabilities and to strengthen external response capabilities through financial and/or technical support of partners at the local, state, tribal, territorial, federal, and international levels.

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# Appendices

# Appendix 1: Overview of CDC Preparedness Activities

The mission of the Centers for Disease Control and Prevention's (CDC) terrorism preparedness and emergency response activities is to prevent death, disability, disease, and injury associated with urgent health threats by improving preparedness of the public health system, the healthcare delivery system, and the public. CDC has made all-hazards preparedness and emergency response a priority and is building and enhancing systems at local, state, and federal levels. For more information, see CDC's Emergency and Response website ([www.emergency.cdc.gov](http://www.emergency.cdc.gov)).

## **CDC's Coordinating Office for Terrorism Preparedness and Emergency Response (COTPER)**

coordinates terrorism preparedness and emergency response activities across CDC and strategically distributes funds to other CDC coordinating centers and offices, and the National Institute for Occupational Safety and Health (NIOSH). COTPER comprises the following divisions and offices:

- The *Division of State and Local Readiness (DSLRL)* administers the Public Health Emergency Preparedness (PHEP) cooperative agreement, which funds state and local efforts to strengthen their abilities to respond to public health emergencies and provides technical assistance to promote these efforts.
- The *Division of Strategic National Stockpile (DSNS)* operates and maintains the Strategic National Stockpile, a national repository of antibiotics, chemical antidotes, antitoxins, life-support medications, and medical supplies. During a public health emergency, state and local public health systems and resources may become overwhelmed. The Stockpile is designed to supplement and resupply state and local public health departments in the event of such an emergency. DSNS also provides technical assistance to local officials to help ensure that local, state, and federal agencies can work together to receive, stage, store, and distribute Stockpile assets.
- The *Division of Emergency Operations (DEO)* coordinates CDC's preparedness, assessment, response, recovery, and evaluation prior to and during public health emergencies. DEO has overall responsibility for the CDC Director's Emergency Operations Center (DEOC), which maintains situational awareness of potential health threats 24 hours a day and is the centralized location for event management when activated. The DEOC is equipped with state-of-the-art communications technologies to support information pipelines with state, federal, and international partners.
- The *Division of Select Agents and Toxins (DSAT)*, through the Select Agent Program, regulates the possession, use, and transfer of biological agents and toxins (select agents) that have the potential to pose a severe threat to public health and safety. This program is designed to ensure compliance with the select agent regulations by providing guidance and evaluating and inspecting registered entities.
- The *Office of the Director (OD)* manages strategy, budget formulation, policy, workforce and career planning, communication, research, and science for terrorism preparedness and emergency response activities. In addition, OD manages the Career Epidemiology Field Officer program, which recruits and supports skilled epidemiologists in state and local public health departments. Through this program, public health departments can choose to spend PHEP cooperative agreement funds to support a field officer in their agencies. OD also manages the Centers for Public Health Preparedness program, a national network of colleges and universities that collaborates with state and local agencies and other community partners to provide preparedness education and training resources to the public health workforce, healthcare providers, students, and others based on community need.

Emergency preparedness and response is a collective effort among the different offices and centers at CDC. In addition to the programs that COTPER manages directly, other CDC organizations and programs make significant contributions to emergency preparedness and response. The organizations and programs that follow receive Terrorism Preparedness and Emergency Response funding and/or funding from other sources.

### Coordinating Center for Environmental Health and Injury Prevention (CCEHIP)

CCEHIP plans, directs, and coordinates public health research, programs, and laboratory sciences that improve health and eliminate illness, disability, and/or death caused by injuries or environmental exposures. CCEHIP conducts public health preparedness activities through two national centers.

- The *National Center for Environmental Health/Agency for Toxic Substances and Disease Registry (NCEH/ATSDR)* conducts ongoing projects to improve surveillance systems, laboratory capacity, and emergency response. NCEH/ATSDR is improving various surveillance systems for chemical exposures, hazardous substance spills, and morbidity following disasters. NCEH/ATSDR also works with state and local public health departments to improve response to chemical, nuclear, and radiologic terrorism.
- The *National Center for Injury Prevention and Control (NCIPC)* links to the injury care community to decrease morbidity and mortality from injuries caused by explosions. NCIPC is moving toward this goal through curriculum development for healthcare providers, development of clinical guidance resources for management of blast injuries, and translation of lessons learned from international and U.S. military experience. NCIPC is also working to improve surveillance systems for blast injuries due to bombings and behavioral/mental health outcomes associated with disasters and incidents of mass violence and is providing educational materials to prevent or reduce the impact of these events on mental health and behavioral health outcomes.

### Coordinating Center for Health Information and Service (CCHIS)

CCHIS provides leadership and promotes innovation in public health informatics, health statistics, health marketing, and scientific communications. The national centers within CCHIS support CDC's emergency communication objectives in several ways.

- The *National Center for Health Marketing (NCHM)* strengthens health communications networks across federal, state, and local levels with such projects as Epi-X and the Public Health Training Network. NCHM's Emergency Communication Branch provides leadership for cross-agency emergency risk communication during emergencies and ensures that CDC coordinates with state and local public health departments in providing critical health protection information to the public, clinicians, emergency responders, and other stakeholders.
- The *National Center for Public Health Informatics (NCPHI)* coordinates BioSense, the near real-time biosurveillance system that provides health situational awareness using existing data from healthcare organizations across the country. Through the Public Health Information Network, NCPHI provides technical assistance and guidance to state and local partners to implement public health information systems for the exchange of data across organizational and jurisdictional boundaries.
- The *National Center for Health Statistics (NCHS)* develops and conducts data collection activities to monitor the nation's health and provides expertise in data collection and analysis to state and local partners through collaborative efforts.

### Coordinating Center for Health Promotion (CoCHP)

CoCHP seeks to increase the potential for full, satisfying, and productive living across the lifespan for all people in all communities. CoCHP preparedness activities include providing technical expertise in epidemiology, surveillance, and communications during emergencies for populations with physical and developmental disabilities and chronic diseases, pregnant and lactating women, reproductive-age women, infants, the elderly, and school-age children. The national centers in CoCHP have specific responsibilities related to these activities.

- The *National Center on Birth Defects and Developmental Disabilities (NCBDDD)* is conducting ongoing projects to develop and strengthen intramural research and surveillance capacity related to emergency preparedness for at-risk populations.

- The *National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP)* has produced a number of publications addressing issues surrounding persons with chronic diseases following natural disasters.

### **Coordinating Center for Infectious Diseases (CCID)**

CCID strives to protect the public's health by preventing and controlling infectious diseases. CCID's ongoing public health preparedness activities include developing vaccines, improving diagnostic methods for select bioterrorism agents, and improving the Laboratory Response Network.

- The *Influenza Coordination Unit (ICU)* ensures that the diverse activities related to pandemic or seasonal influenza preparedness and response activities are coordinated, effective, and efficient. ICU works with other CDC divisions and offices to continuously improve the CDC Pandemic Influenza Operations Plan, plan and participate in agencywide exercises, and manage portfolios of related pandemic influenza projects.
- The *National Center for Immunization and Respiratory Diseases (NCIRD)*, as part of the Anthrax Vaccine Research Program, is conducting a large-scale human clinical trial of the anthrax vaccine, as well as further immunological studies in animals. NCIRD is providing CDC leadership for the revision of the Advisory Committee on Immunization Practices guidelines for use of the anthrax vaccine. NCIRD is also collaborating in developing and evaluating alternative treatment strategies for inhalation anthrax.
- The *National Center for Zoonotic, Vector-Borne, and Enteric Diseases (NCZVED)* is working to improve surveillance, diagnostic and molecular methods, and laboratory capacities for a number of select bioterrorism agents, including smallpox, botulism, and plague. NCZVED also seeks to quicken the detection and response to bioterrorism agents in water and food.
- The *National Center for Preparedness, Detection, and Control of Infectious Diseases (NCPDCID)* manages the Laboratory Response Network, the global consortium of reference and national laboratories whose goal is to decrease the time needed to detect biological and chemical agents that can harm the public and respond to these events with detection and identification capacities and surveillance support. The Division of Bioterrorism Preparedness and Response is primarily responsible for managing the Laboratory Response Network and preparedness activities within CCID. In addition, NCPDCID tests the continuing effectiveness of existing drugs against bioterrorism agents and prepares U.S. ports of entry to reduce the risk of natural or intentional introduction of infectious diseases into the country.

### **Coordinating Office for Global Health (COGH)**

COGH provides leadership and works with global partners to increase life expectancy and quality of life and also to increase global preparedness to prevent and control natural and manmade threats to health.

- The Global Terrorism Preparedness and Emergency Response program is developing a pre-event strategy for CDC's external engagements with international public health partners in terrorism preparedness and emergency response.
- COGH also coordinates international response with the Director's Emergency Operations Center during international emergency response events and serves as the principal CDC point of contact for CDC programs, federal agencies, foreign governments, and other organizations concerned with international terrorism preparedness and response.

### **National Institute for Occupational Safety and Health (NIOSH)**

NIOSH provides leadership to prevent work-related illness, injury, and death through information gathering, scientific research, and translation of knowledge into products and services. The *NIOSH Emergency Preparedness and Response Office* is the focal point for technical expertise; rapid and specific on-site support; and advance research and collaboration to enhance preparedness and response efforts.

## CDC Office of the Director (OD)

OD manages and directs the activities of CDC and coordinates the CDC response to emergencies. Public health preparedness activities within the OD include security, legal preparedness, and workforce training. OD also coordinates the placement of senior management officials (SMOs), who function as the chief CDC representatives within selected states. SMOs oversee CDC resources, provide technical assistance, and serve as a point of contact during emergencies. In 2007, 11 states and Washington, D.C., had permanent SMOs, and five states and two territories had SMOs who provide support only during an emergency. The following OD offices participate in CDC preparedness activities:

- The *Office of the Chief Operating Officer (OCOO)* ensures that federal assets and critical infrastructure are safeguarded by providing security for CDC facilities and the Strategic National Stockpile. OCOO also manages secure intelligence communication systems and HealthImpact.net (an internal CDC system) to support terrorism preparedness projects.
- The *Office of the Chief of Public Health Practice (OCPHP)* is responsible for the legal basis of CDC preparedness programs and ensures coordination and synergy of preparedness activities within CDC and with numerous partners. Activities in support of the mission are carried out through programs and offices focused on public health law, public health system standards, agency accreditation, and surveillance for emerging issues in public health practice.
- The *Office of the Chief Science Officer (OCSO)* leads the agency in scientific vision by enhancing the relevance, quality, and integrity of science and by fostering successful scientific collaborations. At the request of the CDC Director, OCSO is the agency's approving authority of Emergency Use Authorization (EUA) submitted on behalf of CDC. OCSO assists CDC programs with oversight and review of EUA processes. If an emerging public health threat is identified for which no licensed or approved product exists, the Project BioShield Act of 2004 authorizes the U.S. Food and Drug Administration (FDA) commissioner to issue an EUA for the rapid dissemination of promising countermeasures for the protection and safety of the U.S. population. Specifically, these countermeasures can be used for the diagnosis, treatment, or prevention of serious or life-threatening diseases or for conditions caused by chemical, biologic, or radiologic agents for which no adequate, approved, or available alternatives exist. CDC plays a critical role in ensuring the public's safety by providing scientific expertise and leadership regarding the risk/benefit assessment of these countermeasures. CDC also provides support for the distribution of medical countermeasures stored in the Strategic National Stockpile formulary. CDC, in conjunction with National Institutes of Health, also provides expert consultation to the FDA commissioner regarding the appropriateness of EUA requests.
- The *Office of Enterprise Communication (OEC)* promotes effective and efficient communication networks both within CDC and with external partners, including the media. During an emergency situation that requires a CDC response, OEC provides information and communication support within the Joint Information Center located in the Director's Emergency Operations Center.
- The *Office of Workforce and Career Development (OWCD)* plans, directs, and manages workforce training programs for public health preparedness. The Epidemic Intelligence Service trains high-level epidemiologists for placement at CDC and in state and local public health departments. Management personnel and staff of the Laboratory Response Network reference laboratories are also trained in preparedness, select agent regulations, and testing protocols. The CDC University School of Preparedness and Emergency Response provides instructional offerings to support current and future training requirements of CDC responders.

# Appendix 2: TPER Funding Information

## Centers for Disease Control and Prevention Terrorism Preparedness and Emergency Response Budget for Fiscal Years 2005 through 2008

Terrorism – Budget Authority Budget Activity/Description	FY 2005 Actual	FY 2006 Actual	FY 2007 Actual	FY 2008 Enacted
Upgrading State and Local Capacity	\$919,148,000	\$823,099,000	\$766,660,000	\$746,039,000
• BT/Public Health Emergency Preparedness Cooperative Agreement	\$857,337,000	\$760,470,000	\$712,919,000	\$700,465,000
• Centers for Public Health Preparedness	\$29,425,000	\$30,669,000	\$29,063,000	\$28,555,000
• Advanced Practice Centers	\$5,424,000	\$5,342,000	\$5,355,000	\$5,261,000
• All Other State and Local Capacity	\$26,962,000	\$26,618,000	\$19,323,000	\$11,758,000
Upgrading CDC Capacity	\$140,972,000	\$136,504,000	\$122,928,000	\$120,744,000
Anthrax	\$16,666,000	\$13,851,000	\$12,405,000	\$7,882,000
Botulinum Toxin Research	—	—	\$2,963,000	—
Biosurveillance Initiative	\$79,271,000	\$133,380,000	\$71,249,000	\$53,281,000
• BioSense	\$57,871,000	\$57,208,000	\$52,005,000	\$34,389,000
• BioSense (DOD)	—	\$35,000,000	—	—
• Quarantine	\$11,190,000	\$11,068,000	\$10,062,000	\$9,870,000
• Quarantine (DOD)	—	\$20,000,000	—	—
• Real Time Lab Reporting	\$10,210,000	\$10,104,000	\$9,182,000	\$9,022,000
Strategic National Stockpile	\$466,700,000	\$524,339,000	496,348,000	\$551,509,000
<b>Total, Terrorism</b>	<b>\$1,622,757,000</b>	<b>\$1,631,173,000</b>	<b>\$1,472,553,000</b>	<b>\$1,479,455,000</b>

Sources: Data from CDC and the *Justification of Estimates for Appropriation Committee, Fiscal Year 2006 through 2009, U.S. Department of Health and Human Services, Centers for Disease Control and Prevention*



# Appendix 3: Data Sources

Data presented in this report come from a variety of sources. The purpose of the information below is to provide additional details about data sources for the programs and/or activities referenced in this report.

## CDC

Bacterial Diseases data; fiscal year (FY) 2007, CDC, Coordinating Center for Infectious Diseases, National Center for Zoonotic, Vector-Borne, and Enteric Diseases, Division of Vector-Borne Infectious Diseases, Bacterial Diseases Branch

BioSense data; FY 2007 and calendar year (CY) 2007, CDC, Coordinating Center for Health Information and Service, National Center for Public Health Informatics; Division of Integrated Surveillance Systems and Services

Biotechnology Core Facility data; FY 2007, CDC, Coordinating Center for Infectious Diseases, National Center for Preparedness, Detection, and Control of Infectious Diseases, Division of Scientific Resources, Biotechnology Core Facility Branch

Bioterrorism-related Anthrax data; 2001, CDC, Coordinating Center for Infectious Diseases, National Center for Preparedness, Detection, and Control of Infectious Diseases

Career Epidemiology Field Officer (CEFO) data; FY 2007, CDC, Coordinating Office for Terrorism Preparedness and Emergency Response, Office of the Director

Centers for Public Health Preparedness (CPHP) data; FY 2007, CDC, Coordinating Office for Terrorism Preparedness and Emergency Response, Division of State and Local Readiness

Cities Readiness Initiative (CRI) data; FY 2007, CDC, Coordinating Office for Terrorism Preparedness and Emergency Response, Division of Strategic National Stockpile

Clinician Outreach and Communication Activity data; FY 2007, CDC, Coordinating Center for Health Information and Service, National Center for Health Marketing

Crisis and Emergency Risk Communication data; FY 2007, CDC, Coordinating Center for Health Information and Service, National Center for Health Marketing

Director's Emergency Operations Center (DEOC) data; FY 2007, CDC, Coordinating Office for Terrorism Preparedness and Emergency Response, Division of Emergency Operations

Early Aberration Reporting System (EARS) data; FY 2007, CDC, Coordinating Center for Infectious Diseases, National Center for Preparedness, Detection, and Control of Infectious Diseases, Division of Bioterrorism Preparedness and Response

Enteric Diseases Laboratory Preparedness data; FY 2007, CDC, Coordinating Center for Infectious Diseases, National Center for Zoonotic, Vector-Borne, and Enteric Diseases, Division of Foodborne, Bacterial and Mycotic Diseases, Enteric Diseases Laboratory Preparedness Branch

*Epi-X* data; FY 2007, CDC, Coordinating Center for Health Information and Service, National Center for Health Marketing

Epidemic Intelligence Service (EIS) data, FY 2007 and CY 2007, CDC, Office of the Director, Office of Workforce and Career Development

Hazardous Substances Emergency Events Surveillance (HSEES) data; FY 2007, CDC, Coordinating Center for Environmental Health and Injury Prevention, National Center for Environmental Health, Office of the Director

Laboratory Response Network (LRN) data; FY 2007, CDC, Coordinating Center for Infectious Diseases, National Center for Preparedness, Detection, and Control of Infectious Diseases, Division of Bioterrorism Preparedness and Response

Laboratory Sciences data; FY 2007, CDC, Coordinating Center for Environmental Health and Injury Prevention, National Center for Environmental Health, Division of Laboratory Sciences

Parasitic Diseases data; FY 2007, CDC, Coordinating Center for Infectious Diseases, National Center for Zoonotic, Vector-Borne, and Enteric Diseases, Division of Parasitic Diseases, Parasitic Diseases Branch

Poxvirus Program data; FY 2007, CDC, Coordinating Center for Infectious Diseases, National Center for Zoonotic, Vector-Borne, and Enteric Diseases, Division of Viral and Rickettsial Diseases, Poxvirus and Rabies Branch

Public Health Emergency Preparedness Cooperative Agreement data; 1999-2007, CDC, Coordinating Office for Terrorism Preparedness and Emergency Response, Division of State and Local Readiness

Public Health Law data; FY 2007, CDC, Office of the Director, Office of the Chief of Public Health Practice

Quarantine and Migration Health System data; FY 2007 and CY 2007, CDC, Coordinating Center for Infectious Diseases, National Center for Preparedness, Detection, and Control of Infectious Diseases

Select Agents and Toxins data; FY 2007, CDC, Coordinating Office for Terrorism Preparedness and Emergency Response, Division of Select Agents and Toxins

Special Pathogens data; FY 2007, CDC, Coordinating Center for Infectious Diseases, National Center for Zoonotic, Vector-Borne, and Enteric Diseases, Division of Viral and Rickettsial Diseases, Special Pathogens Branch

Strategic National Stockpile data; FY 2007, CDC, Coordinating Office for Terrorism Preparedness and Emergency Response, Division of Strategic National Stockpile

Strategy and Innovation data; FY 2007, CDC, Coordinating Office for Terrorism Preparedness and Emergency Response, Strategy and Innovation Office

#### **ASTHO**

Association of State and Territorial Health Officials (ASTHO). 2007 State Public Health Workforce Survey Results. Available at [www.astho.org/pubs/WorkforceReport.pdf](http://www.astho.org/pubs/WorkforceReport.pdf).

#### **CSTE**

Council of State and Territorial Epidemiologists (CSTE). 2006 National Assessment of Epidemiological Capacity. Available at [www.cste.org/ECA.asp](http://www.cste.org/ECA.asp).

# Appendix 4: TPER-Funded Projects for Fiscal Year 2007

The table below is a listing of the Terrorism Preparedness and Emergency Response (TPER)-funded projects in fiscal year 2007 within the following five core public health functions:

1) Health Monitoring and Surveillance, 2) Epidemiology and Other Assessment Sciences, 3) Public Health Laboratory Science and Service, 4) Response and Recovery Operations, and 5) Public Health System Support.

FY 2007 TPER Projects by Functional Category	CDC Coordinating Center/ National Center/Office
<b>Health Monitoring and Surveillance</b>	
Assessing Public Emergency Knowledge, Attitudes, and Behaviors	Coordinating Center for Health Information and Service
BioSense	Coordinating Center for Health Information and Service
Hazardous Substances Emergency Events Surveillance (HSEES) System	Coordinating Center for Environmental Health and Injury Prevention
Improving Coordination of Federal, State, and Local Public Health Morbidity Surveillance After Disasters	Coordinating Center for Environmental Health and Injury Prevention
Improving Public Health Surveillance of Chemical Exposures and Other Potential Health Hazards	Coordinating Center for Environmental Health and Injury Prevention
Infection Control and Healthcare Response Surveys	Coordinating Center for Infectious Diseases
<b>Epidemiology and Other Assessment Sciences</b>	
Anthrax Immune Globulin Development (AIG)	Coordinating Center for Infectious Diseases
Anthrax Vaccine Research Program	Coordinating Center for Infectious Diseases
Assessing the Special Needs of Vulnerable Populations: Data to Inform Emergency Response Efforts	Coordinating Center for Health Promotion
Career Epidemiology Field Officer (CEFO) Program	Coordinating Office for Terrorism Preparedness and Emergency Response
Coordinated Systems for Managing Outbreaks and Health Events (OMS)	Coordinating Center for Health Information and Service
Developing a Probabilistic Sampling Tool Kit for Initial Response Sampling	National Institute for Occupational Safety and Health
Epidemic Information Exchange ( <i>Epi-X</i> ) - Communications Project	Coordinating Center for Health Information and Service
Evaluation of Compliance with Emergency Communication Interventions	Coordinating Center for Health Information and Service
MedKits	Coordinating Office for Terrorism Preparedness and Emergency Response

FY 2007 TPER Projects by Functional Category	CDC Coordinating Center/ National Center/Office
Modeling Health Dynamics in Emergencies	Coordinating Center for Environmental Health and Injury Prevention
Providing a Competent Workforce in Epidemiologic Science and Public Health to CDC and State and Local Partners (EIS)	CDC Office of the Director
Reducing Adverse Impacts from Prolonged School Closure Due to Emerging Threats	Coordinating Center for Environmental Health and Injury Prevention
<b>Public Health Laboratory Science and Service</b>	
An Integrated Approach for <i>Coxiella burnetii</i> (Q Fever) Preparedness	Coordinating Center for Infectious Diseases
Antimicrobial Susceptibility and Phenotypic Testing Methods for Bacterial Agents of Bioterrorism	Coordinating Center for Infectious Diseases
Bioterrorism – Special Pathogen Branch	Coordinating Center for Infectious Diseases
Bioterrorism Environmental Sampling Methods and Analysis Research	Coordinating Center for Infectious Diseases
Bioterrorism Preparedness for Rickettsia	Coordinating Center for Infectious Diseases
Bioterrorism Vaccine Safety - Anthrax	Coordinating Center for Infectious Diseases
Botulism: Molecular Methods Development	Coordinating Center for Infectious Diseases
CDC Mass Spectrometry Toxin Laboratory: Develop and Validate Methods for Confirmation of Toxins	Coordinating Center for Environmental Health and Injury Prevention
Chemical Terrorism: Laboratory Training; Proficiency Testing; and Exercises for State, Local, and Territorial Public Health Laboratories	Coordinating Center for Environmental Health and Injury Prevention
Consolidated Support Projects for Bioterrorism Preparedness	Coordinating Center for Infectious Diseases
Database Development and Records Management	Coordinating Office for Terrorism Preparedness and Emergency Response
Detection and Response to Bioterrorism Agents in Water, Food, and Environmental Samples	Coordinating Center for Infectious Diseases
Determination of the Risk of <i>Bacillus anthracis</i> Spore Resuspension from Envelopes Contaminated by the Anthrax Containing Leahy Letter	National Institute for Occupational Safety and Health
Development of Novel Molecular Tools for Genotyping <i>Bacillus anthracis</i> - Molecular Epidemiology	Coordinating Center for Infectious Diseases
Division of Select Agents and Toxin's Program Administration	Coordinating Office for Terrorism Preparedness and Emergency Response
Drinking Water Disinfection of Bacterial Select Agents	Coordinating Center for Infectious Diseases

FY 2007 TPER Projects by Functional Category	CDC Coordinating Center/ National Center/Office
Enhance CDC Laboratory Readiness and Response to Intentional Botulism Events	Coordinating Center for Infectious Diseases
Enhancement of Proficiency Testing of the LRN Laboratories to Perform Bioterrorism Related Diagnostics	Coordinating Center for Infectious Diseases
Establishing GMP Regulatory Production Capacity and a Quality Assurance Program for CDC-Prepared Reagents for Bioterrorism and Other Public Health Emergencies	Coordinating Center for Infectious Diseases
Expansion of National Botulism Toxin Testing Capacity	Coordinating Center for Infectious Diseases
Global Health Security Action Group Laboratory Network	Coordinating Center for Infectious Diseases
Improved Capacity for Diagnosis and Detection of Plague and Tularemia	Coordinating Center for Infectious Diseases
Inspection and Registration	Coordinating Office for Terrorism Preparedness and Emergency Response
Lab Response and Surge Capacity Readiness for Plague and Tularemia	Coordinating Center for Infectious Diseases
Laboratory Capacity for Category A Agent Smallpox and Related Human Pathogenic Orthopoxviruses: Nucleic Acid Diagnostic Methodologies	Coordinating Center for Infectious Diseases
Laboratory Response Network (LRN) - National Asset for Preparedness and Response	Coordinating Center for Infectious Diseases
LRN Reagents	Coordinating Center for Infectious Diseases
LRN Real Time Laboratory Information Exchange	Coordinating Center for Health Information and Service
LRN Reference Laboratory Terrorism Preparedness Training	CDC Office of the Director
LRN Sentinel Laboratory Terrorism Preparedness Training through the National Laboratory Training Network	CDC Office of the Director
Maintain LRN Reference Laboratories at Arctic Investigations Program	Coordinating Center for Infectious Diseases
Mass Spectrometry Expanded Toxin Research	Coordinating Center for Environmental Health and Injury Prevention
National Interagency Biodefense Campus	Coordinating Center for Infectious Diseases
Novel Molecular Methods for Rapid Detection and Viability Determination of Select Agents	Coordinating Center for Infectious Diseases
Pathology Readiness and Capacity Building for Bioterrorism Preparedness and Response	Coordinating Center for Infectious Diseases

FY 2007 TPER Projects by Functional Category	CDC Coordinating Center/ National Center/Office
PulseNet Surveillance System for <i>Y. pestis</i> and <i>F. tularensis</i>	Coordinating Center for Infectious Diseases
Rapid Molecular Detection of Antimicrobial Resistance	Coordinating Center for Infectious Diseases
Select Agent Training for LRN Reference Laboratories	CDC Office of the Director
Smallpox Vaccine Research	Coordinating Center for Infectious Diseases
Smallpox-functional Genomics of Orthopoxviruses	Coordinating Center for Infectious Diseases
Specimen Tracking and Results Reporting System	Coordinating Center for Health Information and Service
Upgrading and Maintaining CDC Laboratory Capacity to Respond to Chemical and Radiological Terrorism	Coordinating Center for Environmental Health and Injury Prevention
<b>Response and Recovery Operations</b>	
CDC Emergency Responder Training and TOPOFF 4 Exercise	Coordinating Office for Terrorism Preparedness and Emergency Response
Competency-based Responder Training	CDC Office of the Director
Constructing the CDC Corporate University's School of Preparedness and Emergency Response	CDC Office of the Director
Countermeasures and Response Administration	Coordinating Center for Health Information and Service
Director's Emergency Operations Center	Coordinating Office for Terrorism Preparedness and Emergency Response
Director's Emergency Operations Center IT and Informatics Support	Coordinating Center for Health Information and Service
Division Coordination	Coordinating Office for Terrorism Preparedness and Emergency Response
Division of Emergency Operations - Office of the Director	Coordinating Office for Terrorism Preparedness and Emergency Response
Emergency Communication System Information Management Team	Coordinating Center for Health Information and Service
Emergency Communication Strategic and Organizational Planning and Management	Coordinating Center for Health Information and Service
Emergency Preparedness and Response Website	Coordinating Center for Health Information and Service
Enhancing the Ability of Federal, State, and Local Public Health Agencies to Respond to Nuclear or Radiological Terrorism	Coordinating Center for Environmental Health and Injury Prevention

FY 2007 TPER Projects by Functional Category	CDC Coordinating Center/ National Center/Office
Epidemic Information Exchange ( <i>Epi-X</i> ) Advancement	Coordinating Center for Health Information and Service
Geographic Research, Analysis, and Services Program for Planning During Emergency Response	Coordinating Center for Environmental Health and Injury Prevention
Global Terrorism Preparedness and Emergency Response	Coordinating Office for Global Health
Improving Environmental Public Health Emergency Response	Coordinating Center for Environmental Health and Injury Prevention
Inventory Management and Acquisition	Coordinating Office for Terrorism Preparedness and Emergency Response
Joint Worldwide Intelligence Communication System	CDC Office of the Director
Logistics Support	Coordinating Office for Terrorism Preparedness and Emergency Response
National Public Health Information Coalition	Coordinating Center for Health Information and Service
NIOSH Emergency Preparedness and Response Support	National Institute for Occupational Safety and Health
Plans, Training, and Exercising	Coordinating Office for Terrorism Preparedness and Emergency Response
Preparedness Activities	Coordinating Office for Terrorism Preparedness and Emergency Response
Public Response Hotline and Clinician Information Line	Coordinating Center for Health Information and Service
Regulatory Affairs	Coordinating Center for Infectious Diseases
Response and Investigation Capacity	Coordinating Center for Infectious Diseases
Security of the Strategic National Stockpile	CDC Office of the Director
Smallpox Vaccine Purchase	Coordinating Center for Infectious Diseases
Technical Advisory Response Unit	Coordinating Office for Terrorism Preparedness and Emergency Response
Terrorism Preparedness at U.S. Ports	Coordinating Center for Infectious Diseases
Translation Services for Emergency Information	Coordinating Center for Health Information and Service
Upgrade Capacity for Rapid Ecological Deployment and Response for Plague and Tularemia	Coordinating Center for Infectious Diseases

FY 2007 TPER Projects by Functional Category	CDC Coordinating Center/ National Center/Office
<b>Public Health System Support</b>	
Advanced Practice Centers	Coordinating Office for Terrorism Preparedness and Emergency Response
Automated Disaster and Emergency Planning Tool - Building a Platform for Technical Assistance for States	Coordinating Center for Environmental Health and Injury Prevention
CCID Preparedness Goals Management	Coordinating Center for Infectious Diseases
Centers for Public Health Preparedness Program	Coordinating Office for Terrorism Preparedness and Emergency Response
COTPER Business Services Office	Coordinating Office for Terrorism Preparedness and Emergency Response
COTPER Goals Management	Coordinating Office for Terrorism Preparedness and Emergency Response
COTPER Office of the Director	Coordinating Office for Terrorism Preparedness and Emergency Response
DeKalb County Police	CDC Office of the Director
Development of the Preparedness Goal Action Plan: Establishment of Environmental Health Scenario Goal Team Leader and Scenario Goal Team Leads for Preparedness	Coordinating Center for Environmental Health and Injury Prevention
Enterprise Communication Technology Platform	Coordinating Center for Health Information and Service
HealthImpact.net - Terrorism System Support	Coordinating Office for Terrorism Preparedness and Emergency Response
Informatics Technical Assistance Group for PHEP Cooperative Agreement Grantees	Coordinating Center for Health Information and Service
Management, Oversight, and Program Services	Coordinating Office for Terrorism Preparedness and Emergency Response
National Preparedness Leadership Institute	CDC Office of the Director
National Public Health Radio Network	Coordinating Center for Health Information and Service
Preparedness Agreements with Key Public Health Associations	Coordinating Office for Terrorism Preparedness and Emergency Response
Preparedness Strategic Marketing and Partnering Plan	Coordinating Center for Health Information and Service
Public Health Emergency Preparedness Cooperative Agreement (Bioterrorism Cooperative Agreement)	Coordinating Office for Terrorism Preparedness and Emergency Response
Public Health Training Network: Ensuring Functionality	Coordinating Center for Health Information and Service
Risk Communication Capacity Building for State and Local Partners	Coordinating Center for Health Information and Service



FY 2007 TPER Projects by Functional Category	CDC Coordinating Center/ National Center/Office
Strengthening Emergency Preparedness: 2007 CDC Public Health Emergency Legal Preparedness Summit	CDC Office of the Director
Strengthening Emergency Preparedness: Ensuring Key Legal Competencies for Front-Line Practitioners during Public Health Emergencies	CDC Office of the Director
Strengthening Emergency Preparedness: Improving Emergency Response Coordination between Public Health, Law Enforcement, Corrections, and the Judiciary	CDC Office of the Director
Strengthening Emergency Preparedness: New State Isolation and Quarantine Laws	CDC Office of the Director
Strengthening Emergency Preparedness: the Public Health Legal Preparedness Clearinghouse	CDC Office of the Director
Strengthening Emergency Preparedness: COTPER Mutual Aid Agreement Requirements	CDC Office of the Director
Terrorism Injuries: Information Dissemination and Exchange	Coordinating Center for Environmental Health and Injury Prevention

# Endnotes

- 1 The timeframe for fiscal year 2007 is October 1, 2006, through September 30, 2007, the most recent budget period for which complete data were available.
- 2 For more information about the progress and challenges in state and local preparedness, see CDC's report, *Public Health Preparedness: Mobilizing State by State* at [www.emergency.cdc.gov/publications/feb08phprep](http://www.emergency.cdc.gov/publications/feb08phprep).
- 3 This funding consists of the following congressional budget lines: Upgrading State and Local Capacity (including the Public Health Emergency Preparedness Cooperative Agreement), the Strategic National Stockpile, Upgrading CDC Capacity, Biosurveillance, Anthrax, and Botulinum Toxin Research. This figure does not include non-TPER projects, such as pandemic influenza preparedness.
- 4 Figure based on estimated obligations fiscal year 2004 through 2008.
- 5 Available at [www.emergency.cdc.gov/publications/feb08phprep](http://www.emergency.cdc.gov/publications/feb08phprep).
- 6 Drawing on the definition provided in the Pandemic and All-Hazards Preparedness Act, 2006, HHS has adopted the following definition of at-risk individuals. The term "at-risk individuals" is interchangeable with terms like "special needs populations" and "vulnerable populations." Before, during, and after an incident, members of at-risk populations may have additional needs in one or more of the following functional areas: maintaining independence, communication, transportation, supervision, and medical care. In addition to those individuals specifically recognized as at-risk in the statute, i.e., children, senior citizens, and pregnant women, individuals who may need additional response assistance include those who have disabilities, live in institutionalized settings, are from diverse cultures, have limited English proficiency or are non-English speaking, are transportation-disadvantaged, have chronic medical disorders, or have pharmacological dependency.
- 7 See note 2.
- 8 References to CDC also apply to the Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH).
- 9 More information about public health threats is provided on page 12.
- 10 See note 1.
- 11 Institute of Medicine. *Research Priorities in Emergency Preparedness and Response for Public Health Systems. A Letter Report*. Washington, DC: The National Academies Press, 2008. Available at [www.iom.edu/CMS/3740/48812/50685.aspx](http://www.iom.edu/CMS/3740/48812/50685.aspx).
- 12 As specified in Emergency Support Function #8 (ESF #8) – Public Health and Medical Services Annex of the National Response Framework. Available at [www.maxwell.af.mil/au/awc/awcgate/frp/frpesf8.htm](http://www.maxwell.af.mil/au/awc/awcgate/frp/frpesf8.htm).
- 13 Assistant Secretary for Preparedness and Response website ([www.hhs.gov/aspr](http://www.hhs.gov/aspr)).
- 14 See note 6.
- 15 Originally established as the Office for Terrorism Preparedness and Emergency Response (OTPER) in August 2002 and renamed the Coordinating Office for Terrorism Preparedness and Emergency Response (COTPER) in 2005 during a CDC reorganization.
- 16 See note 3.
- 17 See Appendix 4 for a listing of all TPER-funded projects for fiscal year 2007.
- 18 See note 2.

- 19 The National Response Framework utilizes the National Disaster Medical System (NDMS) as part of the U.S. Department of Health and Human Services, Office of Preparedness and Response, under Emergency Support Function #8 (ESF #8), Health and Medical Services, to support federal agencies in the management and coordination of the federal medical response to major emergencies and federally declared disasters. NDMS responds by providing teams, supplies, and equipment; moving patients from a disaster site to unaffected areas of the nation; and providing care at participating hospitals in unaffected areas.
- 20 Federated database technologies support data sharing across a large community despite data being stored in different geographic locations.
- 21 External contamination occurs when radioactive material, in the form of dust, powder, or liquid, comes into contact with a person's skin, hair, or clothing. In other words, the contact is external to a person's body. Internal contamination occurs when people swallow or breathe in radioactive materials or when radioactive materials enter the body through an open wound or are absorbed through the skin.
- 22 "Route of vaccine administration" refers to the ways vaccines can be introduced into the body, such as being injected beneath the skin (subcutaneously) or into a muscle (intramuscularly).
- 23 More information about the MedKit evaluation is available at [www.emergency.cdc.gov/agent/anthrax/prep/pdf/medkit-evaluation-summary-2007.pdf](http://www.emergency.cdc.gov/agent/anthrax/prep/pdf/medkit-evaluation-summary-2007.pdf).
- 24 The Council of State and Territorial Epidemiologists results comprise responses from all 50 states, the District of Columbia, and four territories and jurisdictions (American Samoa, Northern Mariana Islands, Puerto Rico, and U.S. Virgin Islands).
- 25 The EPI-AID mechanism is a means for Epidemic Intelligence Service (EIS) officers, along with other CDC staff, to provide technical support to state health agencies requesting assistance for epidemiologic field investigations (disease outbreaks or health emergencies).
- 26 See note 6.
- 27 All members of the LRN for biological agents can perform tests for these agents, and members of the LRN for chemical terrorism can either test for a set of chemical agents or safely ship these agents to another laboratory.
- 28 Public Law 107–188. The Public Health Security and Bioterrorism Preparedness and Response Act of 2002.
- 29 Entities consist of academic, commercial, nonprofit, and government organizations.
- 30 A list of select agents is available at [www.selectagents.gov/agentToxinList.htm](http://www.selectagents.gov/agentToxinList.htm).
- 31 Internal contamination occurs when people swallow or breathe in radioactive materials, or when radioactive materials enter the body through an open wound or are absorbed through the skin.
- 32 *Public Health Laboratory Preparedness: Ready, Set, Respond*. An APHL Report on the Preparedness of State Public Health Laboratories, May 2008. Available at [http://www.aphl.org/AboutAPHL/publications/Documents/All\\_Hazards\\_2008.pdf](http://www.aphl.org/AboutAPHL/publications/Documents/All_Hazards_2008.pdf).
- 33 The first DEOC (DEOC 1) was opened in January 2003 and the new DEOC facility (DEOC 21) became operational in February 2006.
- 34 CDC's Coordinating Office for Global Health works with international partners to improve global preparedness and response to major public health threats, serves as the lead international point of contact, and helps to coordinate international emergency responses.
- 35 This capability is provided through the aircraft dedicated to emergency operations responses managed by the Division of Emergency Operations. In addition, the Division of Strategic

National Stockpile manages two aircraft, which are dedicated to support simultaneous unplanned deployments of Strategic National Stockpile assets and response teams anywhere in the country within 12 hours.

- 36 The EPI-AID mechanism is a means for Epidemic Intelligence Service (EIS) officers, along with other CDC staff, to provide technical support to state health agencies requesting assistance for epidemiologic field investigations (disease outbreaks or health emergencies).
- 37 MEDEVAC is the air transport of persons to a place where they can receive medical or surgical care.
- 38 Infectious means capable of causing an infection, usually by a pathologic microorganism. Contagious means that the disease is transmissible by direct and indirect contact.
- 39 The Incident Command System (ICS) is the organizational structure for managing incidents that require response from different jurisdictions and disciplines. ICS lays out standard roles and responsibilities for the incident commander and staff.
- 40 See note 4.
- 41 The latest scientific data are from the Public Health Emergency Medical Countermeasures Enterprise (PHEMCE), a coordinated interagency effort by the Office of the Assistant Secretary for Preparedness and Response (ASPR) that includes three primary HHS internal agencies: CDC, U.S. Food and Drug Administration, and National Institutes of Health.
- 42 Large metropolitan public health departments are part of the Cities Readiness Initiative (CRI).
- 43 Successful examples of partnerships include Business Executives for National Security and the United States Postal Service.
- 44 Institute of Medicine. *Quarantine Stations at Ports of Entry Protecting the Public's Health*. Washington, DC: The National Academies Press, 2005. Available at [www.iom.edu/CMS/3793/22845/29602.aspx](http://www.iom.edu/CMS/3793/22845/29602.aspx).
- 45 See Section 361 of the Public Health Service Act.
- 46 This program was previously referred to as the Clinician Registry.
- 47 Acehanese, Bahasa Indonesia, Creole, Dutch, Hmong (Hmoob), Japanese, Khmer/Cambodian, Lao, Portuguese, Somali, Swahili, Thai, and Ukrainian.
- 48 Extended hours are defined as 12 hours to 16 hours a day during a response.
- 49 More information is available at:
  - [www.pandemicflu.gov/plan/healthcare/maskguidancehc.html](http://www.pandemicflu.gov/plan/healthcare/maskguidancehc.html);
  - [www.pandemicflu.gov/plan/community/maskguidancecommunity.html](http://www.pandemicflu.gov/plan/community/maskguidancecommunity.html);
  - [www.pandemicflu.gov/plan/healthcare/influenzaguidance.html](http://www.pandemicflu.gov/plan/healthcare/influenzaguidance.html).
- 50 Institute of Medicine. *The Future of Emergency Care in the United States Health System: Emergency Medical Services at the Crossroads*. Washington, DC: The National Academies Press, 2006. Available at [http://www.nap.edu/catalog.php?record\\_id=11629](http://www.nap.edu/catalog.php?record_id=11629).
- 51 The 62 grantees include all 50 states, four metropolitan areas (Chicago, Los Angeles County, New York City, and Washington, D.C.), five territories (Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, and the U.S. Virgin Islands), and three freely associated states (the Federated States of Micronesia, Palau, and the Marshall Islands).
- 52 A complete listing of the Preparedness and Emergency Response Research Centers is available at [www.cdc.gov/media/pressrel/2008/r081006.htm](http://www.cdc.gov/media/pressrel/2008/r081006.htm).
- 53 Available at [www.bt.cdc.gov/cerc/pdf/CERC-SEPT02.pdf](http://www.bt.cdc.gov/cerc/pdf/CERC-SEPT02.pdf).

54 More information is available at [www.meta-leadershipsummit.org](http://www.meta-leadershipsummit.org).

55 The pilot phase included additional summits in Wichita, KS; Denver, CO; Louisville, KY; and Princeton, NJ.

56 Social distancing refers to measures to decrease the frequency of contact among people to decrease the risk of spread of communicable diseases. This could include measures such as school dismissal and staying at home when sick.

57 More information is available at [www2a.cdc.gov/phlp/index.asp](http://www2a.cdc.gov/phlp/index.asp).

58 The focus papers were supported with TPER funds. The white paper was funded by CDC's Office of the Chief Science Officer.

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Report available at  
[www.emergency.cdc.gov/publications/jan09phprep](http://www.emergency.cdc.gov/publications/jan09phprep)

