ISSUE REPORT

Ready or Not?

PROTECTING THE PUBLIC'S HEALTH FROM DISEASES, DISASTERS, AND BIOTERRORISM 2011

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Introduction

For the past decade, since the September 11, 2001 and anthrax events, the United States has grappled with how to best prepare for public health emergencies.

These tragedies marked the first time public health was considered central to the nation's emergency preparedness — marking the beginning of a significant transformation. However, the system had been underfunded for years, and while officials responded to the attacks as best as they could, they often did not have the technology, resources, workforce or training needed. A series of expert assessments after September 11 and the anthrax events concluded that the public health system was "structurally weak in almost every area."[1,2,3]

Since then, the field of public health has faced the challenge of rebuilding basic capabilities in all 50 states and territories while also determining how to prioritize and plan for the greatest risks — with limited resources.

There are two key aspects of preparedness. One is to support the basic functions of a public health system — such as trained epidemiologists, laboratories and surveillance systems. The second is to have the specialized training, procedures, leadership and coordinated plans in place so first responders and experts have clear roles and responsibilities and know what capabilities exist and how to use them during a crisis. This requires ongoing planning and coordination, exercises and drills, systems for providing care to large numbers of patients when needed, including the ability to rapidly distribute vaccines and medications, and a system to detect, manage the response and communicate emergencies as soon as they arise. Preparedness requires programs and funds dedicated specifically to building core capabilities and understanding what is necessary to respond to any hazard or crisis the country faces.

For nine years, the Trust for America's Health (TFAH) has issued the *Ready or Not?* report to provide an independent analysis of progress and vulnerabilities in public health preparedness. The reports have found that while a significant investment has led to a major upgrade in the nation's ability to prevent, diagnose and respond to health emergencies, the resources have not been sufficient for filling many major gaps.

Despite these serious ongoing gaps, the *Ready or Not?* reports documented how preparedness had been on an upward trajectory until the economic crisis hit. Since then, local, state and federal cuts to public health budgets and staff are starting to erode a decade's worth of progress. Health departments are increasingly spread thin and programs and core capabilities are being cut.

- In the past year, 40 states and Washington, D.C. have cut funds to public health, 30 states cut their budgets for the second year in a row and 15 of those have cut their budget three years in a row;
- Since 2008, 49,310 state and local public health department jobs have been lost to layoff and attrition — 14,910 in state health agency central offices and 34,400 in local health departments;[4]
- Sixty percent of state health agencies have cut entire programs since 2008, while half of all local public health departments reported cutting at least one program altogether in the last year alone;[5] and
- Federal funds for state and local preparedness declined by 38 percent from fiscal year (FY) 2005 to 2012 (adjusted for inflation) — and additional cuts are expected under budget sequestration.[6]

This year's *Ready or Not?* report examines:

- **Section 1:** Examples of specific programs and capabilities at-risk for major cuts or elimination;
- **Section 2:** State and local public health budget cuts;
  - *Commentary: Select Agents and Toxins — Impact of Proposed Regulatory Changes on Public Health Laboratories — By Chris N. Mangal, MPH, Director of Public Health Preparedness and Response, Association of Public Health Laboratories*
  - *Commentary: Components of a System Put to the Test: A Look at North Dakota's Public Health Preparedness System — By Tim Wiedrich, Section Chief Emergency Preparedness and Response Section, North Dakota Department of Health*
- **Section 3:** A review of 10 years of progress and gaps in preparedness, a timeline of major public health preparedness events, and a review of special topics;
  - *Commentary: Meta-Leadership Empowers Community Leaders to Act Together in Times of Crisis — By Charles Stokes, president and chief executive officer of the CDC Foundation*
  - *Commentary: Preparedness and Public Health Systems and Services Research — By F. Douglas Scutchfield, MD, principal investigator of the Center for Public Health Systems and Services Research at the University of Kentucky College of Public Health*

- ▲ *Commentary: Public Health Legal Preparedness in the United States — Q&A with James G. Hodge, Jr., JD, LLM, Lincoln Professor of Health Law and Ethics and director of the Public Health Law and Policy Program and director of the Network for Public Health Law-Western Division at the ASU Sandra Day O'Connor College of Law*
- ▲ *Commentary: Disaster Preparedness for Mass Casualties from Explosive Devices — the Role of Injury Prevention and Control — By Richard W. Sattin, MD, FACP, president-elect of the Society for the Advancement of Violence and Injury Research and professor and research director at the Department of Emergency Medicine at the Georgia Health Sciences University*

■ **Section 4:** An examination of areas with major gaps in federal policies and recommendations for improving all-hazards preparedness — particularly in the context of a reauthorized Pandemic and All-Hazards Preparedness Act (PAHPA), including:

- ● Dedicated funding for preparedness and for strengthening public health infrastructure;
- ▲ *Commentary: A Decade of Public Health Preparedness: A Focus on Oregon — By Melvin Kohn, M.D., MPH, State Health Officer and Public Health Director, Oregon Health Authority*
- ▲ *Commentary: Improving Collaboration between Federal, State and Local agencies in Planning for a Worst Case Scenario: A Broad Aerosolized Dispersal of Weaponized Anthrax in a Major Metropolitan Area, By Alonzo Plough, PhD, MPH, Director of Emergency Preparedness and Response of the Los Angeles County Department of Public Health and Member of the Board of Directors, Trust for America's Health*
- ● Modernizing biosurveillance to rapidly and accurately detect outbreaks and threats;
- ▲ *Commentary: Surveillance: Essential for Public Health Preparedness and Response, By, Jeffrey Engel, M.D., State Health Director, Division of Public Health, North Carolina Department of Health and Human Services*
- ● Improving research, development and availability of vaccines and medications;
- ● Increasing the ability of the public health and health care systems to provide mass care during emergencies;
- ● Working with communities to cope with and recover from emergencies;
- ▲ *Commentary: Vulnerability, Resilience and Mental Health Considerations in Disaster Planning and Response: Do Resources Match the Rhetoric? By David Abramson, PhD, MD and Irwin Redlener, MD, Columbia University Mailman School of Public Health*
- ● Coordinating public health preparedness with strategic implementation of the U.S. Food and Drug Administration (FDA) Food Safety Modernization Act of 2011
- ▲ *Commentary: Food Safety: New Law Takes a Big Bite Out of the Problem, but Leaves Much on the Plate, By By Erik D. Olson, Director of Food Programs at The Pew Charitable Trusts*

Overall, the report concludes that while it is impossible to be prepared for every potential threat, it is possible and essential to maintain a basic, core level of preparedness and response capabilities. Being prepared means the country must have enough resources and vigilance to prevent what we can and respond when we have to. In an era of scarce resources, it is more important than ever to think strategically to ensure Americans are not left unnecessarily vulnerable.

KEY FINDINGS

- ■ Fifty-one cities — located in 40 states — are at risk for elimination of Cities Readiness Initiative funds, which support the ability to rapidly distribute and administer vaccinations and medications during emergencies.
- ■ All 10 state labs with "Level 1" chemical threat testing status are at risk for losing top level capabilities, which could leave the U.S. Centers for Disease Control (CDC) with the only public health lab in the country with full chemical testing capabilities.
- ■ Twenty-four states are at risk of losing expert epidemiology support, which has supplemented state and local gaps in the past.
- ■ Academic preparedness research and training centers are at risk due to budget cuts.
- ■ Potential cuts to the National Center for Environmental Health (NCEH) mean the ability for the U.S. Centers for Disease Control and Prevention (CDC) to mount a comprehensive response to nuclear detonation, radiological attacks, chemical attacks and natural disasters is at risk.
- ■ Forty states and Washington, D.C. cut their state public health budgets — 29 states cut their budgets for a second year in a row, 15 for three years in a row.
- ■ Forty-one states had cuts in state and local preparedness support through the Public Health Emergency and Preparedness (PHEP) grants from FY 2010 to FY 2011.
- ■ All 50 states and Washington, D.C. had cuts in the Hospital Preparedness Program (HPP) from FY 2010 to FY 2011.

SECTION 1

Examples of Key Programs at Risk For Major Federal Funding Cuts

Since the terrorist attacks of September 11, 2001, CDC has provided more than $7 billion in preparedness funding to states and some major cities.

Federal funds for state and local preparedness declined by 38 percent from fiscal year (FY) 2005 to 2012 (adjusted for inflation) — and additional cuts are expected under budget sequestration.

From FY2010 to FY2012, there will be a $72 million reduction to PHEP grants from state, local, territorial, and tribal funds, a $22 million cut to the Academic Centers for Public Health Preparedness and $5 million from the Advanced Practice Centers.

These programs are also at risk based on FY 2012 and FY 2013 sequestration budget scenarios.

This section highlights a number of programs that are at risk due to the continued funding cuts to preparedness and response activities at CDC.

A number of these programs receive support as part of the PHEP cooperative agreement (Cities Readiness Initiative, the chemical laboratory program, and the Career Epidemiology Field Officer Program (CEFO)) and others are part of the CDC's operational budget for providing expertise and support during national or local crises (support for environmental health emergencies at the National Center on Environmental Health).

TFAH has identified the following CDC programs as under particular threat as a result of proposed additional cuts to preparedness funding. This analysis is based in part on a review of Administration and Congressional budget documents as well as expert assessments of the potential impact of cuts.

FEDERAL, STATE AND LOCAL PUBLIC HEALTH JURISDICTIONS

The federal role: Includes setting national policies, funding programs, overseeing national disease prevention efforts, collecting and disseminating health information, building capacity, and directly managing some services, and supporting biomedical research and production capability.[7] Some public health capabilities, such as the Strategic National Stockpile (SNS), are federal assets managed by federal agencies that are available to supplement a state's and community's response to a public health emergency that overwhelms or may overwhelm their capabilities. Public health functions are widely diffused across eight federal agencies and two offices.

State and local roles: Under U.S. law, state governments have primary responsibility for the health of their citizens. Constitutional "police powers" give states the ability to set local policies and enact laws and issue regulations to protect, preserve and promote the health, safety and welfare of their residents. In most states, state laws charge local governments with responsibility for the health of their citizens. State and local health departments and first responders are the front line in any public health emergency.

KEY PROGRAMS AT RISK FOR MAJOR FUNDING CUTS

	Level One Chemical Labs At Risk for Elimination	Cities Readiness Initiative Cities At Risk for Elimination	At Risk for Losing Career Epidemiology Field Officer Program Support	At Risk for Losing Preparedness and Emergency Response Learning Center Support	
STATE		**City**			
Alabama		Birmingham	✓	University of Alabama at Birmingham School of Public Health	
Alaska		Anchorage			
Arizona			✓	University of Arizona College of Public Health	
Arkansas		Little Rock			
California	✓	Riverside, Sacramento Fresno, San Jose	✓		
Colorado					
Connecticut		New Haven, Hartford			
Delaware		Dover			
D.C.					
Florida	✓	Orlando, Tampa	✓	University of South Florida College of Public Health	
Georgia					
Hawaii		Honolulu			
Idaho		Boise	✓		
Illinois		Peoria		University of Illinois at Chicago School of Public Health	
Indiana		Indianapolis			
Iowa		Des Moines		University of Iowa College of Public Health	
Kansas		Wtchita			
Kentucky		Louisville	✓		
Louisiana		Baton Rouge, New Orleans			
Maine		Portland	✓		
Maryland		Baltimore		Johns Hopkins University Bloomberg School of Public Health	
Massachusetts	✓			Harvard University School of Public Health	
Michigan	✓		✓		
Minnesota	✓		✓	University of Minnesota School of Public Health	
Mississippi		Jackson	✓		
Missouri		Kansas City			
Montana		Billings	✓		
Nebraska		Omaha	✓		
Nevada			✓		
New Hampshire		Manchester			
New Jersey		Trenton			
New Mexico	✓	Albuquerque			
New York	✓	Albany, Buffalo	✓	Columbia Universtiy Mailman School of Public Health; University of Albany SUNY School of Public Health	
North Carolina		Charlotte	✓	University of North Carolina Gillings School of Global Public Health	
North Dakota		Fargo	✓		
Ohio		Cincinnati, Columbus			
Oklahoma		Oklahoma City		University of Oklahoma College of Public Health	
Oregon		Portland			
Pennsylvania			✓		
Rhode Island		Providence			
South Carolina	✓	Columbia			
South Dakota		Sioux Falls	✓		
Tennessee		Memphis, Nashville	✓		
Texas		San Antonio	✓	Texas A&M School of Rural Public Health	
Utah		Salt Lake City			
Vermont		Burlington	✓		
Virginia	✓	Richmond, Virginia Beach	✓		
Washington				University of Washington School of Public Health	
West Virginia		Charleston	✓		
Wisconsin	✓	Milwaukee			
Wyoming		Cheyenne	✓		
Total	10	40	24	13	

*2011 budget totals adjusted for inflation

AND CURRENT FUNDING CUTS

		At Risk of Losing Prevention and Emergency Response Research Center Support	At Risk for Losing Environmental Threat Support	Cuts to PHEP Funding	Cuts to State Public Health Budget*	Cuts to HPP Funding
	Alabama		✓	✓	✓	✓
	Alaska		✓			✓
	Arizona		✓	✓	✓	✓
	Arkansas		✓	✓		✓
	California	University of California at Berkeley and Los Angeles	✓	✓	✓	✓
	Colorado		✓	✓	✓	✓
	Connecticut		✓	✓	✓	✓
	Delaware		✓		✓	✓
	D.C.		✓		✓	✓
	Florida		✓	✓		✓
	Georgia	Emory University	✓	✓	✓	✓
	Hawaii		✓		✓	✓
	Idaho		✓	✓	✓	✓
	Illinois		✓	✓	✓	✓
	Indiana		✓	✓		✓
	Iowa		✓	✓	✓	✓
	Kansas		✓	✓	✓	✓
	Kentucky		✓	✓	✓	✓
	Louisiana		✓	✓		✓
	Maine		✓	✓	✓	✓
	Maryland	Johns Hopkins University Bloomberg School of Public Health	✓	✓	✓	✓
	Massachusetts	Harvard School of Public Health	✓	✓	✓	✓
	Michigan		✓	✓		✓
	Minnesota	University of Minnesota	✓	✓	✓	✓
	Mississippi		✓	✓	✓	✓
	Missouri		✓	✓	✓	✓
	Montana		✓		✓	✓
	Nebraska		✓	✓	✓	✓
	Nevada		✓	✓	✓	✓
	New Hampshire		✓		✓	✓
	New Jersey		✓	✓	✓	✓
	New Mexico		✓	✓	✓	✓
	New York		✓	✓	✓	✓
	North Carolina	University of North Carolina	✓	✓	✓	✓
	North Dakota		✓			✓
	Ohio		✓	✓		✓
	Oklahoma		✓	✓	✓	✓
	Oregon		✓	✓	✓	✓
	Pennsylvania	University of Pittsburgh	✓	✓	✓	✓
	Rhode Island		✓		✓	✓
	South Carolina		✓	✓	✓	✓
	South Dakota		✓		✓	✓
	Tennessee		✓	✓		✓
	Texas		✓	✓	✓	✓
	Utah		✓	✓	✓	✓
	Vermont		✓	✓	✓	✓
	Virginia		✓	✓	✓	✓
	Washington	University of Washington	✓	✓	✓	✓
	West Virginia		✓	✓	✓	✓
	Wisconsin		✓	✓		✓
	Wyoming		✓		✓	✓
		8	50 + D.C.	41	40 + D.C.	50 + D.C.

A. CITIES READINESS INITIATIVE: 51 CITIES AT RISK TO BE CUT FROM THE PROGRAM

More than half of the country's population lives in urban areas. Many experts believe that because of their density, cities are more likely to be the target of a bioterror attack.

In 2004, CDC created the Cities Readiness Initiative (CRI), a program that helps cities and large metropolitan areas prepare to dispense medicine quickly, on a large scale. CRI is funded through PHEP.

From 2004 to 2010, CRI expanded from 21 initial cities and metropolitan areas to include 72 cities and metropolitan areas — at least one in every state.[8]

The program focuses primarily on helping these cities improve their ability to deliver antibiotics to the entire population in that area within 48 hours of an attack, which is the time window for possible effective treatment. In each metropolitan area, health departments have developed their own plans. The primary dispensing model for each plan is through Points of Dispensing (PODs). PODs are large public clinics, set up to deliver medicine to thousands of people, up to 500 per hour.[9] In some places, officials have developed plans for "closed PODs," which act as public sector clinics at places such as large companies, which can distribute medicines to employees and their families, to help relieve the strain on the public PODs. Some of distribution plans depend on school buses, public employees or postal workers to get medicine to the population.[10]

In addition to creating plans for the delivery of medicine, CRI helps participating areas integrate emergency plans, so that fire, police and public health departments, as well as hospitals and local governments, are all working together.

Every year, CDC tests participating cities to gauge their readiness. In a report released in September 2011, *Public Health Preparedness: 2011 State-by-State Update on Laboratory Capabilities and Response Readiness Planning*, the agency found that the national average for the cities' readiness scores increased from 68 out of 100 in 2007-08 to 88 in 2009-10. According to the report, cities improved most on training, exercise and evaluation, as well as on communicating information to the public.[11]

The program received $54 million in FY 2011, down from $62 million in FY 2010.[12] Further proposed cuts to PHEP cooperative agreement in FY 2012, could result in 51 cities being cut from the program — reducing the number of CRI cities from 72 back to the initial 21 cities.[13]

Initial 21 CRI Areas as of 2004 — Expected to Be Funded in FY 2012	15 CRI Areas (Added in 2005) At Risk for Elimination in FY 2012	36 CRI Areas (Added in 2006) At Risk for Elimination in FY 2012
Atlanta, GA	**Baltimore, MD**	**Albany, NY**
Boston, MA	**Cincinnati, OH**	**Albuquerque, NM**
Chicago, IL	**Columbus, OH**	**Anchorage, AK**
Cleveland, OH	**Indianapolis, IN**	**Baton Rouge, LA**
Dallas, TX	**Kansas City, MO**	**Billings, MT**
Denver, CO	**Milwaukee, WI**	**Birmingham, AL**
Detroit, MI	**Orlando, FL**	**Boise, ID**
District of Columbia	**Portland, OR**	**Buffalo, NY**
Houston, TX	**Providence, RI**	**Burlington, VT**
Las Vegas, NV	**Riverside, CA**	**Charleston, WV**
Los Angeles, CA	**Sacramento, CA**	**Charlotte, NC**
Miami, FL	**San Antonio, TX**	**Cheyenne, WY**
Minneapolis, MN	**San Jose, CA**	**Columbia, SC**
New York City, NY	**Tampa, FL**	**Des Moines, IA**
Philadelphia, PA	**Virginia Beach, VA**	**Dover, DE**
Phoenix, AZ		**Fargo, ND**
Pittsburgh, PA		**Fresno, CA**
San Diego, CA		**Hartford, CT**
San Francisco, CA		**Honolulu, HI**
Seattle, WA		**Jackson, MS**
St. Louis, MO		**Little Rock, AR**
		Louisville, KY
		Manchester, NH
		Memphis, TN
		Nashville, TN
		New Haven, CT
		New Orleans, LA
		Oklahoma City, OK
		Omaha, NE
		Peoria, IL
		Portland, ME
		Richmond, VA
		Salt Lake City, UT
		Sioux Falls, SD
		Trenton, NJ
		Wichita, KS

Source: http://www.rand.org/pubs/technical_reports/2009/RAND_TR640.pdf, p. 55-56

B. PUBLIC HEALTH LABORATORY RESPONSE NETWORK: CHEMICAL THREAT TESTING AT RISK IN ALL 10 STATE LABS WITH ADEQUATE CHEMICAL CAPABILITIES AND CAPACITIES

Public health labs have shown dramatic progress in the past decade. In 2010, every lab except one increased or maintained their capability to respond to chemical threats.

In addition, the laboratories created an effective and efficient network, the Laboratory Response Network (LRN-c) to respond chemical threats.[14] The LRN-c includes:

- Nine Level 3 laboratories, which perform the basic functions that all of the LRN labs have — working with hospitals and other first responders within their jurisdiction to maintain competency in clinical specimen collection, storage, and shipment; and
- Thirty-four Level 2 laboratories have chemists who are trained to detect exposure to a number of toxic chemical agents (analysis of cyanide, nerve agents, and toxic metals in human samples are examples of Level 2 activities); and
- Ten Level 1 laboratories provide surge capacity to CDC and can detect exposure to an expanded number of chemical agents, including mustard agents, nerve agents and other toxic industrial chemicals. These labs expand CDC's ability to analyze large numbers of patient samples when responding to large-scale exposure incidents.

Above the Level 1 labs are those at CDC and the Department of Defense (DOD), which test the most complex and dangerous samples.

A report released in September 2011 by CDC, *Public Health Preparedness: 2011 State-by-State Update on Laboratory Capabilities and Response Readiness Planning*, found the most advanced, "Level 1" LRN-c labs increased their capabilities by increasing the number of methods they use to rapidly detect chemical agents, from an average of 6.7 in 2009 to an average of 8.9 in 2010.[15]

Over the last two years, funding for Level 1 chemical labs has been decreased significantly. It is unlikely that states will continue to operate their Level 1 chemical labs without sustained funding from CDC and cuts to the PHEP cooperative agreement threaten that funding.

The 10 chemical labs currently at Level 1 status, which are at risk if further funding cuts are enacted include:

- **California**
- **Florida**
- **Massachusetts**
- **Michigan**
- **Minnesota**
- **New Mexico**
- **New York**
- **South Carolina**
- **Virginia**
- **Wisconsin**

If the chemical testing capabilities are cut from these 10 labs, CDC would be the only remaining public health lab in the country with this ability.

LABORATORY RESPONSE NETWORK FOR BIOLOGICAL THREATS

In addition to responding to chemical threat, the laboratories created an effective and efficient network, the Laboratory Response Network (LRN-bio) to respond biological threats.16 The LRN-bio includes labs with a hierarchy of different capabilities, wherein labs with increased capabilities provide support for other labs, consisting of:

- National laboratories - including those operated by CDC, U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID), and the Naval Medical Research Center (NMRC) — are responsible for specialized strain characterizations, bioforensics, select agent activity and handling highly infectious biological agents;
- Reference laboratories are responsible for investigation and/or referral of specimens. They are made up of more than 100 state and local public health, military, international, veterinary, agriculture, food and water testing laboratories; and
- Sentinel laboratories, which provide routine diagnostic services, rule-out and referral steps in the identification process. While these laboratories may not be equipped to perform the same tests as LRN reference laboratories, they can test samples.

2011 SURVEY BY THE ASSOCIATION OF PUBLIC HEALTH LABORATORIES

According to a survey conducted by the American Public Health Laboratory Association (APHL) in the fall of 2011 about capabilities from August 10, 2010 to August 9, 2011, funding cuts are negatively impacting the capabilities of many state public health laboratories.

Cuts to Biological Terrorism Preparedness Activities

Forty-four percent of state public health labs report being unable to renew service or maintenance contracts for instrumentation, 40 percent report losing a full-time staff position and 40 percent report being unable to attend trainings.

Cuts to Chemical Threat Activities

Thirty percent of state public health reported that budget cuts meant they would be unable to renew service or maintenance contracts for some instruments, 29 percent report being unable to expand capabilities for new assays or tests, 27 percent report being unable to hire staff due to lack of funds, 25 percent report being unable to purchase critical equipment and 23 percent report being unable to attend trainings and conferences.

*48 out of 50 states responded to the survey.

SENTINEL LABORATORY PARTNERSHIPS AND OUTREACH

One of the key components of public health preparedness and response is the ability for laboratories to quickly and accurately detect and report public health threats. To ensure that a robust system is in place, state and local public health laboratories that receive CDC Public PHEP cooperative agreement funding must build strong partnerships with clinical laboratories. These relationships assure that specimens are quickly referred into the public health system. The APHL supports strong and effective communication and collaboration between the public health reference laboratories and the sentinel clinical laboratories of the national Laboratory Response Network (LRN). These public-private partnerships are the foundation for a successful system poised to detect the next threat.

In fall 2011, APHL conducted a survey of the 50 state and Washington, D.C. public health laboratories. Forty-eight (94 percent) of laboratories responded to this survey and provided the following information on sentinel laboratory preparedness and outreach:

- Forty-eight state public health laboratories maintained a list of more than 4,000 active sentinel clinical laboratories in their jurisdiction. Forty-one of these laboratories utilized a rapid method, such as the Health Alert Network (HAN), blast-email or fax, to send messages to sentinel clinical laboratories. Public health laboratories also utilized the same tools to send routine updates and information on training events and drills to these clinical laboratories.

In addition to routine communications with their sentinel clinical partners, public health laboratories provide training on rule-out testing, biosafety, packaging and shipping to thousands of laboratorians across the US. However, this outreach and training is in jeopardy as declining funds threaten to reduce personnel, supply and travel budgets.

APHL has established a Sentinel Laboratory Partnerships and Outreach group, comprised of representatives from state and local public health laboratories, clinical partners such as the American Society for Microbiology (ASM) and the American Society for Clinical Pathology, and the CDC, to address the status of sentinel and public health laboratory relationships to enhance overall preparedness and response to emerging threats. In the coming year, the group will review and make recommendations to adopt a definition of sentinel clinical laboratories, develop a list of common database elements that PHEP funded state and local public health LRN reference laboratories could use to contact sentinel laboratories in their jurisdiction and further articulate the broad role of public health laboratories in support of the sentinel clinical laboratories. The more standardized definition and contact databases will help public health laboratories to perform more targeted outreach to sentinel clinical partners.

EXPERT COMMENTARY

Select Agents and Toxins — Impact of Proposed Regulatory Changes on Public Health Laboratories

By Chris N. Mangal, MPH, Director of Public Health Preparedness and Response, APHL

The events of September 11, 2001 reinforced the need to enhance public health preparedness and response across the United States. Recognizing this gap, Congress passed the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 ("the Bioterrorism Response Act" or "the act") (PL107-188)[17], which President George W. Bush signed into law on June 12, 2002. In addition to bolstering laboratory preparedness and response capability at CDC and in public health laboratories across the United States, the Act also addressed the need to enhance controls on dangerous biological select agents and toxins (BSAT) agents by establishing a BSAT list; regulating the possession, transfer and use of BSAT; maintaining databases of and inspecting facilities that possessed the agents; and screening personnel with access to such agents. The act culminated with the implementation of the final Select Agents Regulations (SAR) (42 CFR Part 73, 7 CFR Part 331 and 9 CFR Part 121) in April 2005.

Since the implementation of the SAR, CDC and the US Department of Agriculture (USDA) have maintained the National Select Agent Registry (NSAR) and have routinely inspected facilities which possess BSAT. Public health laboratories which possess limited quantities of biological select agents and toxins for quality assurance and control purposes are typically regulated by the CDC Select Agent Program (SAP). Further, these laboratories are also regulated under Occupational Safety and Hazard Administration (OSHA), National Environmental Laboratory Accreditation Commission (NELAC), Clinical Laboratory Improvement Amendments (CLIA), and the College of American Pathologists (CAP).

In July 2010, President Barack Obama signed Executive Order 13546, *Optimizing the Security of Biological Select Agents and Toxins in the United States*, noting that the "absence of clearly defined, risk-based security measures in the SAR/SAP has raised concern about the need for optimized security and for risk management."[18] The executive order directed the Secretaries the Department of Health and Human Services (HHS) and the USDA to designate a subset of the select agents and toxins list (Tier 1) that presents the greatest risk of deliberate misuse with the most significant potential for mass casualties or devastating effects to the economy, critical infrastructure; or public confidence; explore options for graded protection for these Tier 1 agents and toxins to permit tailored risk management practices based upon relevant contextual factors; and consider reducing the overall number of agents and toxins on the select agents and toxins list. Further, the order established the Federal Experts Security Advisory Panel (FESAP) to provide advice to the Secretaries on the Select Agent Program security including:

- The composition and potential reduction of the Biological Select Agents and Toxins (BSAT) list, including the development of "Tier 1 agents," which pose the greatest risk for intentional misuse
- Measures to enhance reliability of personnel with access to Tier 1 BSAT
- Standards for physical and cyber security for facilities possessing Tier 1 BSAT
- Emerging policy issues relevant to the security of BSAT

The concept of a tiered approach to regulating select agents and toxins assumes that more optimized security measures can be implemented for agents that pose a higher risk to public health and safety. However, the proposed changes articulated in the October 2011 Federal Register Notice, *Possession, Use and Transfer of Select Agents and Toxins; Biennial Review; Proposed Rule,* per the Federal Register volume 76, No. 191, October 3, 2011,[19] does not take into account the unique role public health labo-

ratories play in the Laboratory Response Network (LRN), a national asset in place to ensure a rapid response to public health and emerging threats. The LRN, formed in 1999 through a partnership between CDC, the Federal Bureau of Investigation (FBI) and APHL, is the nation's premier laboratory network serving as a model for all other networks, responding to actual events on a daily basis and continually proving its utility during events such as Amerithrax, the H1N1 pandemic, disease outbreaks and natural disasters. The true value of the LRN is demonstrated through the communications and relationships built with clinicians, hospitals, law enforcement, first responder and epidemiology communities. These well established partnerships are the cornerstone that allows the LRN to effectively respond to all threats.

The proposed changes would adversely impact the public health laboratories, which comprise 70 percent of the LRN, by jeopardizing the ability of these laboratories to respond to biological threats. In September 2010[20] and again in July 2011[21], APHL participated in meetings of the FESAP to provide input on the final recommendations issued in their report, Recommendations Concerning the Select Agent Program released on June 12, 2011.[22] APHL informed the panel of existing biosecurity practices within state and local public health laboratories that comprise the LRN and the impact of changes to the select agent regulations on these laboratories.

APHL has publicly commented on the proposed rule, calling for:

- Exemption of all LRN reference laboratories from the proposed Tier 1 requirements. APHL encouraged the Select Agent Program to consider the recommendation from the FESAP, where they noted: *The FESAP recognizes that there are unique facilities such as diagnostic, public health, animal health, and environmental laboratories, such as the laboratories of the Laboratory Response Network, which perform a vital national security function and may require different methods of implementation of the recommended standards. In these instances, the FESAP encourages the Select Agent Program, through their authority in Section 4 of E.O. 13546, to "explore options for graded protection of Tier 1 agents and toxins… to permit tailored risk management practices based upon relevant contextual factors."*
- Representation of local and state public health laboratories during the development of codifying changes and guidance documents; and
- Removal of *Bacillus anthracis* Pasteur Strain, botulinum neurotoxin, and toxin-producing strains of *Clostridium botulinum* from Tier 1 designation.

Further, APHL also noted:

- Additional costs to comply with the proposed changes to the rule would adversely impact other critical public health programs that are supported by state and local public health laboratories, many of which have had to take significant budget reductions during the past three years.
- Public health laboratories already foster an environment of biosafety and biosecurity to protect against physical and cyber attacks and insider threats.
- Promoting continued exemplary practices of engaging leadership, encouraging teamwork, building relationships with employees and providing ethics training has greater value than the use of a "spot in time" personnel reliability program.
- Additional requirements for select agents may result in some laboratories abandoning the LRN, resulting in a weakened capability for national response.
- Modifying occupational health programs or adding personnel reliability program requirements will put further strain, including legal ramifications for request for health information, on laboratories already facing worker shortages.
- Increased biosecurity requirements will be damaging to public health laboratories storing limited quantities of BSAT used during response to public health emergencies and would compromise lab preparedness and the ability of the US to detect and respond to threats.

APHL continues to monitor changes to the Select Agent Regulations, providing feedback to federal officials to ensure that public health laboratories are not adversely affected and that robust biosecurity and biosafety practices implemented within public health laboratories remain in place to protect against public health threats.

C. CAREER EPIDEMIOLOGY FIELD OFFICER PROGRAM: 24 STATES AT RISK TO LOSE EPIDEMIOLOGY SUPPORT

In 2002, CDC developed a program to help state, territorial, and local health departments strengthen their epidemiologic capability for public health preparedness and response. The Career Epidemiology Field Officer (CEFO) Program assigns CDC epidemiologists at the request of state, territorial or local health departments. The program has filled a critical gap by establishing a system to assign well-trained, highly capable epidemiology staff to provide direct support and assistance to health departments.[23]

All CEFOs have completed CDC's Epidemic Intelligence Service (EIS) training or comparable training. Once assigned to a location, CEFOs take on a range of roles:

- Developing and strengthening state and local surveillance systems;
- Investigating major health problems;
- Training local staff;
- Helping develop local public health emergency plans and disaster-response exercises;
- Coordinating local response to disasters and outbreaks with CDC and other federal agencies; and
- Fostering cooperation between emergency responders, health care providers and other agencies involved in disaster response.

Over the past decade, CEFOs have played essential roles in a wide range of incidents. For example, a CEFO assigned in New York City helped the city respond in the early stages of the H1N1 flu epidemic, tracking cases among high school students who had returned from spring break in Mexico.[24] A CEFO in Kentucky organized and led the emergency needs assessments for over 7,000 persons in temporary shelters following the 2009 ice storm. The CEFO in North Dakota served as Planning Chief for the state's public health emergency response to the 2010 Red River flooding. The CEFO in Mississippi established surveillance to monitor health effects in coastal residents following the Gulf oil spill.

As of November 2011, the program had 32 epidemiologists working in 24 states.[25] The program is supported as part of the PHEP cooperative agreement. Under the FY2012 cuts to state and local preparedness programs at CDC, states that currently have CEFOs could lose the support, including:

- **Alabama**
- **Arizona**
- **California**
- **Florida**
- **Idaho**
- **Kentucky**
- **Maine**
- **Michigan**
- **Minnesota**
- **Mississippi**
- **Montana**
- **North Carolina**
- **North Dakota**
- **Nebraska**
- **Nevada**
- **New York**
- **Pennsylvania**
- **South Dakota**
- **Tennessee**
- **Texas**
- **Virginia**
- **Vermont**
- **West Virginia**
- **Wyoming**

D. PREPAREDNESS AND EMERGENCY RESPONSE LEARNING CENTERS: 14 UNIVERSITIES AT RISK TO LOSE FUNDS FROM CUTS TO THE TRAINING PROGRAM

In 2010, 14 universities around the country received funding to create Preparedness and Emergency Response Learning Centers (PERLCs) to help train and educate public health workers on disaster preparedness and response. PERLCs are designed to help integrate federal and local disaster response by educating workers and officials on federal standards and strategies.[26]

A number of local public health officials have said these programs help fill a crucial gap. "Many people in critical public health roles don't come through with formal training," said then New York State Health Commissioner Dr. Richard F. Daines. "They… desperately need the support of academic training."[27]

Some PERLCs are expanding on schools' existing work. For instance, at Harvard, the PERLC replaces the Harvard Center for Public Health Preparedness, which began in 2002. Over the last nine years, the center has trained nearly 33,000 students and organized drills and exercises involving more than 6,000 public health officials.[28] Over the past decade, Columbia University's PERLC, the Columbia Regional Learning Center (CRLC), has trained 100,000 public health workers across the country. Because the center uses online training for many of its classes, a significant number of these workers are outside the school's immediate area.[29]

CDC originally announced that the centers would be funded for five years. But in the FY 2011 federal budget, the PERLC budget was reduced by 30 percent. The Academic Centers for Public Health Preparedness, which include the PERLCs and Preparedness and Emergency Reseponse Research Centers (PERRCs), are scheduled for $10 million in additional cuts in FY 2012.[30, 31]

In FY 2011, $13 million in grants were awarded to the 14 institutions listed below, with the grants totaling approximately $940,000 each.[32] The federal funds for these programs will be significantly cut in 2012:

- **Columbia University Mailman School of Public Health, New York, NY**
- **Harvard University School of Public Health, Boston, MA**
- **Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD**
- **Texas A&M School of Rural Public Health, College Station, TX**
- **University at Albany SUNY School of Public Health, Albany, NY**
- **University of Alabama at Birmingham School of Public Health, Birmingham, AL**
- **University of Arizona College of Public Health, Tuscan, AZ**
- **University of Illinois at Chicago School of Public Health, Chicago, Illinois**
- **University of Iowa College of Public Health, Iowa City, IA**
- **University of Minnesota School of Public Health, Minneapolis, MN**
- **University of North Carolina Gillings School of Global Public Health, Chapel Hill, NC**
- **University of Oklahoma College of Public Health, Oklahoma City, OK**
- **University of South Florida College of Public Health, Tampa, FL**
- **University of Washington School of Public Health, Seattle, WA**

E. PREPAREDNESS AND EMERGENCY RESPONSE RESEARCH CENTERS: NINE UNIVERSITIES AT RISK TO LOSE FUNDS FROM CUTS TO THE PROGRAM

One of the major ongoing gaps in preparedness is understanding ways to measure standards and create performance metrics.

In 2008 and 2009, CDC awarded $13.6 million to nine schools of public health around the country to help them form Preparedness and Emergency Response Research Centers (PERRCs).[33] The goal of these centers is to study key questions about how best to respond to disasters and emergencies, and then to translate that knowledge into practical guidelines that can be adopted by public health departments across the country.

Each center is undertaking three or four research projects, focusing on a different area of study. The research topics, which have been recommended by the Institute of Medicine (IOM), include:

School	Research Priority	Award
Emory University (Atlanta, GA)	Create and maintain sustainable preparedness and response systems	$1,562,676
Harvard University (Boston, MA)	Generate criteria and metrics to measure effectiveness and efficiency	$1,717,286
Johns Hopkins University (Baltimore, MD)	Preparedness to address the risks of vulnerable populations	$1,495,398
University of California (Berkeley, CA)*	Achieve public health and community readiness for today's challenges and future threats	$1,506,306
University of California* (Los Angeles, CA)	Preparedness and Emergency Response Centers: A public health systems approach	$1,193,365
University of Minnesota (Minneapolis, MN)	Enhance the usefulness of training	$1,470,307
University of North Carolina (Chapel Hill, NC)	Create and maintain sustainable preparedness and response systems	$1,695,189
University of Pittsburgh (Pittsburgh, PA)	Create and maintain sustainable preparedness and response systems and generate criteria and metrics to measure effectiveness and efficiency	$1,701,845
University of Washington (Seattle, WA)	Improve communications in preparedness and response	$1,270,632

*Funded FY 2003-2013

Source: http://www.cdc.gov/phpr/documents/science/PERRC_Fact_Sheet.pdf

So far, the research has resulted in the publication of 64 peer-reviewed articles.[34]

For FY 2011, CDC cut the overall PERRC budget by approximately 40 percent.[35] The FY 2012 budget significantly cuts funding for PERRCs.[36] Depending on how CDC allocates cuts to the PERRCs and PERLCS, any of the nine research centers could be eliminated in 2012.

F. NATIONAL CENTER ON ENVIRONMENTAL HEALTH (NCEH) AND AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY (ATSDR) PROGRAM: COMPREHENSIVE RESPONSE CAPABILITIES FOR NUCLEAR DETONATION, RADIOLOGICAL ATTACKS, CHEMICAL ATTACKS AND NATURAL DISASTERS AT RISK

The National Center for Environmental Health and the Agency for Toxic Substances and Disease Registry (NCEH/ATSDR) lead CDC in developing national, coordinated, science-based responses to deal with the health concerns resulting from environmental threats. Environmental health threats comprised eight out of 15 "all-hazard" planning scenarios that were released in 2005 for use in national, federal, state and local homeland security preparedness activities including:

- Nuclear detonation;
- Radiological attacks or accidents;
- Chemical attacks or accidents, including blister agents, toxic industrial chemicals, nerve agents and chlorine explosions; and
- Natural disasters, including major earthquakes and hurricanes.[37]

These scenarios were "designed to be the foundational structure for the development of national preparedness standards from which homeland security capabilities can be measured because they represent threats or hazards of national significance with high consequence."[38] Additionally, natural disasters to date have caused more fatalities and destruction in the United States than any others.

In FY 2011, NCEH received around $2.7 million to support emergency preparedness and response activities. In addition, in FY 2011, NCEH received $3.5 million in support from CDC's Office of Public Health Preparedness and Response (OPHPR) for activities related to radiological emergency preparedness and response and $2.3 million from OPHPR for maintaining and enhancing CDC radiological laboratory capacity to respond to a radiological or nuclear emergency.

NCEH/ATSDR has led CDC's response to the public health challenges of diverse environmental emergencies. These include the Deepwater Horizon oil spill, the Fukushima nuclear power plant disaster, and every hurricane response including major disasters such as Katrina (2005) and Gustav and Ike (2008). With cuts proposed to CDC's preparedness activities in the FY 2012 budget, the agency would need to prioritize where internal resources should be targeted. CDC officials have indicated that support for preparedness activities at NCEH/ATSDR, like support for other CDC preparedness programs addressing infectious diseases, mass trauma, and other threats, could be eliminated in order to provide sufficient resources to other priorities. Without these funds, CDC would have limited capability to assist all 50 states and Washington, D.C. in the response to natural disasters or with incidents involving toxic substance releases or radiological exposures through contamination assessments, field investigations and issuing expert guidance on protective actions.

In addition, if the approximately $1.7 million in preparedness funding for poison center (PC) surveillance was cut, it would mean:

- All national surveillance efforts for chemical and radiological exposures and illness would stop (there is currently no alternative system available which could replace this);
- NCEH-CDC would no longer be able to honor requests for assistance from other Departments, including DHS, and Agencies, FDA, EPA in particular, with regard to poison center data in a public health emergency;
- Maintenance and support would cease for the web-based National Poison Control Data System (NPDS) services used by state public health departments and BioSense agencies;
- Maintenance and support of PC upload of data to NPDS would cease;
- NCEH-CDC would lose their unrestricted access to the national poison center database; and
- NCEH-CDC would no longer be able to perform customized, incident-specific surveillance for exposures and illness from a public health threats where this has been utilized in the past such as carbon monoxide poisoning from hurricanes, oil exposures from the Deepwater Horizon incident, adverse effects from medical countermeasures used during the 2011 Japan nuclear incident.

OFFICIALS VOICE CONCERN OVER PREPAREDNESS SPENDING CUTS

In a September 2011 commentary in the British medical journal *The Lancet*, Ali S. Khan, M.D., M.P.H, director of CDC's OPHPR, noted that state and local health departments had lost more than 44,000 jobs between 2008 and 2010. Since then, the number as risen to nearly 50,000. Khan wrote that "(s)tates cannot adequately meet everyday needs, let alone increased efforts for emergency incidents that have potential national implications, without reliable, dedicated, or sustained federal funding. Because all responses are initially local, this limitation is the primary vulnerability to national preparedness."[39]

Khan argued that in the aftermath of the Sept. 11, 2001, terrorist attacks and the anthrax attacks later that year, the country realized that it wasn't properly prepared for such events. Since then, federal, state and local governments have taken important steps to improve their capacity to respond to attacks and disasters:[40]

- In 2006, Congress passed the Pandemic and All-Hazards Preparedness Act (PAPHA), which created a comprehensive framework for dealing with threats;
- Increased federal funding helped improve epidemiological capacity, as well as the stockpile of medicines to respond to specific threats, including anthrax, smallpox, tularemia, and some chemical and nerve agents;
- CDC funding expanded the network of laboratories that analyze and diagnose bioterrorism agents as well as naturally occurring hazardous microbes; and
- CDC now has a cutting-edge emergency operations center; 10 years ago, it had only a makeshift center.

Khan said that these improvements in preparedness have helped public health departments' ability to respond to a range of emergencies. He noted that in 2009, CDC and other groups responded effectively to the discovery of the H1N1 flu strain, quickly developing a vaccine.

He also pointed out that the increased capacity helps in public health departments' routine operation. "The US Government is increasingly recognising [sic] that preparedness and core (routine) investments in public health are synergistic," he wrote. "Large-scale and unpredictable natural, accidental, or intentionally caused disease outbreaks and environmental disasters need many of the same routine surveillance, laboratory, risk communication, and other core public health systems."

At the same time, he said, recent funding cuts, driven by the economic crisis as well as political considerations, have threatened these developments. He noted that a 2009 survey found that 35 percent of state epidemiologists reported that they did not have substantial-to-full capacity for an emergency response to a bioterror attack — a 10 percent increase since federal preparedness funding hit a peak seven years ago.[41]

In the same issue of *The Lancet*, two New York City Health Department officials authored a commentary on how their agency has improved its disaster response abilities.[42] Thomas A. Farley and Isaac Weisfuse, both of the New York City Department of Health and Mental Health (DHMH), write that over the past decade, the agency has taken several key steps. It has:

- Created a volunteer Medical Reserve Corps, made up of 9,000 medical professionals, who can help the city during emergencies;
- Established a formal incident command system, which gives all of the agency's 6,000 workers specific responsibilities during an emergency;
- Set up two emergency operations centers at different sites, in case one is unusable in a disaster; and
- Developed an electronic medical surveillance system that includes almost all city hospital emergency departments.[43]

The authors single out two areas in which the disaster community must improve: strategies for cleaning up anthrax from the environment, and how to most efficiently distribute medicine to large populations during a disaster or epidemic.

In another September commentary in the *Journal of the American Medical Association*, Thomas V. Inglesby of the Center for Biosecurity of the University of Pittsburgh Medical Center agreed that disaster preparedness had improved significantly over the past decade, largely because the federal government increased funding.[44] He also noted that social media, including Facebook and Twitter, have played a key role in helping both the public and responders share information quickly.

At the same time, he wrote, the disaster response community must continue to hone its strategies and provide adequate funding.[45]

"Commitment to a stable level of investment in disaster preparedness at the federal, state, and local levels is needed," he wrote. "The gains of the last 10 years are now at risk with this decreased funding and will be further threatened if resources continue to decline."[46]

Components of a System Put to the Test: A Look at North Dakota's Public Health Preparedness System

By Tim Wiedrich, Section Chief Emergency Preparedness and Response Section, North Dakota Department of Health

To safeguard the public's health and ensure public safety, North Dakota has built an integrated preparedness system that features six main components. These components are the result of a strategic approach to preparedness focusing on an all-hazards approach.

The investments in public health and preparedness over the last decade have helped us develop our preparedness systems and these components. These investments have been critical for building capabilities and capacity. As the economic situation continues to worsen, the potential for further funding cuts could put these advancements at significant risk.

Component 1: Statewide Tactical Communications

North Dakota has a secure and redundant wide-area network that includes a variety of technologies (video conference, data, Voice Over IP, teleconference, web streaming and others) to connect public health, hospitals, long-term care facilities and emergency medical services (EMS).

We also have wireless routers in every hospital and trailer-based (which includes satellites, VHF public safety, VHF repeaters and cell phone repeaters) and kit-based (which includes Satellite-Bgan with data and voice, public safety radios with VHF and commercial wireless with data and voice) communication systems.

To truly be prepared, responders must be able to communicate with each other during public health emergencies. North Dakota strategically created flexible communications channels that can be utilized during any kind of emergency. Through our statewide tactical communications component, everyone involved in public health preparedness shares a common operating picture and can stay in contact no matter the emergency.

Component 2: Command and Control

The North Dakota Department of Health, like most other state health departments, has an emergency operations center. Our operations center houses a trained staff of 50 personnel who undergo quarterly training programs. In addition, the department is committed to the National Incident Management System (NIMS), which ensures public health proactively works with other parts of government, nongovernment organizations and the private sector to respond to emergencies.

Through our statewide situational awareness, each aspect of an emergency response is integrated and connected; for example, from the vehicle (such as ambulances) and staff staging areas to the sending facility to the receiving facility. Every part of the staff, patient, transportation and destination is tracked step by step through command and control.

North Dakota has also built a statewide Health Alert Network Notification System that ensures public health departments and the medical community share information rapidly.

Our command and control systems allow responders to take action on a common operating picture, which is shared through the statewide tactical communications, to coordinate operations among a variety of different responders in different locations.

Component 3: State Medical Cache

Much like the Strategic National Stockpile, North Dakota has a state medical cache that includes:

- Warehouse and delivery;
- Pre-hospital stabilization and staging, which include trailer-based kits that feature ten beds that can surge to 20;
- State medical shelters for low acuity patients;
- Ancillary medical equipment;
- Bus conversion kits, which ensure transport for wheelchairs and stretchers; and
- Tent sheltering.

Our state's warehouse and delivery system is a 23,000 square foot facility that houses medical supplies, pharmaceuticals, wrap-around supplies and equipment and other public health emergency essentials. The entire cache is standardized, palletized and deliverable by cargo. Supplies and equipment are ordered by medical and public health providers through an online ordering process.

We can quickly transport medicines, materials and people across the state during an emergency through our state medical cache.

Component 4: Just-in-Time Training

North Dakota has the ability to reach out to the medical community and distribute educational information and rapidly teach them techniques and information they need using our just-in-time training component. For example, in 2002, the federal government initiated a smallpox vaccination program to inoculate key medical and public health responders. Because smallpox vaccination had not been done for several decades, medical professionals were no longer familiar with the technique. Just-in-time training delivered through a distance learning system provided an effective mechanism to rapidly build this capability. The just-in-time distance learning system includes live and archived web/video conference capabilities that can be broadcast through dedicated wide area networks, the public internet and public access television.

North Dakota's Public Health Preparedness System

Component 5: Planning and Response Contracts

North Dakota has created and entered into planning and response contracts that determine, in advance, important aspects of emergency response. This includes things like medical shelters, pharmaceutical and transportation access, services and many other aspects.

The planning contracts have been made with local public health departments, the Long Term Care Association and the Hospital Association. Response contracts also exist with EMS, universities, bus companies, pharmaceutical distributors and medical supply and equipment distributors.

During emergencies, the contracts are activated to obtain the resources required to respond.

Component 6: Medical Reserve Corps, Emergency System for Advanced Registration of Volunteer Health Professionals (ESAR-VHP)

In North Dakota, the Medical Reserve Corps and ESAR-VHP are a single statewide system. The system has credentialed more than 800 medical professionals and has the capability of notifying all 17,000 licensed medical providers in the state to rapidly credential and deploy personnel. North Dakota state law established a single ESAR-VHP registry operated by the state health department and provides tort protection when medical providers are activated under the auspices of the state response system.

Our Preparedness System, Tested

Beginning in 2009, these systems were put to substantial test.

In 2009, North Dakota experienced extensive flooding along the Red River, which impacted Fargo, Valley City and other communities in the eastern part of the state. The flooding required public health to create a major evacuation process for thousands of hospital patients, long-term care residents and other vulnerable populations. The evacuation included movement of these groups across a three-state area.

The difficulty of the response was exacerbated by an incredible spring blizzard that hit the interstate roads and closed down traffic during the evacuation. We relied on our systems to go beyond what our initial plan had contemplated to press other types of evacuation processes. We worked with the private sector to secure commercial airplanes to transfer people. Delta/Northwest provided two large commercial aircrafts to do multiple round trips.

Immediately after the flooding subsided, Influenza A (H1N1) was spreading across North America. Obviously, this presented a far different public health emergency. However, at the end of the day, the same six components were utilized to manage and mitigate the issues. For example, vaccine distribution relied on our state tactical communication systems and command and control to distribute the state medical cache.

The flooding in 2009 was labeled as the "500-year flood." However, our weather patterns in 2010 aligned in the same way as the previous year creating another substantial spring flood threat. The entire state received heavy snowfall, but an almost perfect spring thaw allowed us to escape serious spring flooding. In 2011, we were not as lucky. Flooding and flood threats occurred on three major river systems. On the east side of the state, substantial flooding and flood threats were occurring on the Red River. At the same time, there was another flood threat hundreds of miles away on the Missouri River in the central part of the state near Bismarck.

Then a third river system, the Souris, was overwhelmed. The river, which begins in Canada and goes through Minot and other communities, experienced devastating flooding. The hospital systems were hardened so that evacuation of the hospital was not necessary, but a large long-term care facility and over 11,000 people in Minot needed to evacuate. The flooding river cut the city in half and isolated many citizens from medical facilities. The local hospital stood up a temporary emergency department and clinic on the north side of the city using the state medical cache.

During the flood responses for all three river systems, we leaned on transportation agreements to get supplies, people and materials to those who in the impacted areas. In total, about 7,000 homes flooded. The health and medical response to these devastating floods was successful in large part because of the planning, processes and systems that have been developed and implemented through the public health and medical preparedness programs.

Moving Forward

The last three years have validated our preparedness system. It has proven to be robust, flexible and effective. However, it is in significant danger of eroding. As we learned in 2011, emergencies can occur simultaneously hundreds of miles apart.

If preparedness funding continues to deteriorate, it is clear that major portions of our system will be threatened and lost. If I look at our six components, there is not one component that can be sacrificed and still maintain an effective system.

As most states have done over the last decade, North Dakota has built strong and effective preparedness systems that have been put to the test many times and will continue to be tested by Mother Nature, pandemics and humans. Preparedness is not something you can buy once and put on the shelf, it needs to be updated, supported and maintained.

SECTION 2

State and Local Public Health Funding Cuts

Forty states decreased their public health budgets from FY 2009-10 to FY 2010-11, 29 states decreased budgets for a second year in a row, and 15 for three years in a row.

In FY 2010-11, the median state funding for public health was $30.09 per capita, ranging from a high of $154.80 in Hawaii to a low of $3.45 in Nevada.

From FY 2008 to FY 2011, the median per capita state spending decreased from $33.71 to $30.09.

While most preparedness specific funding comes from the federal level, the federal investment assumes and builds on a core capacity at the state and local level. State budget cuts are undermining core public health capacities.

Every state allocates and reports its budget in different ways. States also vary widely in the budget details they provide. This makes comparisons across states difficult. TFAH conducts an annual analysis that examines state budgets and appropriations bills for the agency, department, or division in charge of public health services, using a definition as consistent as possible across the two years, based on how each state reports data. TFAH defined "public health services" broadly, including most state-level health funding.

10 states increased or maintained level funding for public health services from FY 2009-10 to FY 2010-11		40 states and D.C. DECREASED funding for public health services from FY 2009-10 to FY 2010-11	
State and percent increase (adjusted for inflation)		State and percent decrease (adjusted for inflation)	
Alaska (11.2%)[2]	**North Dakota (17.9%)[3]**	Alabama (-0.4%)	Nebraska (-3.4%)
Arkansas (1.8%)	Ohio (7.2%)	Arizona (-0.1%) ^	Nevada (-4.6%)*
Florida (3.9%)[2]	Tennessee (0.2%)	California (-5.1%) ^	New Hampshire (-9.4%)[4]
Indiana (1.4%)	Wisconsin (2.9%)	Colorado (-1.3%)*	New Jersey (-15.8%) ^
Louisiana (1.9%)		Connecticut (-8.4%)[2, *]	New Mexico (-11.7%)[4, *]
Michigan (0.4%)[3]		Delaware (-28.0%)[2, *]	New York (-2.4%)*
		D.C. (-19.5%)[4, *]	North Carolina (-3.2%)[2, ^]
		Georgia (-15.7%)*	Oklahoma (-10.6%)[1, *]
		Hawaii (-17.2%)[2]	**Oregon (-18.1%)***
		Idaho (-1.2%)*	Pennsylvania (-6.1%)[2, ^]
		Illinois (-8.9%)*	Rhode Island (-2.3%)[4, ^]
		Iowa (-16.2%)[4, *]	South Carolina (-19.2%) ^
		Kansas (-3.0%) ^	South Dakota (-4.9%)[4]
		Kentucky (-7.0%)	Texas (-1.6%)
		Maine (-14.2%)[2]	Utah (-1.6%)[4, ^]
		Maryland (-5.7%)[2, 4, ^]	Vermont (-10.1%)[4, *]
		Massachusetts (-6.2%) ^	**Virginia (-5.1%)[3, ^]**
		Minnesota (-6.5%)[2, ^]	**Washington (-2.1%)[3]**
		Mississippi (-13.2%)[2, ^]	West Virginia (-2.4%)
		Missouri (-28.5%)*	**Wyoming (-0.6%) ^**
		Montana (-7.5%)	

NOTES:
Biennium budgets are bolded.

1 May contain some social service programs, but not Medicaid or CHIP.

2 General funds only.

3 Budget data taken from appropriations legislation.

4 State did not respond to the data check TFAH coordinated with ASTHO that was sent out October 26, 2011. States were given until November 18, 2011 to confirm or correct the information. The states that did not reply by that date were assumed to be in accordance with the findings.

* Budget decreased for second year in a row

^ Budget decreased for third year in a row

Source: Research by TFAH of publicly available state budget documents and communications with health and budget officials in the states.

The following states' budgets went down for the second year in a row: Colorado, Connecticut, Delaware, D.C., Georgia, Idaho, Illinois, Iowa, Missouri, Nevada, New Mexico, New York, Oklahoma, Oregon and Vermont.

The following states' budget went down for the third year in a row: Arizona, California, Kansas, Maryland, Massachusetts, Minnesota, Mississippi, New Jersey, North Carolina, Pennsylvania, Rhode Island, South Carolina, Utah, Virginia and Wyoming.

Public health funding is discretionary spending in most states and, therefore, is at high risk for significant cuts during economic downturns. While few states allocate funds directly for public health preparedness, state and local funding is essential for supporting public health infrastructure and core capacities of health departments.

Several states in this analysis that are identified as increasing or maintaining spending may not have actually increased their spending on public health programs; this can just be a reflection of how that state reports their budget. For instance, some states include federal funding in the totals or public health dollars within health care spending totals, such as the state share of Medicaid or mental health expenditures, which makes it very difficult to determine "public health" as a separate item.

For additional information on the methodology of the budget analysis, please see Appendix B: Data and Methodology for State Public Health Budgets.

PUBLIC HEALTH ACCREDITATION

In September 2011, the Public Health Accreditation Board (PHAB) launched the first national accreditation program for all public health departments.[47]

The goal of accreditation is to set standards and measures for public health departments, including in key areas related to preparedness.

According to Kaye Bender, RN, PhD, FAAN, President and CEO of the Board, "PHAB's vision for accreditation is to create a reliable national standard for public health. PHAB supports health departments in achieving this standard by recognizing the important work they do and by providing support to improve their services."

In a time of budget cuts, accreditation can help determine when cuts are having an impact on the core standards and capabilities of public health departments. "With shrinking budgets and a growing number of health challenges to address, there has never been a more important time for public health departments to focus on the best and most efficient ways to keep people healthy," according to James Marks, M.D., MPH, Senior Vice President and Director of the Robert Wood Johnson Foundation's Health Group.

LOCAL HEALTH DEPARTMENTS CUTS

A recent study conducted by the National Association of County and City Health Officials (NACCHO) found significant cuts to programs, workforce and budgets at local health departments (LHDs) around the country.

Since 2008, LHDs have lost a total of 34,400 jobs due to layoffs and attrition.[48] Combined state and local public health job losses total 49,310 since 2008.[49]

LHDs continue to struggle with budget cuts. In July, 2011 nearly half of LHDs reported reduced budgets, which is in addition to 44 percent that reported lower budgets in November 2010.[50] In addition, more than 50 percent of LHDs expect cuts to their budgets in the upcoming fiscal year.

CITY AND COUNTY MANAGERS OUTLINE KEYS TO DISASTER PREPAREDNESS

In September 2011, city and county managers, who oversee and coordinate jurisdiction-wide responses that encompass a range of aspects beyond public health, outlined key aspects of preparedness from their perspective at the annual conference of the International City/Management Association (ICMA).[51]

Five panelists who represent different types of communities — Ron Carlee, COO of the ICMA, who, managed Arlington County, Virginia, during the September 11 attacks; William Fraser, city manager of Montpelier, Vermont; Aden Hogan, city manager of Evans, Colorado, and former assistant city manager of Oklahoma City, Oklahoma during the 1995 bombing; Elizabeth Kellar, President and CEO of the Center for State and Local Government Excellence; and Ken Pulskamp, city manager of Santa Clarita, California — identified the following key components to effective disaster response:

General Planning and Preparation:

- Every disaster is local, and local governments should be prepared to respond in partnership with states.
- Many communities, especially smaller ones, have difficulty planning for emergencies. But preparedness is essential.
- The first few hours after a disaster are crucial.
- Reduce disaster responsibilities to checklists. On the day of an emergency no one has time to read pages of text.
- Have a plan, but be flexible. The disaster rarely plays out exactly according to the plan. Be prepared to adjust on the fly.
- It is impossible to plan for every contingency. Plan for what is probable. A careful plan that activates resources can be effective in many contexts.
- Have a plan to make use of residents who want to volunteer during and after the disaster. This can be a key resource.
- Collaboration between departments, and between neighboring jurisdictions, and with state and federal partners, is critical. It is very important to practice joint response strategies with these partners.

Communication:

- During a disaster, frequent communication with the public is essential.
- It is especially crucial to communicate frequently with the disabled community, as well as with the elderly and people with children.
- During emergencies, Twitter and other social media tools can help keep the public informed.
- Especially in smaller communities, disaster response officials should be prepared to act as direct communicators with the public.
- It is important to manage not only those affected directly by the disaster but also the "worried well" who can either help or hinder a response depending on how they are supported.

What Residents Should Know:

- Authorities may not be able to offer help for 72 hours. Residents should know that they may have to rely on their own resources for that time; they should know their neighbors, be able to turn off water and gas lines, and have stockpiles of essential supplies such as food, water and batteries. They should also consider buying a generator.
- The public should know to pay close attention to official warnings. Often people don't take these alerts as seriously as they should.
- Residents should plan for road closings and major traffic, and should prepare alternate routes to and from home, work and school.

Challenges:

- Recent federal, state and local budget cuts have put a strain on local preparedness efforts to communicate with the public in a timely manner to mount the most effective response as well as to engage partners in a coordinated, strategic and as immediate response as possible.

WMD COMMISSION REPORT FINDS UNITED STATES VULNERABLE TO BIOTERROR

A new report, released October 2011, by the Bipartisan Weapons of Mass Destruction (WMD) Terrorism Research Center, headed by former U.S. Senators Jim Talent (R-MO) and Bob Graham (D-FL), found the United States is not prepared for a bioterror attack, particularly a large-scale event.[52]

Eleven of the nation's top biodefense experts participated in the Bio-Response Report Card and gave different aspects of the response grades ranging from Bs to Fs.

The higher grades were awarded to the ability to respond to small-scale non-contagious and contagious events, but dropped for larger-scale, drug-resistant and global health crises.

The lowest grade for capability across all of the response scenarios was for "attribution," which is the ability to identify the source of the attack which is important for determining who is responsible for the attack and how to halt follow-up attacks if need be. Communication among first responders and stakeholders received the highest marks across the types of attacks.

The ability to detect and diagnose biological events, the availability and ability to distribute vaccines or other medicines, and medical management grades were higher for the smaller-scale events and significantly lower for larger-scale events. The overall ability of the country to develop and approve vaccines and drugs received a D.

Some of the report's top findings and conclusions include:

- "A scientifically and legally validated attribution capability [the ability to identify the source of an attack] does not yet exist for anthrax or virtually any other pathogen or toxin."
- The Biomedical Advanced Research and Development Authority (BARDA), which encourages the private sector to develop countermeasures, is significantly underfunded and is not spurring necessary innovation.
- The country has adequate doses of smallpox vaccine and antibiotics for anthrax, but it doesn't have adequate countermeasures for the viral diseases known collectively as hemorrhagic fevers.
- The Department of Health and Human Services (HHS) has not yet developed a set of goals for research, product requirements and dispensing countermeasures to civilian populations and is not coordinating these priorities with the Department of Defense.
- While the government has built up the Strategic National Stockpile (SNS), it has not paid enough attention to how it will deliver the medicines during an attack.
- The usefulness of BioWatch, which is designed to provide early warning of a bioterror attack, remains unclear.
- The country's health system is not equipped to handle the surge of patients that would follow a large-scale attack. Current surge capacity may be as much as 50 times below what might be needed.
- Very few of the recommendations developed by the federally appointed National Commission on Children and Disasters have been implemented or funded. Children represent one of the largest vulnerable and special needs populations in the U.S.; failure to understand and accommodate special needs becomes a crisis in any major disaster.
- Most individual citizens are not prepared for a bioterror attack and don't understand basic medical facts about the most likely bioterror agents.
- The government has no plan for cleaning up a large area after an attack with a non-contagious agent such as anthrax. While small-scale cleanup plans do exist, they are not likely to be applicable to a larger area.
- The federal government has no plan, and provides little guidance, on local or regional evacuation following an anthrax attack or the detonation of an improvised nuclear device (IND), among other potential large-scale disasters.

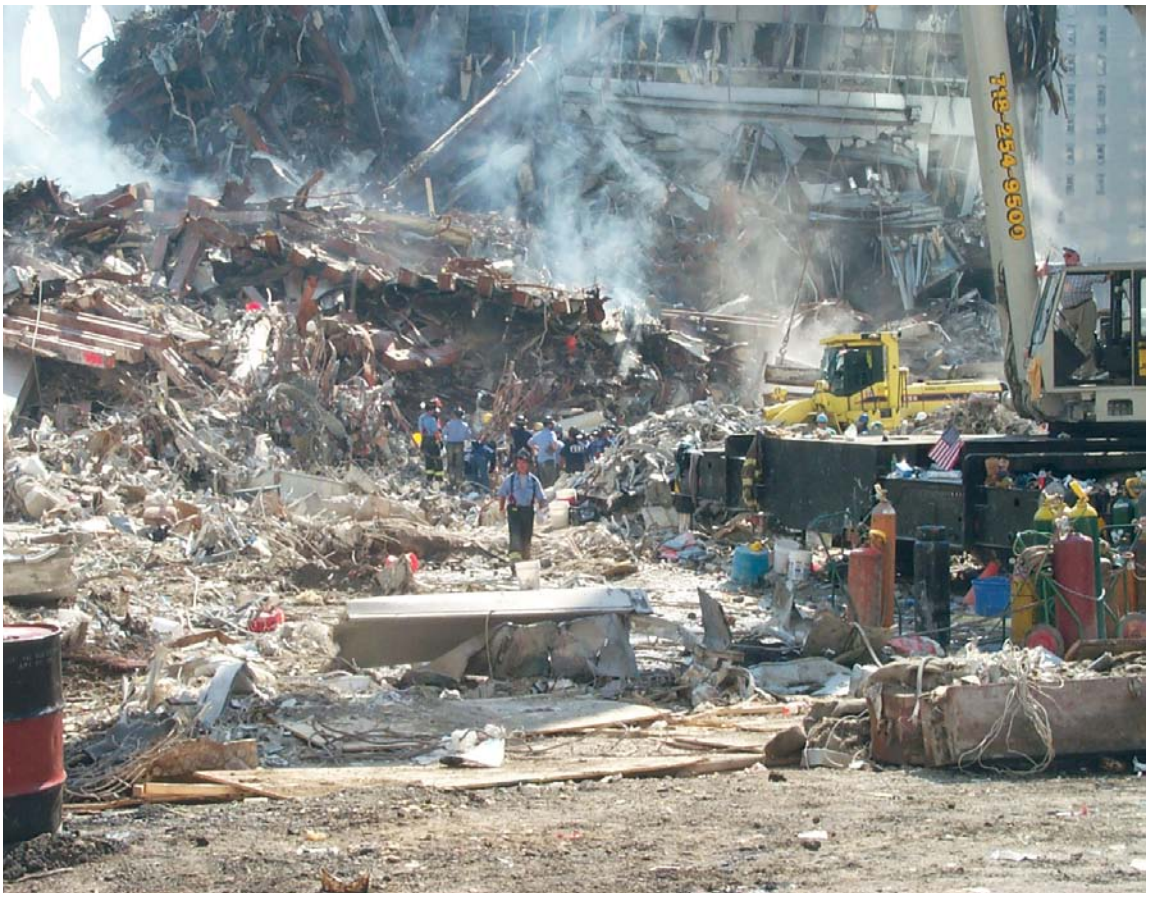
SECTION 3

A Decade of Public Health Preparedness

Ten years ago, the September 11th and anthrax tragedies clearly demonstrated that the public health system was not prepared for the range of modern health threats we face. Since then, significant investments have resulted in the country being much better prepared to respond to public health emergencies ranging from threats of bioterrorism to major infectious disease outbreaks like a pandemic flu to natural disasters like hurricanes, tornadoes and floods. Since 2003, in the annual *Ready or Not? Protecting the Public's Health from Diseases, Disasters, and Bioterrorism*, TFAH has documented progress and ongoing vulnerabilities in the nation's ability to respond to health crises.

A. PROGRESS IN PREPAREDNESS SINCE 2001

Since 2001, major investments in improving preparedness have led to significant improvements in preparedness planning and coordination; public health laboratories; vaccine manufacturing; the SNS; pharmaceutical and medical equipment distribution; surveillance; communications; legal and liability protections; increasing and upgrading staff; and surge capacity.



MAJOR AREAS OF IMPROVEMENTS	
Planning and Coordination	■ In June 2002, Congress passed the Public Health Security and Bioterrorism Response Act of 2002, which included cooperative agreement funding support for states around the country. In 2006, Congress reauthorized the legislation as the Pandemic and All-Hazards Preparedness Act (PAHPA). Congress is considering reauthorization of the bill in 2011. ■ Homeland Security Presidential Directive-21 (HSPD-21) was issued in 2007 setting a National Strategy for Public Health and Medical Preparedness. ■ Release of the National Health Security Strategy in 2009. ■ Creation of the IOM Forum on Medical and Public Health Preparedness for Catastrophic Events. ■ All 50 states and Washington, D.C. completed initial bioterrorism response plans by September 2003. ■ The federal government created a comprehensive National Strategy for Pandemic Influenza, involving all federal agencies and partners within state and local governments, businesses, and communities around the country. President Bush requested and Congress appropriated more than $6 billion to support the national strategy, and another $7.7 billion was provided to help respond to the H1N1 pandemic flu outbreak. ■ All 50 states and Washington, D.C. developed pandemic flu plans that were reviewed by HHS before the 2009 outbreak of H1N1. In 2003, only 13 states had pandemic flu plans. ■ 44 states and Washington, D.C. activated their Emergency Operations Center (EOC) a minimum of two times in a year as of 2008.*** ■ 44 states and Washington, D.C. reported that pre-identified staff were able to acknowledge notification of emergency exercises or incidents within a target time of 60 minutes at least twice as of 2008.*** ■ 48 states and Washington, D.C. developed at least two After-Action Reports/Improvement Plans within 60 days of an exercise or actual incident as of 2008.*** ■ All 50 states and Washington, D.C. reported conducting an emergency preparedness drill or exercise that included both the health department and the National Guard as of 2007.
Public Health Laboratories	■ 47 states reported having enough staffing capacity to work five, 12-hour days for six to eight weeks in response to an infectious disease outbreak, such as novel influenza A H1N1 from August 10, 2009 to August 9, 2010. ■ 49 states and Washington, D.C. increased or maintained their Laboratory Response Network for Chemical Threats (LRN-C) chemical capacity from August 10, 2009 to August 9, 2010. In 2005, only 10 state public health labs had adequate chemical terrorism response capabilities. ■ By 2007, 44 states and Washington, D.C. reported sufficient bio-testing capabilities, an increase from 6 in 2003. ■ In 2007, only one state and Washington, D.C. reported their labs did not have the capability to provide 24/7 coverage to analyze samples. ■ By 2006, 47 states reported having sufficient numbers of trained scientists to test for possible anthrax and plague, an increase from 10 in 2004.
Vaccine Manufacturing	■ Congress appropriated billions of dollars through Project BioShield and BARDA to invest in vaccine research and development, but there are still limited financial and business incentives for companies to pursue research and development. ■ BARDA awarded a contract to develop the first cell-based flu vaccine.
Strategic National Stockpile (SNS)	■ The SNS has been substantially upgraded to maintain a variety of critical pharmaceuticals and medical supplies including antibiotics, chemical nerve agent antidotes, antiviral drugs, pain management drugs, vaccines for a number of agents, and radiological countermeasures. The SNS is positioned in undisclosed locations throughout the United States and is configured to provide flexible response strategies. ■ In advance of the H1N1 outbreak, the SNS contained pandemic flu countermeasures, including 50 million antiviral treatment courses, 105.8 million N95 respirator masks and 51.7 million surgical masks.
Pharmaceutical and Medical Equipment Distribution	■ All 50 states and Washington, D.C. have adequate plans to receive and distribute supplies from the SNS based on a CDC evaluation of planning and management. In 2003, only two states had adequate plans according to CDC. ■ 47 states and Washington, D.C. increased vaccination rates for seniors against the seasonal flu from 2008 to 2009. In 2006, only 38 states increased rates from the year before.

MAJOR AREAS OF IMPROVEMENTS	
Surveillance	■ 44 states and Washington, D.C. reported using a disease surveillance system that is compatible with CDC's National Electronic Disease Surveillance System (NEDSS), as of 2009. In 2004, only 18 states had disease surveillance systems that were NEDSS-compatible. ■ 43 states and Washington, D.C. can send and/or receive electronic health information with health care providers.** ■ 40 states and Washington, D.C. have an electronic surveillance system that can report and exchange information.** ■ 29 states were able to rapidly identify disease-causing E.coli O157:H7 and submit the lab results in 90 percent of cases within four days.*** ■ CDC, in partnership with state and local health agencies, was able to provide real-time summarized daily data for flu surveillance ahead of the second wave of the H1N1 flu outbreak in the fall of 2009. ■ By working with state health departments, CDC was able to provide weekly surveillance summaries of oil spill-related health complaints from the affected Gulf states following the 2010 Deepwater Horizon oil spill.
Communications and Community Resiliency	■ 25 states and Washington, D.C. mandate all licensed child care facilities to have a multi-hazard written evacuation and relocation plan. ■ PAHPA, HSPD-21 and the National Health Security Strategy make community resiliency a top priority of preparedness. ■ The Long-Term Disaster Recovery Group, composed of the Secretaries and Administrators of more than 20 federal departments, agencies and offices, was created in 2009 to strengthen disaster recovery and help communities recover more quickly and effectively after emergencies.
Legal and Liability Protections	■ Every state had adequate statutory authority to implement quarantine in response to a hypothetical bioterrorism attack as of 2005. ■ By 2009, at least 33 states had liability protection for entities or organizations that provide volunteer assistance during emergencies.
Increasing and Upgrading Staff and Volunteer Health Responders	■ All 50 states and Washington, D.C. met three key criteria for the Medical Reserve Corps (MRC) (having a coordinator, a majority of units in the state meeting incident management guidelines, and the majority of units are part of a registry). The MRC is a national network of community-based groups which engage volunteers to strengthen public health emergency response and community resilience. In 2007, 13 states did not meet a minimum threshold for MRC volunteers for every 100,000 citizens. In 2008, 16 states did not have MRC coordinators.
Surge Capacity	■ In 2002, the National Bioterrorism Hospital Preparedness Program — renamed the Hospital Preparedness Program (HPP) in 2006 — was created and has provided around $400 million annually to support hospital preparedness and surge capacity development. ■ In 2009, the IOM published *Guidance for Establishing Crisis Standards of Care for Use in Disaster Situations: A Letter Report*, which included a five-step process for emergency planners to follow when developing crisis standards of care.

Source: TFAH's Ready or Not reports, data from 2003-2010.

** Source: ASTHO Profile Survey, data from 2010.

*** Source: CDC's Strengthening the Nation's Emergency Response State by State Report, data from 2007-08.

B. ONGOING GAPS IN PREPAREDNESS

The United States often takes a band-aid approach to public health preparedness. As new emergencies and concerns emerge and attention shifts, resources are often diverted from one pressing priority to another, leaving other ongoing areas unaddressed.

After September 11th and the anthrax attacks, the federal government made an unprecedented investment to quickly shore up areas of preparedness, which have led to major improvements. However, it was not at a sufficient level to backfill long-standing gaps in infrastructure or update technologies to meet state-of-the-art standards to protect the public's health.

There is a new threat to preparedness and consequently to the public's health and safety: the current economic climate and budget cuts at the federal, state and local level mean that the progress made over the past decade could be lost.

MAJOR ONGOING GAPS	
A Funding Gap	Historically, funding for emergencies is often substandard until there is an actual emergency, and then there is a call for emergency supplemental support. This dynamic means the country is often unprepared to immediately respond during crises. The current economic difficulties have led to major cuts in federal, state and local support for public health and preparedness, leaving Americans more vulnerable during emergencies. The economic impact of a disaster can also be more significant if the community cannot return to normal after an event. Adequate preparedness allows for a strong and more timely recovery. ■ **State cuts:** 40 states and Washington, D.C. cut funding for public health from fiscal year (FY) 2009-2010 to 2010-2011, 30 of these states cut funding for a second year in a row. According to the Center on Budget and Policy Priorities (CBPP), states have experienced overall budgetary shortfalls of $425 billion since FY 2009.[53] ■ **Local cuts:** Since 2008, 34,400 local public health jobs have been lost, and in the past year, close to half of all local public health departments reported reducing or cutting at least one program altogether;[54] ■ **Federal cuts:** Between FY2005 and 2011, federal support for state and local public health preparedness, including the PHEP cooperative agreements was also cut by 38 percent. Since FY 2010, the grant program will have sustained a $72 million cut.
A Workforce Gap	There is already a major shortage of trained public health workers and funded positions. There are not enough workers, particularly experts, to effectively respond during public health emergencies. The United States has 50,000 fewer public health workers than it did 20 years ago, and one-third of public health workers will be eligible to retire within five years.[56, 57] As baby boomers begin to retire, there is not a new generation of workers being trained to fill the void. Also, under current policies and, in some cases, public health workers in one area are not allowed to be shifted to help in other areas, even during emergencies. The recent budget cuts are intensifying the problem, with a reduction of 15 percent of the local public health workforce since 2008, and, at the same time, health departments around the country are experiencing furloughs or shortened work weeks.

MAJOR ONGOING GAPS	
A Surge Capacity Gap	In the event of a major disease outbreak or attack, the health care system is stretched beyond normal capabilities. Surge capacity, the ability of the medical system to care for a massive influx of patients, remains one of the most serious challenges for emergency preparedness. A large-scale disaster also requires having enough equipment and appropriate space to treat patients. There are numerous ongoing surge capacity issues related to response in primary care settings beyond just hospitals, including crisis standards of care, alternative care sites, coordinating volunteers to help and providing them with adequate liability protection and regional coordination among health care facilities.
A Surveillance Gap	The United States still lacks an integrated, national approach to biosurveillance — which would dramatically improve response capabilities ranging from a bioterrorism attack to catastrophic disasters to contamination of the food supply. There is not a standardized, interoperable system using up-to-date technology. Currently, there are major differences in states' ability to collect and report data, which hampers bioterrorism and disease outbreak identification and control efforts. Timeliness in identifying and emerging health threats can prevent disease and save lives.
A Gap in Community Resiliency Support	The ability of public health to work with communities to cope and recover from a disaster or public health emergency is another major challenge. It is particularly difficult to address the needs of at-risk, special needs and vulnerable populations, such as children, the elderly, people with underlying health conditions and lower-income communities. The gaps in day-to-day public health departments, such as enough staff to engage community members in preparedness and limits in cultural competencies, make it challenging to build and maintain the relationships needed to identify and work with vulnerable Americans who need the most help during emergencies.
Gaps in Vaccine and Pharmaceutical Research, Development, and Manufacturing	Research and development of medical countermeasures — including diagnostics, antiviral medications and vaccines — is outdated in the United States, in large part because it is not a particularly profitable venture for pharmaceutical investors. Project BioShield and BARDA were developed to spur innovation and investment in medical countermeasures, but, so far, the result of new, effective products has been limited. The investments made in vaccine research and development did help lead to the production of a vaccine for the H1N1 flu strain in record time, but manufacturers were only able to produce limited quantities by the beginning of the flu season because of insufficient capacity and a reliance on an outdated egg-based production strategy.

C. PREPAREDNESS HISTORY TIMELINE, 2001-2011

The September 11, 2001 and anthrax attacks revealed significant deficiencies in the country's disaster preparedness for health emergencies, and led to a paradigm shift in how the government and public view disaster readiness. The following timeline highlights many of the major public health emergencies and policy and research events from the past decade.

2001

Major Public Health Emergencies

- **September 11 — Al Qaeda terrorists** hijacked four planes and crashed them into the World Trade Center, the Pentagon and a field in Shanksville, Pennsylvania, killing nearly 3,000 people. In the aftermath, public health officials activated a range of responses, including readying the SNS and providing services, including mental health counseling.
- **October** — A series of **anthrax attacks** occurred; five people were killed, 17 were sickened and thousands were potentially exposed. Public health officials were at the lead of the anthrax response –diagnosing and treating victims, running more than a million tests on hundreds of thousands of potentially life-threatening samples, providing useful guidance to the public to address their fears and supporting efforts to decontaminate postal facilities and other properties contaminated with anthrax spores.

Major Policy or Research Events

- **March** — CDC released a new report, ***Public Health Infrastructure — A Status Report***, in the wake of the tragedies, that concluded the U.S. public health infrastructure "is still structurally weak in nearly every area."[58]
- **September** — President George W. Bush appointed Gov. Tom Ridge as the director of the new **Office of Homeland Security** within the White House.[59]
- **October** — The **USA Patriot Act** became law, expanding definitions and discretion of law enforcement to investigate and prevent domestic and international terrorism.

2002

Major Public Health Emergencies

- **Spring/Summer** — Public health officials around the country developed strategies for responding to the continuing spread of the **West Nile Virus (WNV)** — in 2002, the virus spread to nearly every state while more than 4,000 Americans developed West Nile Virus and 284 died from the illness.[60] The WNV response helped inform future disease tracking and containment approaches.
- **Fall — Severe acute respiratory syndrome (SARS)** first emerged in Foshan City, Guangdong Province, China.[61] Chinese officials originally withheld information about the outbreak. The disease was later identified to be a new coronavirus. There were no existing vaccines for the disease and treatments did not offer a clear benefit. The full impact of SARS would not be recognized until 2003.
- **October** — Pilgrim's Pride recalled over 27 million pounds of frozen and prepared poultry products after **Listeria** was found at a processing plant. Eight people died, 53 became seriously ill and three women had miscarriages or stillbirths.[62, 63]

Major Policy and Research Events

- **January** — HHS announced **$1.1 billion in funding** for state public health, hospital and medical preparedness planning for a bioterrorist event.[64]
- **June** — The **Public Health Security and Bioterrorism Act** became law. It provided guidance to public health officials, created the Assistant Secretary for Public Health Emergency Preparedness and the National Disaster Medical System and provided cooperative agreement grant funds to states for public health emergency preparedness, including:
  - The **HPP**, which is designed to help hospitals respond more effectively to bioterror attacks and other public health emergencies such as pandemic flu outbreaks. HPP provides money for hospitals to buy medication, medical supplies, communications equipment and other resources that can help during an emergency.[65]
  - **PHEP**, which provides money to states, territories and urban areas to improve public health lab testing, health surveillance, training, planning and other aspects of disaster response. PHEP currently gives out 62 grants a year to the 50 states, four large metropolitan areas (Chicago, Los Angeles County, New York City and Washington, D.C.) and eight U.S. territories and freely associated states.[66]

- **November —** The **Homeland Security Act** became law, creating the **Department of Homeland Security (DHS)**, which incorporated a number of existing federal agencies, including the Customs Service, the Coast Guard and the Secret Service.[67, 68]

- **November —** The **MRC** was established to help communities respond to disasters. Community-based units made up of volunteers now exist across the country, ready to be activated when necessary. As of 2011, there are more than 950 units, with more than 200,000 volunteers.[69]

- **November** — Then-U.S. Senate Majority Leader Bill Frist, MD, authored an analysis in ***Health Affairs*** that concluded that "over the past two decades, the [nation's public health] infrastructure has greatly deteriorated."[70]

2003

Major Public Health Emergencies

- **March** — The World Health Organization (WHO) issued a global alert for **SARS** and WHO and CDC issued travel alerts for Vietnam, China and Hong Kong.[71] In April, CDC issued a travel alert for Toronto, which was the center of the outbreak in Canada. A week later the agency lifted the Toronto alert.[72] CDC issued another travel alert for Toronto in April that was soon lifted. SARS proved to be highly contagious only in hospitals, so the spread of the virus was able to be controlled by isolation of the sick and other public health interventions.[73] In July, WHO announced that SARS' chain of transmission had been broken.[74] Overall, more than 8,400 people were infected with SARS, and more than 800 died. The disease spread to 29 countries. In the United States, there were 33 confirmed cases. None of these patients died.[75, 76]

- **June —** There were 37 confirmed cases of the **monkeypox** virus in Midwestern states. There were no fatalities, but two children were hospitalized, one with encephalitis. The illness is in the same family of viruses as smallpox, although its symptoms are generally milder. Investigators traced the outbreak to pet prairie dogs, which had contracted it from rodents imported from Africa.[77, 78]

- **October** — A **Hepatitis A** outbreak began, which was linked to contaminated green onions and caused more than 600 illnesses and four deaths. The onions were served in salsa and a cheese dip at a Chi-Chi's restaurant outside Pittsburgh. Investigators traced the onions to farms in Mexico.[79, 80]

- **December —** The first case of **mad cow disease** (bovine spongiform encephalopathy (BSE)) was discovered in the United States. The United States Department of Agriculture (USDA) began widespread testing. After detecting very few cases, it scaled back testing in 2006.[81]

Major Policy and Research Events

- **January** — CDC launched a national campaign to **vaccinate 500,000 emergency and medical workers** on a voluntary basis against smallpox. The disease was eradicated in the 1970s, but officials were concerned that terrorists could get samples and use them as a bioweapon. Fewer than 40,000 medical and emergency personnel — less than 10 percent of the campaign's goal — received the shots. According to a GAO report, many health workers were concerned about the health risks of vaccination.[82]

- **March** — The previously existing National Pharmaceutical Stockpile was expanded by the Homeland Security Act to become the **SNS**, a national repository of antibiotics, chemical antidotes and other medicines and medical supplies for use during a chemical or biological terror attack, or other public health emergency.[83]

- **April** — A **GAO report** examining state and local preparedness progress found deficiencies in capacity, communication and coordination elements essential to preparedness and response, including workforce shortages, inadequacies in disease surveillance and laboratories and a lack of regional coordination and compatible communications systems.[84]

- **September** — CDC launched **BioSense**, a nationwide system to detect early signs of a bioterrorism attack or infectious disease outbreak. Initially, BioSense focused solely on bioterror attacks, but it expanded over time to cover a range of threats, such as Dengue fever and health problems related to the Gulf Oil Spill. The network receives information from a wide range of sources across the country: nearly 2,000 government and private hospitals and healthcare facilities, almost 2,800 laboratories and more than 49,000 pharmacies.[85, 86]

- **October —** DHS launched **BioWatch**, a monitoring system that tests air samples for biological agents. As of 2011, there are sensors in more than 30 cities around the country, monitoring six major biological threats, including anthrax.[87]

- **November** — The IOM published the ***Future of the Public's Health in the 21st Century*** report, which found that the public health system had: "vulnerable and outdated health information systems and technologies; an inadequately trained public health workforce; antiquated laboratory capacity; a lack of real-time surveillance and epidemiological systems; ineffective and fragmented communications networks; incomplete domestic preparedness and emergency response capabilities; and communities without access to essential public health services." Overall, the report concluded that, "[t]hese problems leave the nation's health vulnerable — and not only to exotic germs and bioterrorism."[88]

- **December** — The White House issued **Homeland Security Presidential Directive-8 (HSPD-8)**, which established new requirements for national preparedness. HSPD-8 assigned DHS the lion's share of responsibility for organizing the federal preparedness effort. The directive also established the National Preparedness Goal, Universal Task List and Target Capabilities List (TCL) to serve as baseline capabilities necessary for all aspects of preparedness, from prevention to recovery. HSPD-8 was the first in a series of Homeland Security Presidential Directives related to bioterrorism and public health preparedness issued between 2002 and 2009.[89]

- **December** — For the first time, every state and Washington, D.C. were recognized for having **CDC-approved bioterrorism and public health emergency plans**.[90]

2004

Major Public Health Emergencies

- **February — Ricin**, a highly toxic protein made from the castor bean that is poisonous if inhaled, injected or ingested, was detected in a U.S. Senate mailroom serving the office of Majority Leader Bill Frist, MD. No illnesses were reported in the mailroom or in Sen. Frist's office.[91] News reports said it was unclear how the ricin was delivered and approximately 16 people underwent decontamination. An investigation into the incident is still open.

- **March** — *The New York Times* reported on a Pentagon report, ***Lessons Learned from the Anthrax Attacks: Implications for U.S. Bioterrorism Preparedness***, which was written in 2002 but not previously publicly released. The article described the report as "a sweeping assessment [that] identifies weaknesses in 'almost every aspect of U.S. biopreparedness and response.'"[92]

- **May** — A ***Salmonella*** **outbreak** linked to raw almonds sickened at least 29 people in 12 states, leading to the recall of 13 million pounds of the nuts.[93, 94]

- **July — Tomatoes contaminated with *Salmonella*** caused more than 400 illnesses in nine states. Investigators traced the problem to pre-sliced tomatoes served at a chain of convenience stores.[95, 96]

- **Fall** — A series of **powerful hurricanes** hit Florida. In response, the U.S. Public Health Service sent nearly 500 members of the Commissioned Corps, a uniformed service of 8,500 public health professional who are able to help during national and international health emergencies and offer aid.[97]

- **October** — The United States faced a **flu vaccine shortage**, when the Chiron Corporation announced it would not be able to meet demand for its flu vaccine after problems at a British plant halted production of millions of doses.[98] The shortage highlighted gaps in vaccine research and development in the United States.

- **October** — the worldwide death toll from **H5N1 avian influenza** reached 32 in Asia, triggering concerns of the potential of new pandemic flu outbreak.[99] As of 2011, H5N1 still poses a potential threat and is being tracked by researchers.

Major Policy and Research Events

- **April** — President Bush signed a classified directive, **Biodefense for the 21st Century**, to improve coordination among the government's bioterrorism programs and initiatives.[100]

- **July — Project BioShield** became law. BioShield is a $5.6 billion effort to encourage biotech and pharmaceutical companies to develop products that will help treat or prevent the effects of a chemical or biological terror attack. In 2007, BioShield became part of BARDA.

- **September** — CRI was created, to help cities and large metropolitan areas prepare to dispense medicine quickly, on a large scale. From 2004 to 2010, CRI expanded from 21 to 72 cities and metropolitan areas.[101]

2005

Major Public Health Emergencies

- **July — Tomatoes contaminated with *Salmonella*** sickened 29 people in 16 states. Health officials traced the problem to a pair of Virginia farms.[102]

- **August and September — Two powerful hurricanes, Katrina and Rita**, hit the Gulf Coast. The storms killed approximately 1,900 people and caused more than $100 billion in damage.[103] In response, the Commissioned Corps carried out the largest deployment in its history, deploying some 2,119 Corps officers to the region between August 26 and November 7. Of these officers, 81 percent served on teams that provided healthcare and other services directly to the affected communities, while 19 percent served on emergency response teams or at local operations centers.[104, 105]

- **September** — A second major ***Salmonella* outbreak** occurred — more than 80 people were sickened after eating tomatoes at a chain restaurant. Investigators identified the source to a farm in Florida. Twenty-six people overall were hospitalized.[106]

Major Policy and Research Events

- **September** — As part of HSPD-8, DHS released **15 National Planning Scenarios** to help federal, state and local officials and the private sector develop better responses for a range of emergencies.[107]

THE 15 NATIONAL PLANNING SCENARIOS:

- Four biological attacks: aerosol anthrax, plague, contamination of ground beef at a factory and Foot and Mouth Disease;
- Four chemical attacks: a blister agent, the nerve agent sarin, a toxic industrial chemical release and a chlorine tank explosion;
- The detonation of a 10-kiloton nuclear bomb;
- A "dirty bomb" that spreads radiation throughout a city;
- The bombing of a sports arena;
- A cyber attack that damages the nation's financial infrastructure; and
- Three natural events: an 8.0 earthquake near a major city, a Category 5 hurricane that strikes a major city and a pandemic flu outbreak.

- **November** — President Bush released a $7.1 billion plan, the ***National Strategy for Pandemic Influenza***, to guide the "nation's preparedness and response to an influenza pandemic, with the intent of (1) stopping, slowing or otherwise limiting the spread of a pandemic to the United States; (2) limiting the domestic spread of a pandemic, and mitigating disease, suffering and death; and (3) sustaining infrastructure and mitigating impact to the economy and the functioning of society."[108]

2006

Major Public Health Emergencies

- **March** — A cow in Alabama tested positive for **mad cow disease**.[109, 110] The cow was not linked to a larger outbreak.

- **Summer and Early Fall** — Nearly 200 people became sick and at least three died due to ***E. coli*** contamination in spinach.[111, 112, 113]

- **July to November** — Two ***Salmonella* outbreaks occurred, both linked to contaminated tomatoes**. The first one took place in 19 states, while the second occurred in 21 states and Canada. Overall, more than 300 people were sickened. Investigators found that one outbreak was related to tomatoes consumed in restaurants, but could not determine the source of the contamination. In the second case, investigators traced the problem to a single restaurant, which had received its tomatoes from an Ohio packinghouse that had been supplied by three growers.[114]

- **August** — Between August 1, 2006 and February 16, 2007, ***Salmonella*-tainted peanut butter** from the Peter Pan and Great Value brands sickened 425 people in 44 states. After an investigation, the manufacturer, ConAgra, said moisture from leaks and a faulty sprinkler system likely led to the problem.[115, 116, 117]

- **November and December** — More than 70 people who ate at Taco Bell restaurants in the Northeast were infected with ***E.coli* bacteria**. Three-quarters of these people were hospitalized and eight developed a type of kidney failure known as hemolytic-uremic syndrome. At first, Taco Bell traced the problem to green onions, but FDA investigators later ruled out that possibility. Officials eventually determined that lettuce was the likely source.[118, 119]

- **December** — Five school-aged children in Rhode Island were diagnosed with **encephalitis**, an acute inflammation of the brain. One of the children died. The health department distributed antibiotics to all students, staff, and family members from the affected school. In early January of 2007, public health authorities also closed three nearby school districts as a precautionary measure. The Department of Health was able to rapidly distribute antibiotics to more than 1,000 people.[120, 121]

Major Policy and Research Events

- **July** — The **Uniform Emergency Volunteer Health Practitioners Act** (UEVHPA) is adopted by the National Conference of Commissioners on Uniform State Laws (NCCUSL) to address the lack of uniformity in state laws that were revealed during the major hurricanes in 2005, especially focused on the use and efficacy of volunteers and licensing and accreditation, liability protection and workers compensation.[122]

- **December** — The **Pandemic and All-Hazards Preparedness Act** (PAHPA) became law. PAHPA reauthorized several expiring programs in the Public Health Security and Bioterrorism Act, and established some new authorities.[123] It broadened the government's focus from bioterrorism to a more comprehensive, all-hazards approach that included infectious diseases and natural disasters, as well as chemical, nuclear, or radiological terror attack. It also placed HHS as the lead agency for the public health and medical response to a public health emergency and created BARDA within HHS to distribute funding for the development of medical countermeasures. **BARDA** has funded about 100 projects, including anthrax vaccines and antitoxins, radiation treatments and vaccines for smallpox and influenza.[124, 125] As part of PAHPA, Congress also created the **Office of the Assistant Secretary for Preparedness and Response (ASPR)**, within HHS. ASPR focuses on preparedness planning and response, federal emergency medical capability, countermeasures research and improving hospital and health care disaster response.[126]

2007

Major Public Health Emergencies

- **May** — CDC announced that a patient with suspected **extensively drug resistant- Tuberculosis (XDR-TB)**, which is spread through the air traveled to Europe and back, prompting an international public health scare. The patient did not turn out to have the disease, but problems in the response raised concerns among public health experts about preparedness for managing a real multidrug resistant TB patient.[127]

- **June — Lead paint** was found on a range of toys made in China, posing a significant public health threat. Over several months, millions of products were recalled.[128]

- August — The Interstate 35W **bridge collapsed** in Minneapolis during the evening rush hour on August 1, leaving 13 people dead and more than 100 injured.[129] Minneapolis Mayor R.T. Rybak attributed a quick emergency response to the city's investment of some $50 million since 2001 in emergency preparedness, specifically, enhanced communication technology.[130]

- **October** — California saw the largest evacuation in state history due to a series of **wildfires** that caused 10 deaths and 139 injuries and forced evacuation of approximately 350,000 homes. The California Department of Public Health deployed 2,000 alternate care site beds that had been purchased by the state to improve the emergency preparedness capabilities. The department also coordinated evacuations from 23 nursing homes, two acute care facilities and a psychiatric hospital.[131]

- **September** — Concerns about the **H5N1 bird flu** as a potential pandemic threat continued to grow as more than 200 cumulative human deaths had been linked to H5N1 at this time.[132, 133]

- September — ***E.coli* contamination** in frozen hamburger meat prompted the third largest hamburger recall in USDA history. Nearly 22 million pounds of meat were recalled; the product caused 40 illnesses in eight states.[134, 135]

- **October** — CDC reported that **methicillin-resistant *Staphylococcus* aureus (MRSA)**, which can cause Staph infections, was responsible for more than 94,000 serious infections and nearly 19,000 deaths each year. CDC identified MRSA as "a major public health problem primarily related to health care, but no longer confined to intensive care units, acute care hospitals, or any health care institution."[136]

Major Policy and Research Events

- **October** — The White House updated the ***National Strategy for Homeland Security*** for the first time since September 11, 2001 and also issued the **Homeland Security Presidential Directive 21** (HSPD 21), which established a ***National Strategy for Public Health and Medical Preparedness***.[137] The directive was the most recent in a series of executive orders issued since September 11, 2001 to protect the nation in the event of terrorist attacks or other catastrophic health events. The directive included four key parts: biosurveillance, countermeasure distribution, mass casualty care and community resilience.[138] The strategy included many of the requirements set forth in PAHPA and affirms the importance of the all-hazards approach to public health emergency preparedness. In addition, it established the Public Health and Medical Preparedness Task Force and required the Task Force to submit yearly status reports on the implementation plan and suggested changes to HSPD 21.

"Indeed, certain non-terrorist events that reach catastrophic levels can have significant implications for homeland security. The resulting national consequences and possible cascading effects from these events might present potential or perceived vulnerabilities that could be exploited, possibly eroding citizens' confidence in our nation's government and ultimately increasing our vulnerability to attack. This strategy, therefore, recognizes that effective preparation for catastrophic natural disasters and man-made disasters, while not homeland security per se, can nevertheless increase the security of the homeland."[139]

■ *National Strategy for Homeland Security, October 2007*

■ **December** — Congress created the **National Commission on Children and Disasters** to address the unique needs of children during a crisis. The Commission issued its final report in October 2010, which included recommendations for a National Strategy on Children and Disasters, establishing permanent children's and disaster coordination offices, funding disaster planning for schools and child care facilities and purchasing child-appropriate supplies for shelters and hospitals.[140]

2008

Major Public Health Emergencies

■ **January** — A **measles outbreak** occurred in San Diego after a seven-year-old who had never been vaccinated for measles traveled to Switzerland and returned with a case of measles. He spread the disease to 11 other children, none of whom had been vaccinated.[141]

■ **January to April** — The city of Chicago had 10 cases of **Group C meningococcal invasive disease**, which is best known as a cause for meningitis — compared with 13 cases in all of 2007. The Chicago Department of Public Health launched a mass vaccination campaign focused on the at-risk population — children aged 11 to 18. The city was able to vaccinate 7,213 children in two weeks.[142]

■ **February** — In the **largest beef recall** in history, 143 million pounds of beef were deemed unfit for human consumption. The recall occurred after the Humane Society of the United States released an undercover video showing workers at a California meat company kicking sick cows and using forklifts to force them to walk.[143]

■ **February** — Vials of **ricin** were found in a motel room in Las Vegas, Nevada after a man suffering from respiratory distress was taken to the hospital.[144] According to news reports, the man said he had the ricin for his "self-defense."

■ **March** — ***Salmonella*** in cantaloupes imported from a Honduran grower and packer was linked to 50 illnesses in 16 states, as well as nine illnesses in Canada.[145]

■ **March** — A ***Salmonella*** outbreak in Colorado was linked to the water supply.[146]

■ **March and June — Heavy rains caused severe flooding** in the Midwest. In March, 17 people died as a result of the flooding, and, by the end of June, storms and flooding across six states caused 24 deaths, 148 injuries and more than $1.5 billion in damages to Iowa alone.[147]

■ **June** — Outbreaks of ***Salmonella* Saintpaul** were linked first to tomatoes, and then, months later, to jalapeño and Serrano peppers. CDC identified more than 1,442 people who were sickened by the outbreak in 43 states, the District of Columbia and Canada.[148]

■ **June** — Lightning sparked thousands of **wildfires** across northern California. More than 2,700 individual fires were recorded, causing mandatory evacuations and damaging thousands of acres.[149]

■ **September — Hurricane Gustav** caused widespread destruction in Louisiana, amounting to billions of dollars in damages. Two weeks after Gustav, Hurricane Ike hit Texas as a Category 2 storm, causing extreme damage in the state. Twenty-seven deaths were attributed to the storm, which forced hundreds of thousands of residents to evacuate.[150]

■ **September — Melamine-contaminated infant formula and related dairy products** produced in China were found in countries across the globe.[151]

■ **November** — Federal health officials began tracking cases of Salmonella linked to tainted peanut butter products.[152] Over the next four months, investigators tracked the problem to two peanut butter plants owned by the Peanut Corporation of America. The outbreak killed eight people and sickened more than 700 in 46 states.[153]

Major Policy and Research Events

■ **February** — CDC released its first report featuring state-by-state information on the progress states have made using PHEP grant funding, ***Public Health Preparedness: Mobilizing State by State.***[154] Some key areas of progress included increases in the number of epidemiologists and labs with bio-testing capabilities and improvements in the ability to distribute vaccines and antiviral medications.

- **Fall** — The **world economic crisis** began, which has led to a continuing wave of public health budget cuts and worker layoffs. Between 2008 and 2011, LHDs cut about 34,000 jobs — almost a fifth of the entire local public health workforce.[155]

2009

Major Public Health Emergencies

- **January** — A **severe ice storm** struck Kentucky, and more than 85 percent of the state's counties were declared disaster areas. Immediately after the storm, approximately 800,000 residential and commercial units lost power, including numerous hospitals and long-term care facilities. At the height of the response, more than 200 shelters in 72 counties provided assistance to more than 7,800 people. In the largest statewide call-up ever, over 4,100 National Guard members helped respond.[156]

- **March** — An outbreak of **H1N1**, a novel flu virus, is identified in Veracruz, Mexico. On April 26, officials from CDC and DHS declared a national public health emergency as cases of H1N1 began to spread across the country. In June, WHO and CDC classified the outbreak as a pandemic. Hundreds of schools across the United States closed in the initial weeks of the H1N1 outbreak. Although it was viewed as a relatively moderate pandemic, the H1N1 virus had a serious impact on the United States. It infected around 20 percent of Americans (approximately 60 million people), leading to approximately 274,000 hospitalizations and 12,000 deaths.157 About 90 percent of the Americans who died were under the age of 65, including at least 340 children, as confirmed by laboratory testing.[158] According to CDC, the actual number of deaths in children could be between 910 and 1,880.[159]

Major Policy and Research Events

- **June** — In response to the H1N1 outbreak, Congress passed and President Obama signed the **Supplemental Appropriations Act of 2009**, appropriating $1.9 billion in emergency supplemental funding and an additional $5.8 billion in contingency funding.[160] These funds helped enhance vaccine production capacity, purchase and distribute vaccines, upgrade surveillance capabilities, support the state and local pandemic response and meet other needs.

- **September** — The IOM released ***Guidance for Establishing Crisis Standards of Care for Use in Disaster Situations***, which provided guidance to stakeholders to develop health care protocols when resources are scarce, including taking into account ethics, community engagement, legal authorities, clear indicators and evidence-based clinical processes.[161]

- **December** — HHS released the **National Health Security Strategy** to help galvanize efforts to minimize the health consequences associated with significant health incidents. The strategy is built on a foundation of community resilience.[162]

2010

Major Public Health Emergencies

- **January and February** — More than 1.3 million pounds of **salami tainted with *Salmonella*** were recalled after more than 250 people in 44 states became ill. Federal officials said the problem may have been related to black and red pepper coating the meat.[163]

- **April** — The **Deepwater Horizon** oil platform exploded on the Gulf Coast, resulting in the deaths of 11 workers and the release of an estimated 205 million barrels of oil into the Gulf.[164, 165] In response to the oil spill, with funding from the Substance Abuse and Mental Health Services Agency, CDC designed the Gulf States Population Survey to collect the data needed to assess the mental and behavioral health needs of the affected population. Data collection began in December 2010 and will conclude in December 2011. The complete public health impact of the explosion, spill, and dispersants on the safety of seafood, health of recovery workers, and psychological wellbeing of Gulf Coast residents remains unknown.[166]

- **May** — An outbreak of ***Salmonella*** linked to eggs caused more than 1,900 illnesses. The source of the problem was traced to two large egg farms in Iowa. Eventually, more than 500 million eggs were recalled. FDA officials investigating the farms found a wide range of health violations, including rodents, maggots and improperly stored manure.[167]

- **June** — California public health officials declared a **Pertussis**, also known as **whooping cough**, epidemic in the state. Over the course of the year, the epidemic caused almost 8,000 illnesses and 10 deaths and was the largest epidemic in the state in half a century.[168] Pertussis vaccinations are recommended beginning at two months old, but infants are not fully protected until they reach six months of age and have received a series of shots. Officials attributed the epidemic to gaps in vaccinations.

Major Policy and Research Events

- **August** — The President's Council of Advisors on Science and Technology (PCAST) issued: ***Report to the President on Reengineering the Influenza Vaccine Production Enterprise to Meet the Challenges of Pandemic Influenza***. The report found that the response to the H1N1 outbreak was "impeded by unanticipated delays that arose in manufacturing what was supposed to be the most powerful tool for preventing widespread morbidity and mortality: a vaccine designed to protect against the 2009 H1N1 virus."[169] The report featured a series of recommendations to enhance the nation's ability to produce influenza vaccine in a timelier manner.
- **August** — HHS released a Public Health Emergency Medical Countermeasures Review, ***Public Health Emergency Countermeasures Review: Transforming the Enterprise to Meet Long-Range National Needs***, a strategy to modernize the development of medical countermeasures across the federal government, including addressing issues related to bureaucracy and profitability to help encourage private industry investment in the development of vaccines and other medical countermeasures.[170]

2011

Major Public Health Emergencies

- **March** — On March 11, 2011, northern Japan suffered first a magnitude 9.0 earthquake centered 130 miles off the eastern coast and then an ensuing tsunami. At the Fukushima Daiichi nuclear reactor complex, this caused a cascade of events including loss of electrical power to essential cooling systems, reactor overheating and core meltdown, and radionuclide releases causing widespread radioactive contamination of residential areas, agricultural land, and coastal waters. The Fukushima nuclear emergency response identified major public health and medical challenges in both Japan and in the United States; challenges in the U.S., included the need to identify potential contamination in food, water, and on returning travelers and cargo imported from Japan, as well as to protect the health of Americans in Japan.
- **May** — A **series of tornadoes** in Southern and Central states resulted in more than $7 billion in damages and more than 140 deaths in Joplin, Missouri.[171]
- **July** — The first cases of illness associated with **Listeria-tainted cantaloupes** were reported. The outbreak has sickened more than 139 people in 28 states, killing 30 of them. Making it the deadliest foodborne outbreak since 1924. Investigators traced the outbreak to a Colorado farm. Officials said this was the first known outbreak of Listeria in cantaloupe.[172]
- **August — Hurricane Irene** lead to 56 deaths, $10 to $25 billion in damages, including massive flooding in Vermont. The storm resulted in nearly six million Americans losing electricity and major transportation shut downs.[173]
- **August** — A multistate outbreak of ***Salmonella*** was traced to ground turkey, sickening more than 136 people in 31 states and one death.[174]
- **October** — A Halloween nor'easter became the 14th natural multi-billion dollar natural disaster in the United States in 2011, causing at least six deaths and transportation shut downs and millions to lose electricity on the East coast.[175]
- **November** — A ***Salmonella*** outbreak linked to boiled chicken livers sickened more than 179 people in six states.[176]

Major Policy and Research Events

- **January** — The **FDA Food Safety Modernization Act** became law, giving the agency expanded powers to protect the nation's food supply. The law, which made the first major changes to the country's food safety system in 80 years, included authorization of $1.4 billion in funding over five years and a focus on prevention of foodborne illness, rather than response alone. Among the major changes, for the first time, FDA could order recalls of contaminated food. Previously, the agency had to work with companies to engineer voluntary recalls.[177]
- **March** — President Obama issued **Presidential Policy Directive-8 (PPD-8)**, the latest in a series of policy directives since September 11, 2001, which laid out the country's approach to preparing for acts of terrorism, cyber attacks, disease outbreaks and natural disasters.[178] As part of PPD-8, DHS released an updated **National Preparedness Goal** (NPG) in September 2011 to improve both local and national disaster response. The top level summary of the goal is "to have a secure and resilient Nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk."[179] Additional requirements of the directive include: a National Preparedness System Description; a series of National Frameworks and Federal Interagency Operational Plans; a National Preparedness Report; and a Campaign to Build and Sustain Preparedness.

- **September** — The Public Health Accreditation Board launched the **first national accreditation program for public health departments**, initiated and supported by the Robert Wood Johnson Foundation (RWJF) and CDC, to protect and improve Americans' health by advancing the quality and performance of all of the nation's public health departments—state, local, territorial and tribal.
- **September** — CDC released a new **10-year *National Strategic Plan for Public Health Preparedness and Response***.[180] The plan builds on the experience the agency has had after a decade of major public health emergencies, including the 2001 terrorist attacks, Hurricane Katrina and the H1N1 flu pandemic. The plan includes strategies to cooperate with state and local emergency management and health departments, the private sector and international organizations. It also identifies best practices for coordination between public health departments, emergency management groups and the healthcare system. In addition, it proposes methods to strengthen the surveillance of threats; improve epidemiology and laboratory science related to disasters; generate more ideas for improving training and efficient use of funds; increase the ways to improve cooperation and coordination across the federal government and among federal, state and local agencies; and develop improvements for evaluating progress.

2011 CDC STRATEGIC PREPAREDNESS PLAN EIGHT OVERARCHING OBJECTIVES:

- Objective 1: Prevent and/or mitigate threats to the public's health
- Objective 2: Integrate public health, the healthcare system and emergency management
- Objective 3: Promote resilient individuals and communities
- Objective 4: Advance surveillance, epidemiology and laboratory science and service practice
- Objective 5: Increase the application of science to preparedness and response practice
- Objective 6: Strengthen public preparedness and response infrastructure
- Objective 7: Enhance stewardship of public health preparedness funds
- Objective 8: Improve the ability of the public health workforce to respond to health threats

"These are challenging economic times. We must sustain existing public health capabilities and infrastructure while developing solutions to build the public health systems of the future. Looking ahead towards the year 2020, projected pressures on public health include the increase of the U.S. population from 308 million to 336 million, more diversified age groups (including a 54% increase of citizens over 65, straining the already overburdened health care system), socio-economic tensions, and mass migrations due to adverse weather events. We also know that the advancement and diffusion of scientific technologies will pose threats to health security. Improvements in DNA technologies will increase our vulnerability to attacks from groups who have adapted microbes or created entirely new pathogens with the intent to harm the population. We also face the risk of individuals acting on their own, combining readily available chemicals and other materials to create improvised weapons. The increasing ease of global mobility means that bio-attacks, pandemics, and other health threats to our citizens can more easily travel across borders. Vigilance and forecasting are necessary to mitigate these scenarios and can only be done by sustaining and increasing public health capabilities." [181]

— Ali S. Khan, M.D., M.P.H., U.S. Assistant Surgeon General (Ret), Director, Office of Public Health Preparedness and Response, DHHS/CDC from the National Strategy

MAJOR CDC AND ASPR PUBLIC HEALTH PREPAREDNESS PROGRAMS, 2011

U.S. Centers for Disease Control and Prevention

- Office of Public Health Preparedness and Response: Leads the agency's preparedness and response activities by providing strategic direction, support, and coordination for activities across CDC as well as with local, state, tribal, national, territorial and international public health partners.[182]
  - ▲ The Public Health Emergency Preparedness (PHEP) cooperative agreement program awards funds to states, territories and urban areas to build and sustain public health preparedness capabilities that enhance their ability to respond to public health emergencies. PHEP awards funds to 62 public health departments nationwide, including the 50 states; four large metropolitan areas, Chicago, Los Angeles County, New York City and Washington, D.C.; and eight U.S. territories and freely associated states: American Samoa, Guam, U.S. Virgin Islands, Northern Mariana Islands, Puerto Rico, Federated States of Micronesia, Republic of the Marshall Islands and the Republic of Palau.[183] The distribution of PHEP funds is calculated using a formula that includes a base amount for each awardee plus population-based funding. Funding also is awarded for specific preparedness activities. The fiscal year 2011 cooperative agreement includes a new pilot program that provides a year of funding to 10 urban areas to develop assessments of public health and medical risks, as well as accelerated development of risk reduction strategies that mitigate the public health risks associated with higher population areas.[184]

The 2011 PHEP cooperative agreement focuses on 15 key capability areas, including:

- Community Preparedness
- Community Recovery
- Emergency Operations Coordination
- Emergency Public Information and Warning
- Fatality Management
- Information Sharing
- Mass Care
- Medical Countermeasure Dispensing
- Medical Material Management and Distribution
- Medical Surge
- Non-pharmaceutical Interventions
- Public Health Laboratory Testing
- Public Health Surveillance and Epidemiological Investigation
- Responder Safety and Health
- Volunteer Management
  - ▲ CRI is funded through the PHEP cooperative agreement to help cities and large metropolitan areas prepare to dispense medicine quickly, on a large scale.[185]
  - ▲ The SNS is a national repository of antibiotics, chemical antidotes and other medicines and medical supplies for use during a chemical or biological terror attack, or other public health emergency. Started in 1999, SNS is managed through OPHPR. The program focuses on responding quickly to a large-scale bioterror attack in a large city or metropolitan area (where more than half of the country's population lives). The first line of support is "12-hour Push Packages," which contain over 50 tons of medicines, antidotes and medical supplies designed to provide rapid immediate help, even when the cause of an attack or event is uncertain. Push Packages are kept in secure warehouses across the country, ready for rapid deployment to a designated city or site. SNS also has further supplies, designed to arrive within 24 to 26 hours, if necessary.[186]

Examples of SNS Contents (as of 2009)

- Enough smallpox vaccine to protect 300 million people, or every man, woman and child in America;
- Over 41 million regimens of countermeasures against anthrax;
- Therapeutic anthrax antitoxins to treat symptomatic patients;[187]
- Ten million anthrax vaccine (AVA) doses; and
- Countermeasures to address radiation exposure including 475,000 combined doses of Calcium-DTPA (Diethylenetriamine pentaacetate) and Zinc-DTPA.[188]

OFFICE OF THE ASSISTANT SECRETARY OF PREPAREDNESS AND RESPONSE

- Office of Policy and Planning (OPP) advises HHS and ASPR leadership through policy options and strategic planning initiatives to support domestic and international public health emergency preparedness and response activities.
- Office of Preparedness and Emergency Operations oversees a range of operational programs, three of which include:
  - **Hospital Preparedness Program**, which provides leadership and funding through grants and cooperative agreements to states, territories and eligible municipalities to improve surge capacity and enhance community and hospital preparedness for public health emergencies.[189] HPP provides support for hospitals to buy medication, medical supplies, communications equipment and other resources that can help during an emergency. The program helps hospitals improve decontamination capabilities and personnel management and hospital evacuation planning. It also pays for disaster training and helps local networks of hospitals — as well as local businesses and non-profit groups — work together to plan for emergencies.

A 2009 HHS evaluation found that more than three quarters of hospitals participating in HPP met at least 90 percent of all measures for preparedness.[190]

  - **National Disaster Medical System** (NDMS), a federally coordinated system that augments the nation's medical response capability, which consists of more than 100 teams of trained doctors, nurses and other medical professionals to help respond to major emergencies, and coordinates patient transport and hospital care.[191] More than 1,000 hospitals participate in NDMS. Based throughout the country, these teams are brought to the disaster site to provide a range of services, including medical assessments, primary and emergency medical care, provision of medical equipment and supplies, victim identification and veterinary services.[192]
  - **Emergency System for Advance Registration of Volunteer Health Professionals (ESAR-VHP)**, a federal program created to support states and territories in establishing standardized volunteer registration programs for disasters and public health and medical emergencies. The program, administered on the state level, verifies health professionals' identification and credentials so that they can respond more quickly when disaster strikes. By registering through ESAR-VHP, volunteers' identities, licenses, credentials, accreditations and hospital privileges are all verified in advance, saving valuable time in emergency situations.[193]
- BARDA encourages the development of vaccines, medicines and diagnostic tools that could be used in public health emergencies. Established in 2006 by PAHPA, BARDA works to speed up the development of medical countermeasures (MCMs) by supporting advanced research, development and testing, working with manufacturers and regulators, and helping companies devise large-scale manufacturing strategies. BARDA bridges the funding gap between early research and commercial production.

In 2011, BARDA has more than 100 ongoing projects, including potential vaccines for smallpox, anthrax, influenza and radiation treatments.[194] In addition, the program is involved in helping to open the nation's first cell-based flu vaccine factory.[195]

  - Project BioShield, a program within BARDA, was set up to guarantee a market for newly developed vaccines and medicines needed for biodefense that would not otherwise have a commercial market.[196, 197]

MEMORANDUM OF UNDERSTANDING FOR EMERGENCY PREPAREDNESS GRANT COORDINATION

Several federal departments and agencies distribute preparedness funds and/or provide technical assistance and national strategies in support of various preparedness activities. ASPR, CDC, the Health Resources and Services Administration (HRSA), the Department of Homeland Security's Federal Emergency Management Agency (FEMA), and the Department of Transportation's (DOT) National Highway Transportation Safety Administration (NHTSA) recently agreed through a memorandum of understanding (MOU) to cooperatively assess their current preparedness grant programs and to engage in collaborative efforts to improve interagency grant coordination. The MOU establishes a formal framework that supports joint federal planning designed to focus investments, measure and improve preparedness outcomes, reduce duplication, report results, and enhance return on investment.[198]

According to the agreement, senior leaders from each agency involved will participate in the Interagency Grant Coordination Committee as well as the Grant Coordination Working Group. The Committee and Working Group will work to coordinate grants in the following areas:

1) Grant Program Policies to coordinate policy guidance and documents, including assuring consistency of grant guidance with national emergency preparedness strategies and priorities.

2) Grant Cycle/Timeline to align the following: pre-award administration efforts; programmatic fiscal years; joint application submissions; and application reviews.

3) Grant Administration/Management to coordinate the use of the grant funding for administration activities such as site visits; information sharing; co-presentation at national conferences/meetings; and coordination of programmatic support.

4) Grant Reporting Mechanisms and Evaluation to develop tools and resources to coordinate grant program performance measures.[199]

CDC and ASPR have made significant progress in grant alignment, including improving coordination between HPP and PHEP cooperative agreements. The HPP-PHEP collaboration is working to improve capabilities, evaluation, framework, IT systems, training and technical assistance, grants administration and policy and guidance development. Goals for the HPP-PHEP collaboration are to:

- Have a joint HPP-PHEP funding opportunity announcement in 2012;
- Reduce awardee burden, including during the application process;
- Increase programmatic impact of state and local preparedness programs; and
- Improve federal efficiencies to better support state and local preparedness programs.

ALL-HAZARDS APPROACH TO EMERGENCY PUBLIC HEALTH THREATS

The U.S. public health system is responsible for protecting the American people from a range of potential health threats.

EXAMPLES OF MAJOR EMERGENCY PUBLIC HEALTH THREATS

Agroterrorism: The "…deliberate introduction of an animal or plant disease with the goal of generating fear, causing economic losses, and/or undermining stability."[200] Agroterrorism can be considered a subcategory of "bioterrorism" and foodborne diseases.

Bioterrorism: The intentional or deliberate use of germs, biotoxins, or other biological agents that cause disease or death in people, animals, or plants. Examples include anthrax, smallpox, botulism, *Salmonella*, and *E. coli*.

Blast Injuries: Explosions, whether deliberate or accidental, can cause multi-system, life threatening injuries among individuals and within crowds. In addition, blunt and penetrating injuries to multiple organ systems are likely when an explosion occurs and unique injuries to the lungs and central nervous system occur during explosions.

Chemical terrorism: The deliberate use of chemical agents, such as poisonous gases, arsenic, or pesticides that have toxic effects on people, animals, or plants in order to cause illness or death. Examples include ricin, sarin, and mustard gas.

Chemical incidents and accidents: The non-deliberate exposure of humans to harmful chemical agents, with similar outcomes to chemical terrorism.

Foodborne diseases: Food-borne illness is caused by harmful bacteria, viruses, parasites or chemicals that are found in food and beverages and enter the body through the gastrointestinal tract. CDC estimates there are approximately 76 million pathogen-induced cases of food-borne diseases each year in the United States, causing approximately 127,000 hospitalizations and 3,000 deaths. Examples include botulism, Salmonella, E.coli 0157:H7, shigella, and norovirus.

Natural disasters: Harm can be inflicted during and after natural disasters, which can lead to contaminated water, shortages of food and water, loss of shelter, and the disruption of regular health care. Examples include hurricanes, earthquakes, tornados, mudslides, fires, and tsunamis.

Pandemic flu: A novel, potentially lethal strain of the influenza against which humans have no natural immunity. The H1N1 flu was the first pandemic flu of the 21st century. Historically, pandemic flu occurs two to three times every hundred years or so. In the 20th century the world experienced the 1918, 1957/58, and 1968 pandemic flu, although the severity of the disease varied greatly among them.

Radiological threats: Intentional or accidental exposure to radiological material. For example, a terrorist attack could involve the scattering of radioactive materials through the use of explosives ("dirty bomb"), the destruction of a nuclear facility, the introduction of radioactive material into a food or water supply, or the explosion of a nuclear device near a population center.

Vector-borne diseases: Diseases spread by vectors, such as insects. Examples include Rocky Mountain spotted fever and malaria.

Water-borne diseases: Diseases spread by contaminated drinking water or recreational water, such as typhoid fever and cholera. According to CDC, more than 4,100 persons become ill from contaminated drinking water and more than 13,000 persons become ill from recreational water disease outbreaks annually in the United States.[201, 202]

Zoonotic/Animal-borne diseases: Animal diseases that can spread to humans and, in some cases, become contagious from human to human. Examples include Avian flu, West Nile virus, and SARS. In 2000, WHO identified more than 200 diseases occurring in humans that were known to be transmitted through animals.[203] Experts believe that the increased emergence of zoonotic diseases worldwide can be attributed to population displacement, urbanization and crowding, deforestation, and globalization of the food supply.

ECONOMICS AND PUBLIC HEALTH PREPAREDNESS

In addition to the health toll that diseases, disasters and bioterrorism can take, they also have major economic implications. For example:

- **September 11, 2001 Tragedies:** The total economic loss has been estimated at roughly $80 billion, of which $32.5 billion was insurable.[204] The insurance industry paid the $32.5 billion in insured losses from business interruption, property, workers' compensation, aviation liability and other liability costs.[205] In addition, World Trade Center workers received a $625 million settlement for their exposure to toxic dust.[206]
- **Anthrax Attacks:** According to an article in the Washington Post, the clean up from the 2001 anthrax attacks exceeded $1 billion.[207] A reported $42 million was spent to decontaminate the Hart Senate Office Building and other Capitol Hill offices and it cost in excess of $200 million to decontaminate the postal facilities at Brentwood in Washington, D.C. and in Hamilton Township, New Jersey.[208] This does not include the cost of the public health response and laboratory testing of specimens around the country.
  - ▲ According to a report in the *New York Times*, under a hypothetical scenario developed by DHS involving an anthrax attack, if terrorists were to spray aerosolized anthrax from a van in three cities initially, followed by two more cities shortly afterward, casualties could well exceed 13,000, and result in a loss of billions of dollars.[209] Other estimates are that anthrax could result in more than 13,000 deaths in a single city.
  - ▲ According to a study by Towers Perrin Consulting, one anthrax attack in New York City could lead to $90 billion in workers' compensation losses, which would be three times greater than the entire $30 billion workers' compensation industry.[210]
  - ▲ Risk Management Solutions (RMS), a leading risk consulting firm, believes an attack on downtown New York City could result in 173,000 casualties. In this scenario, anthrax is weaponized and dispersed in aerosol form, resulting in inhalation of anthrax by approximately one million people. RMS estimates economic losses of $91 billion from workers compensation alone.[211]
- **Nuclear, Biologic, or Chemical Attacks and the Insurance Industry:** In 2005, the CEO of Allstate Corp, a leading insurance company, stated that nuclear, biological or chemical terrorist attacks "could literally destroy the entire capital base of the insurance industry."[212] In 2003, the capital base for the insurance industry was $347 billion.[213]
- **Foodborne Illness and Agroterrorism:** Agriculture represents 1.2 percent of the U.S. gross domestic product (GDP), or $173 billion a year.[214] Agriculture and the food sector employed approximately 12.5 million workers in 2008, or nearly nine percent of the total U.S. workforce.[215]
  - ▲ In 2001, a foot-and-mouth disease outbreak in Britain led to an estimated economic loss of $6 billion to $18 billion, and led to the destruction of four million animals.[216] A 1999 report estimated that an outbreak of foot-and-mouth in California would lead to economic losses of $6 billion.[217]
  - ▲ Over the last few decades, the United Kingdom has battled bovine spongiform encephalopathy (BSE), better known as "mad cow disease." As of March 2005, 149 people who were infected with the disease have died, and nearly four million cows have been slaughtered.[218] If a significant outbreak of BSE occurred in the United States, FDA estimates that there would be a loss of $15 billion, resulting from a 24 percent decline in domestic beef sales and an 80 percent decline in beef and live cattle exports. Slaughter and disposal costs of at-risk cattle could be additional $12 billion.[219]
  - ▲ In 1978, the Arab Revolutionary Council engaged in bioterrorism, using mercury to poison Israeli oranges. A dozen children in Holland and West Germany were hospitalized as a result. Ultimately, this act helped sabotage the Israeli economy, resulting in a 40 percent reduction in orange exports.[220] At the time, oranges accounted for about a tenth of all Israeli exports.[221] The United States produces over 20 percent of the world's citrus, or approximately 15.6 million tons in 2004.[222] U.S. citrus exports are roughly $1 billion, while U.S. consumers spend more than $3 billion on citrus products (orange and grapefruit juice and fresh fruit).[223]
- **New Infectious Disease Outbreak:** In 2003, SARS swept through Southeast Asia, infecting over 8,000 people and leaving 774 dead.[224] Its reach demonstrates the tremendous speed in which disease can spread. Originating in China, the SARS outbreak eventually infected individuals from 29 nations around the world. Overall, the economic losses, due to deaths, quarantines and lost tourism dollars, may have been $30 to $50 billion, according to some estimates.[225] In Toronto alone (many thousands of miles away from the initial outbreak), more than 27,000 people in and around the city were forced into quarantine during two outbreaks, which led to an estimated economic loss of nearly $1 billion.[226]
- **Severe Pandemic Flu Outbreak:** A severe pandemic flu similar to the 1918 pandemic could lead to a significant drop in the U.S. Gross Domestic Product (GDP).[227]
- **Gulf Coast Oil Spill:** There was a loss of an estimated $1.2 billion in economic output and 17,000 jobs in 2010 according to an analysis from Moody's Analytics.[228]

D. SPECIAL TOPICS — A DECADE AFTER 9/11 AND ANTHRAX

The following expert commentaries feature a set of topics that are essential components of preparedness, including: bringing a range of community leaders together to prepare together for potential health emergencies through Meta-Leadership efforts; defining the research agenda to further preparedness systems and services; ensuring that laws are in place to protect the public and health officials during emergencies; and focusing on injuries, which is often an overlooked component of preparedness.

Meta-Leadership Empowers Community Leaders to Act Together in Times of Crisis

By Charles Stokes, president and chief executive officer of the CDC Foundation, an independent, nonprofit organization established by Congress to help CDC do more, faster.

The events surrounding 9/11, Hurricane Katrina and H1N1 should be a wakeup call for America. From my perspective, these emergencies underscore the urgent need for leaders to act collaboratively across public and private sectors in times of crisis. As ongoing public health budget cuts strain the capacity of CDC and state and local health agencies across the country, it is critical for communities to find ways to close the gaps to keep America healthy, safe and secure.

The Meta-Leadership Summit for Preparedness, a five-year initiative funded by the Robert Wood Johnson Foundation (RWJF), is a model approach for bringing communities together to respond to crises. Since 2006, the initiative has connected close to 5,000 business, government and nonprofit leaders in 36 communities representing approximately 139 million Americans. The CDC Foundation partnered with CDC, the Robert Wood Johnson Foundation and the National Preparedness Leadership Initiative-Harvard School of Public Health to host the successful networking and training events.

What makes the Meta-Leadership Summit for Preparedness program unique is its focus on cross-sector collaboration and community action. As Summits took place across the country, local host committees were crucial to endorsing the Summit and getting the right leaders in the room. Local sponsors supplemented the Robert Wood Johnson Foundation's national support, covering local event expenses so that participants could attend at no cost. Frontline meta-leaders from CDC and other federal agencies joined with Harvard faculty to provide real-world perspectives on leading in emergencies. High profile speakers — including governors, mayors and CEOs — elevated the profile of the initiative and attracted local media coverage. Realistic scenarios, developed by Harvard faculty in collaboration with local leaders, helped participants envision the serious consequences that could emerge in their own communities following a terrorist attack or natural disaster.

Sometimes connections among Summit participants were not immediately obvious. For example, at the Boston Meta-Leadership Summit, a leader from the Boston Ballet attended the event. Some wondered what role the arts could possibly play in community preparedness. However, when leaders identified gaps in preparedness — and how they might contribute their own resources and capabilities to fill those gaps — the Boston Ballet offered its space as a shelter for disaster victims. A synergy occurs when leaders connect face-to-face to create better prepared, more resilient communities.

Although the final Meta-Leadership Summit took place in Long Island, New York, in June 2011, the initiative is far from over. A CDC post-Summit team reconvenes leaders approximately six months after each Summit to continue building cross-sector connectivity and applying meta-leadership concepts to preparedness planning. Through post-Summit activities unique to each community, CDC casts a wider net, encouraging participants to address preparedness gaps identified at the Summit and through evaluation results. To date, more than 2,000 leaders have participated in post-Summit presentations and discussions related to cross-sector preparedness. Topics include addressing the needs of vulnerable populations, engaging faith-based organizations in preparedness planning, enhancing corporate security and leveraging virtual communities.

Summit participants are also invited to join a Meta-Leadership Online Community (www.meta-leadershipcommunity.org) that extends their collaboration. With thoughtful cultivation and ongoing support from the Robert Wood Johnson Foundation, the online community continues to thrive. More than 2,800 members have joined to share resources, discuss topics of interest and connect with other Summit participants, locally and nationally.

Throughout the initiative, all partners and stakeholders sought clear evidence of Summit outcomes and continuous improvement in the program's design and implementation. Cumulative evaluation results are extremely positive: 94 percent of respondents agreed that attendance at the Summit was a valuable use of their time, 91 percent rated the overall quality of the Summit as "good" or "outstanding" and 91 percent would recommend the Summit to their colleagues.

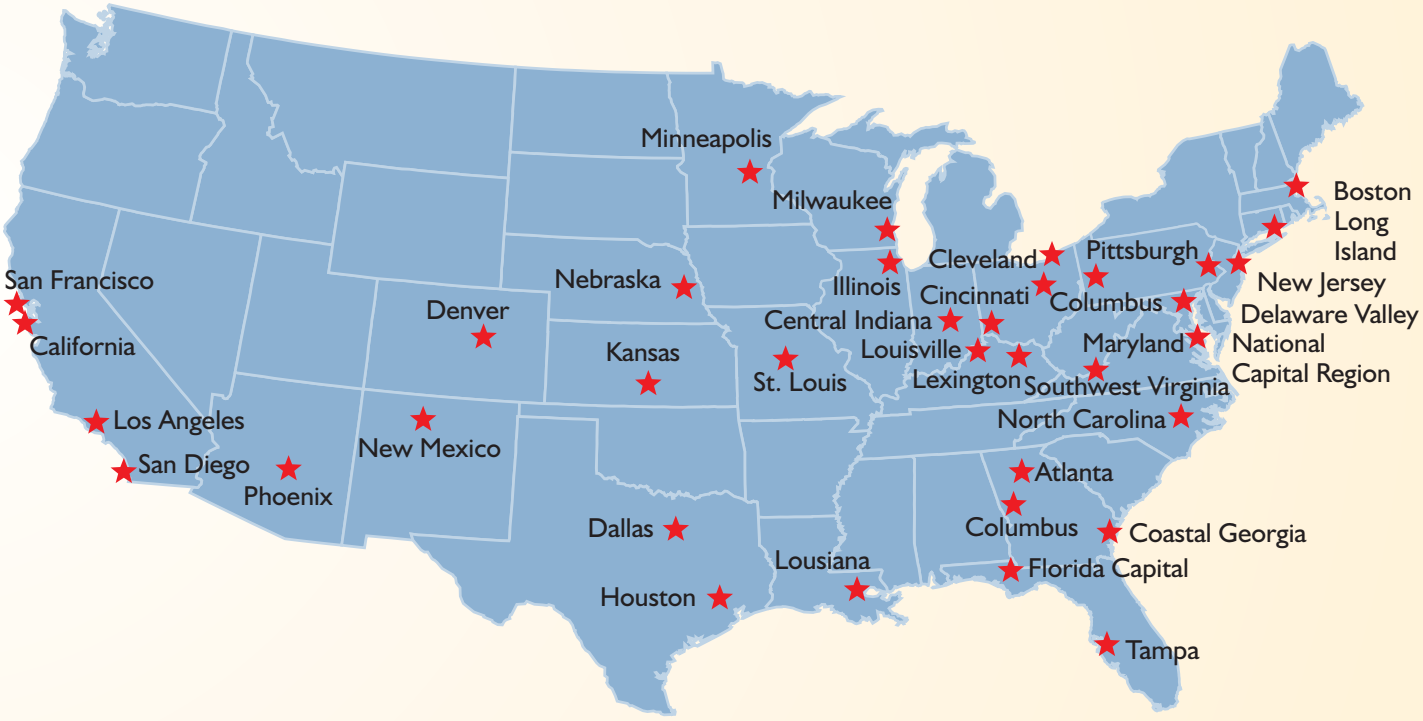
Practical examples of meta-leadership are evident across the country. For example, in San Diego, a public-private coalition established by the San Diego County Office of Emergency Services experienced a significant boost in nonprofit and business participation after the Summit. In Boston, Mayor Menino held a cross-sector Boston Influenza Preparedness Summit, building on the meta-leadership model. Eight Illinois meta-leaders who participated in a University of Illinois at Chicago (UIC) School of Public Health fellowship program made the case for the nation's first Meta-Leadership Institute and applied meta-leadership to community issues beyond preparedness, including school violence, flu vaccination and faith-based outreach. Following the Gulf oil spill, Southeast Louisiana meta-leaders developed a proposal template and

process for BP-funded emotional support services that are essential to long-term community support. Kay Wilkins, CEO, American Red Cross Southeast Louisiana Chapter said, "What the Meta-Leadership Summit did was open avenues to other people and groups we might not have thought about."

As others learn about meta-leadership, interest continues to build. In September 2011, the CDC Foundation was invited to help the Federal Emergency Management Agency (FEMA) develop and implement a "Whole Community" approach to emergency management. The effort includes methods to build on the lessons learned through the Meta-Leadership Initiative — from Summits to post-Summit activities to the online community — to help FEMA identify and test ways to better engage with communities, and to integrate preparedness into community and civic organizations that serve those communities.

CDC and public health leaders across the nation shoulder the considerable and singular duty to protect the nation from major health threats 24/7, including catastrophic events. In light of the ongoing budget cuts, and at a time when the United States and the world faces increasing threats from nature, technology and human action, helping leaders understand their counterparts' interests and establishing connectivity before disaster strikes is imperative.

Meta-Leadership Summit for Preparedness Impact



From 2006-2011, the Meta-Leadership Summit for Preparedness connected close to 5,000 business, government and nonprofit leaders in 36 communities representing approximately 139 million Americans.

What is a Meta-Leader? A meta-leader is a leader of leaders, who mobilizes people and organizations to collaborate in times of crisis.

When disaster strikes, meta-leaders reach across organizations and sectors to build cross-cutting strategies to protect the safety of their families, businesses and communities. They exchange information, share resources and coordinate systems and personnel. They use their influence and connections to guide a cooperative course of action.

Being a meta-leader requires a unique mindset and skill set, which often goes beyond the scope of an individual's previous experiences. And it requires building strong alliances with a diverse array of leaders before an event occurs.

The Meta-Leadership Summit for Preparedness cultivates the critical problem-solving skills and connectivity that leaders need to be effective meta-leaders during times of crisis.

EXPERT PERSPECTIVE

Preparedness and Public Health Systems and Services Research

By F. Douglas Scutchfield, M.D., principal investigator, Center for Public Health Systems and Services Research at the University of Kentucky College of Public Health

The 10th anniversary of 9/11 and the Anthrax scare give us an occasion to pause and consider a vital question. We moved, as a nation, to assure that we were protected from bioterrorism and were prepared for the natural and unnatural disasters that we will likely experience. We have had other reminders of the importance of that capacity, Hurricane Katrina being a classic example. One of the key components of our ability to respond to either of these sorts of events is our public health system and its backbone, the local health department.

Unfortunately, as a nation we have a tendency to "fight the last war" and to gear up in response to a major event, but as those problems fade into time, we tend to neglect the lessons, and allow those efforts we invested in preparedness to deteriorate and return to the status quo that existed before the event. Recently, a colleague and I were working on a public health book, in which there was a chapter on the history of public health. We were both struck by the history of public health, gearing up to respond to a major public health event and then watching as public health gains that were achieved diminish with time and a loss of support and interest.

Unfortunately, that is the current state of public health. We don't learn our history lessons, so following the build-up of public health in 2001, we are now allowing the system we established to deteriorate — two steps forward, three steps back. As certain as the sun will rise in the east, we will experience another event that will demonstrate our inability to cope, as the resources for public health are scarce, and it will prompt the cycle of build-up, neglect, event, build-up, etc.

Following 9/11 we created, in our nation's schools of public health, preparedness centers that were responsible for developing training for preparedness capacity in our nation's public health system. These centers quickly realized that there was information that they needed in their training efforts, information that wasn't available in the lexicon of public health and where they needed research and investigation to respond to this need. This need prompted Congress to establish authority to empower preparedness centers, previously created by CDC as the result of congressional action, to answer some of the most difficult questions in how best to address public health preparedness. With this authority, the CDC created a few select preparedness centers to help find and make this information available to those who are and were training the individuals that we needed for preparedness. As an example of the work of these research centers, the University of North Carolina at Chapel Hill demonstrated that, in North Carolina, which has a state public health department accreditation program, accredited health departments were more likely to score higher on their preparedness profiles than health departments that were not accredited. With the advent of national public health accreditation, this information is a powerful tool to encourage and support those health departments seeking and obtaining accreditation, as there is the assurance that they are more likely to be prepared for dealing with disasters. These centers, Preparedness and Emergency Response Research

Centers, unfortunately lost their funding two years ago. That left a major hole in the capacity to help develop and train the individuals and organizations, as critical gaps exist in knowledge that would impact our ability to cope with disasters.

This is not an uncommon problem. One of the first cuts made in tight budget times is the activities that produce new data and knowledge. Often the assumption is made that we can move on programs, including preparedness, without understanding what's necessary to develop, implement and evaluate health or public health programs. The required knowledge and skills come as the result of efforts to examine the questions and find answers that have utility and can be used to deal with whatever the problem is that presents itself. In fact, one of the most useful things we can engage in, during tight budget times, is the questions of efficiency and effectiveness of our programs. We need to use limited resources as best we can — and research is key to knowing how best to accomplish our goals.

As with other public health programs, successful implementation depends on the infrastructure to deliver the program. The workforce, technology, finances and organization influence tremendously the capacity of the public health system and its units to respond to any eventuality. It is imperative that we have the best knowledge possible on the infrastructure that allows us to be successful in our efforts to implement any public health program, including preparedness.

Recently, the Robert Wood Johnson Foundation and CDC led an effort to establish an agenda of the research questions we need to know in order to most effectively develop and implement public health programs. The list of research questions that covered workforce, structure, finance and other infrastructure issues was several pages long, and reflected the questions and concerns of practitioners, policymakers, and public health academicians alike. The agenda is rich with issues that stand in the way of our being able to carry out the programs and projects that include not only preparedness, but also the myriad of public health problems that face America, from childhood obesity to the increased concerns with chronic diseases, such as cancer and heart disease. Questions from that agenda include issues such as how should state health departments be organized, independent entities or part of a health and social services umbrella organization? How can local health departments develop and sustain sharing agreements across jurisdictional boundaries to assure that the capacity for emergency response exists for the communities they serve? How are broad categorical areas of public health, including preparedness, funded? How do decisions about this funding impact other areas of public health responsibility? Does, for example, an emphasis on preparedness detract from the community's immunization efforts and lead to the increase in whooping cough cases we are experiencing in the U.S.?

These are not trivial questions; in fact the latter issue has prompted a study by GAO and one in the Department of Health and Human Services Assistant Secretary of Planning and Evaluation's office.

Over the past century, public health has played a vital role in efforts to address these issues. Strong public health programs are a critical component to our nation's ability to thrive, even in trying economic times. In order to have those programs, it is imperative that we have the knowledge that lays the groundwork for that success. Working with all segments of the health community in a time of economic instability and tremendous change in our health care system, we can and must have the information and knowledge that allows for successful public health programs and assures that we are prepared for either natural or unnatural disasters. As Gandhi observed, "It is health that is real wealth and not pieces of gold and silver."

Public Health Legal Preparedness in the United States

An Interview with James G. Hodge, Jr., J.D., LL.M., Lincoln Professor of Health Law and Ethics and director of the Public Health Law & Policy Program and director of the Network for Public Health Law-Western Region at the ASU Sandra Day O'Connor College of Law

On September 27, 2011, the Trust for America's Health conducted an interview with Professor James G. Hodge, Jr. regarding the nature, scope and challenges of emergency legal preparedness. Edited for content, questions and responses are as follows:

What is the role of law in emergency preparedness from your point of view?

Law is an essential component of emergency preparedness. Laws define what constitutes an emergency, disaster, or public health emergency. They authorize (and at times prohibit) specific actions. Laws set roles, responsibilities, and liabilities for public and private sector responders and entities. Ultimately, it is law that helps to provide guidance for emergency responses, and, when practiced appropriately in real-time, laws can contribute to declinations in preventable morbidity and mortality in declared emergencies.

What types of legal challenges do states and other governments face in emergency preparedness?

Legal preparedness challenges across jurisdictions are immense. One central challenge of public health legal preparedness relates to meeting surge capacity (i.e., the ability of public health and medical systems to care for a massive influx of patients during public health emergencies). Meeting surge capacity is key to saving lives and preventing the spread of communicable diseases in emergencies. Major concerns surrounding surge capacity include distributing and dispensing antivirals, vaccines, or other medicines; increasing health care staffing; and securing adequate and safe spaces for the influx of patients. None of these objectives is possible without real-time legal assistance and support.

For example, personnel required in a crisis (including out-of-state physicians, nurses, and assistants, as well as mental health providers) must be capable of adapting quickly to implementing a crisis standard of care under potentially changing rules regarding scope of practice. These adaptations necessitate legal changes, as well, inherent in declarations of public health emergency that may typically precede major jurisdictional shifts in health care personnel.

How can law specifically facilitate health care voluntarism during emergencies?

There are many legal paths to ensuring adequate and skilled numbers of volunteer health practitioners in declared emergencies. Whether coming through state-based ESAR-VHP programs, locally-run MRC units, or other routes, civilian volunteers strengthen public health and emergency response efforts by providing essential personnel for overrun medical systems during a crisis. Thousands of skilled, vetted volunteers streamed to Louisiana and surrounding states post-Katrina in 2005. Their efforts were greatly facilitated through legal interventions designed to support trained volunteers and encourage their participation.

Normally, you cannot just bring in out-of-state practitioners and let them practice medicine in any given state. In non-emergencies, state-based licensing laws and other legal liability issues would stop the deployment and use of out-of-state volunteers. The emergency legal environment has to evolve quickly to allow skilled volunteers to step in seamlessly and aid in the response. Legal techniques that provide licensure reciprocity and liability coverage for volunteers make their contributions possible. Each of these and many other legal tools have been crafted in the last decade following the terrorist acts of September 11, 2001, and the ensuing anthrax exposures that fall. My ESAR-VHP Legal and Regulatory Issues Report, prepared for DHHS' Assistant Secretary for Preparedness and Response, provides some helpful tables and analyses across the 50 states related to these issues. The report and other helpful documents are available online at http://www.publichealthlaw.net/Projects/ESAR-VHP.php.

Are there any major gaps in state or local public health preparedness laws?

Over the last decade, there have been systematic, wholesale changes to emergency response laws and policies at all levels of government. Despite solid models introduced to help policymakers considering reforms, many of the legal changes are not uniform across states. While most emergency laws are written broadly enough to allow extensive and flexible responses, sometimes the breadth of these laws leads to confusion, debate, and delay in actual emergencies.

In addition, there are extensive variances in the legal frameworks related to surge capacity, especially in licensing and reciprocity. Lacking uniform protections concerning common negligence claims, for example, it is empirically shown that volunteers might hesitate to help during a crisis. Volunteers and entities that deploy or host them seek strong protections from liability, but sometimes find divergent standards across jurisdictions.

What can jurisdictions do to address these gaps?

Active, advance efforts to assess and address legal preparedness gaps are key. There are several excellent models that provide

uniform approaches to key legal preparedness issues. The Model State Emergency Health Powers Act, drafted in 2001 by the Centers for Law and the Public's Health at Georgetown and Johns Hopkins Universities, provides a comprehensive series of legislative and regulatory provisions for state and local public health emergency responses. Nearly every state legislature has considered its provisions in whole or part, and 38 states, as well as the District of Columbia, have passed related bills, according to the Center's legislative tracking available at http://www.publichealthlaw.net/ModelLaws/MSEHPA.php.

The Emergency Management Assistance Compact (EMAC), executed now by all states, provides licensure reciprocity automatically for all "state or local agents" serving across state borders during declared emergencies. It also provides clear limitations on liability. Of course, not all volunteers are state or local agents. Private sector volunteers through ESAR-VHP or MRC systems may garner similar protections under the Uniform Emergency Volunteer Health Practitioners Act of 2007, but only if states have adopted its provisions. Presently, only 12 states, the District of Columbia, and the Virgin Islands have done so according to the Uniform Law Commission (available at http://www.nccusl.org/Act.aspx?title=Emergency Volunteer Health Practitioners).

How do federal, state and local preparedness laws differ?

Federal, state and local governments have very different legal authorities. States possess the broadest authority to address public health threats, which they may share in part with local governments depending on the degree of "home rule" that is assigned to these local governments. This varies considerably across states. Historically, the federal government's public health emergency law responsibilities are more limited to providing significant guidance, resources and expertise, except as related to emergencies implicating national security interests for which federal jurisdiction is extensive.

While the federal government has reorganized itself since 2001 to better handle national response efforts during emergencies, state and local governments ultimately remain on the frontlines. The federal government defers to state and local agencies in many cases, subject to some prominent exceptions.

How can these differences in federal, state, and local powers complicate or impede emergency response efforts?

One example concerns the distribution of antivirals, vaccines, and other medicines or supplies. To alleviate the potential for national shortages in public health emergencies, Congress has authorized the creation of stockpiles of antivirals and vaccines kept by the SNS, controlled by CDC. These assets are available to supplement state and local response efforts at the discretion of CDC. Legally, CDC may be positioned not only to distribute SNS supplies, but also determine the priorities through which the supplies may be dispensed across states.

During the 2009/2010 H1N1 pandemic, CDC dispensed available vaccines to states together with its policy outlining who should be first in line to receive them. Many state and local actors adhered to CDC's guidance; others did not, however. Once these supplies get to points of dispensing, CDC ultimately may lose control over how they are provided to local populations, although legally it can set a prioritization plan.

What steps can be taken to improve public health legal preparedness across all jurisdictions?

While emergency legal preparedness has improved immensely over the prior decade since 9/11, there are still important gaps to be filled at every level of government, but most notably at the state level given their prominence in protecting the public's health. States seeking to improve preparedness through law might consider actions to:

1. Assess critical legal and policy issues that need to be addressed in advance of the next emergency. Events like Katrina, the H1N1 pandemic and regional emergencies provide ample illustrations of potential gaps in law and policy. So do specific observations among emergency and public health responders wary of key dilemmas before they arise. Policymakers must routinely study and seek to address these issues affirmatively.

2. Address the gaps. Identifying gaps is one thing; solving them is another. Hoping for real-time solutions during an emergency is counter-productive. Lives may be lost while legal issues are hammered out. This is unacceptable and yet easily corrected. Using existing models, practice guidance, or comparisons to policy fixes that work in other jurisdictions, states can legislatively or via regulation address gaps without waiting for inevitable complications during the next emergency.

3. Practice legal preparedness. Like other preparedness skills and capacities, legal preparedness must be practiced to be effective. Everyone involved in law and policy responses during emergencies should work through legal scenarios in "real-time" during training exercises. Practicing what I like to call "legal triage" through actual exercises or education efforts helps to identify and remedy gaps — it is an investment that will facilitate future emergency responses in real-time. CDC and NACCHO have worked recently with the Network for Public Health Law to develop a brief public health legal preparedness curriculum of particular value for state and local officials (which is still under federal review).

Disaster Preparedness for Mass Casualties from Explosive Devices—the Role of Injury Prevention and Control

By Richard W. Sattin, M.D., F.A.C.P., president-elect, Society for Advancement of Violence and Injury Research and professor and research director at the Department of Emergency Medicine at Georgia Health Sciences University

Tornadoes, earthquakes, hurricanes, tsunamis and terrorist bombings have one major health outcome in common—most deaths during these disasters occur due to injury. Drowning, being crushed by a collapsing building or other structure, being struck by a moving object, being thrown against a structure or an object are common outcomes and are predictable. Many non-medical types of preparedness exist that reduce injuries and deaths from natural disasters, including building codes (retrofits for earthquakes, construction of safe rooms in tornado areas, use of hurricane shutters and elevated construction in hurricane/typhoon areas), and improved planning and regulation for land use and building of homes and businesses. Better and more effective preparedness and evacuation plans could lessen the impact of these injuries on individuals, families and society.

As we remember 10 years later the events of 9/11, it is clear that there remain critical issues on how to prevent and lessen the complications of injuries, including death, disability and emotional stress during catastrophic events. Much of the preparedness for mass casualty events in the United States has focused on the threat of biological, chemical, radiation and nuclear incident. As events in Oklahoma City, New York City, Madrid, London, Mumbai, Bali and elsewhere have shown, the use of conventional weapons and explosive devices is a far more likely scenario, and the resultant injuries present unique triage, diagnostic and management challenges to health care providers. Injuries from explosive materials due to terrorism or other causes are a constant threat that happens worldwide. The remainder of this commentary will primarily use mass casualties from conventional explosive devices to explain current injury prevention and control principles and ways to strengthen policies and procedures.

Few physicians in the United States, other than those who have served in combat areas, have been trained in the care of the injured blast victim or have taken care of a patient who has sustained injuries from an explosion. Persons injured from an explosion often have a much greater number of penetrating wounds compared with the routine trauma patient. Most hospitals have emergency response plans and do have regular exercises, but exercises do not approach the chaos which accompanies a mass casualty event. Identifying weak points in those plans and testing alternative strategies are critical to ensure the care for those injured from explosive devices during a real episode is optimal, especially if a large explosion-related mass casualty event occurs on our already fragile and overburdened response system. The ability to push out key information on best practices quickly and efficiently to health professionals who are suddenly faced with a situation with which they are not familiar will be essential to optimizing care.

During a mass casualty event, health professionals use triage protocols to identify those persons needing immediate, lifesaving care and transport to critical care hospitals while avoiding overcrowding at those hospitals. Due to the potential extensive nature of a mass casualty event, outcomes are dependent on a broad continuum and rapid coordination of multidisciplinary care together with the availability of hospital resources (e.g., operating theaters, radiology suites, number of intensive-care beds and respirators, medical specialty care). The number of victims can quickly overwhelm the capacity of the health care system. Health care providers can expect casualties to arrive within 20 minutes of the bombing, with most of the total victims presenting for care within two hours. Most current planning for mass casualty events assumes that the emergency medical response will function normally. Auf der Heide provided a review of the literature regarding disaster planning (The importance of evidence-based disaster planning *Annals of Emergency Medicine* 2006;47, 34–49) indicating, however, that the actual response differs considerably from these planning assumptions; there is uncoordinated emergency dispatch, lack of hospital notification and communication, significant bystander involvement and rescue, absent or ineffective scene triage, self-referral and the transport of many, if not most, patients to the nearest health-care facility. What occurs is, therefore, reverse triage, that is, the least-injured patients arrive at the nearest hospitals before the critically injured patients do. The extent of this reverse triage has been shown to correlate directly with the mortality of those patients who were critically injured in the event.

Injury has been described, until recently, as the "neglected disease" since it occurs in such great numbers, but has been tacitly accepted as a normal occurrence of living in a modern society.

The 1985 report, *Injury in America*, noted, however, that a public health approach similar to that used for other diseases could lead to significant reduction in injuries. To understand the concepts of injuries from explosions, one must also understand the basic paradigm of injury control. Injury can affect any person's body part, organ, or system and its functioning and can have both short-term and long-term effects. It is not merely survival after an explosion-related injury that is important, but rather the ability of the individual to attain maximum physical recovery, to survive financially, and to enable secure, productive lives regardless of functional status. As with other diseases, injuries can be viewed as a relationship between a person (the host), an agent and the environment. Unlike other diseases, the underlying agent of injury is not a microbe or carcinogen, but is energy, most often in the form of mechanical force. The dose of energy received, the dose's distribution, duration and rapidity, and the individual's response to the transfer of the energy can determine if a physical injury occurs or is prevented. For example, a large mechanical energy load quickly transmitted to a hip during a fall involving an older person may lead to a fracture. If that same energy load could be dissipated through use of energy-absorbing flooring or mats or through hip pads or other new technologies, fewer persons would sustain hip fractures. Similarly, the design of safer buildings (e.g., the use of blast-resistant materials such as tempered glass and window coverings) dissipates the energy load and reduces the numbers of persons injured from an explosion.

The basic injury paradigm of host, agent and environment also needs to include the effect of the social environment. Victims of explosions can also experience adverse mental health consequences including depression, anxiety and low self-esteem, and harmful physical health consequences such as suicide attempts, cardiovascular disease and substance abuse. The emotional, financial, and psychosocial effects of an acute injury may be even more debilitating than the actual physical injury. An acute injury has not just an immediate effect on the injured person, but also a long-term "ripple effect" on that person's life and the lives of others in his or her family and community. Temporary or permanent loss of income, changes in personal relationships including income responsibilities, and difficulty in care and financial support for one's children or parents may be a significant social outcome from the injury. Health care providers may also be subject to psychosocial problems resulting from caring for so many injured persons in such a short time period. A community's societal and functional infrastructure may be affected extensively during a mass casualty event.

An understanding of the epidemiology of explosion-related injuries also requires surveillance data to help identify ways to prevent or reduce vulnerability to these types of events. Surveillance data are analyzed to determine the magnitude, scope and characteristics of a health problem; to study the factors that increase the risk of disease, injury, or disability; to determine which risks are potentially modifiable; to assess what can be done to prevent the problem using the information about causes and risk factors; to design, pilot test and evaluate interventions, and to then implement the most promising interventions on a broad scale. Much data during a mass casualty event are perishable since there are no active plans to collect these data. This is unfortunate since determining ways to prevent and improve outcomes from injuries are dependent on understanding what took place and how patients were managed. Standardized minimum data collection instruments and definitions are essential to generate reliable intra- and inter-country comparisons of injuries from explosions. Data collected through this integrated approach can be used to make the case for the design of safer buildings, improve evacuation plans and plan the allocation of medical and rescue resources and operations (e.g., ambulances, blood supply). These enhanced surveillance systems can help public health professionals link the findings to the management decision process and disseminate the data collected to improve the level of preparedness nation-wide.

Over the last decade, we have made significant strides in caring for the explosion-related victim but further progress in learning how to maximize care and protect the public is needed. Further integration of trauma systems and evaluation of that integration with law enforcement, fire prevention, power supply and other infrastructure issues should take place to improve the care of the acutely injured. As communication can be difficult during the chaos following a mass casualty event, it is important to continue to improve communication systems' interoperability. Accurate and reliable data systems are critical to determine how best to prevent injury and care for the injured so identifying and improving ways of collecting data, making full use of existing data systems and having access to the real-time use of data during an event would be major steps forward. Educational programs for health care providers are currently available, but the exact type and extent of education and the need for and amount of refresher courses for various providers (pre-hospital and hospital) to ensure an appropriate level of knowledge and expertise is not precisely known. Many serious secondary injuries occur after a disaster so further coordination between disaster preparedness and acute injury care management of these difficult environments and situations is necessary. By integrating further injury prevention and control into disaster preparedness, we will continue to make major strides in preventing injury and in providing improved medical, mental health and rehabilitative services to survivors of disaster events.


20
INSTRUCTOR

Federal Policy Issues and Recommendations

SECTION 4

In the coming year, implementation of the reauthorized public health preparedness legislation provides a new opportunity to address ongoing challenges that public health preparedness faces while the field considers how to allocate increasingly scarce resources during budget cutbacks.

TFAH has identified some top areas of concern, including:

A. Assuring dedicated and ongoing funding for emergency preparedness and strengthening the core public health infrastructure nationwide;

- *Commentary: Improving Collaboration between Federal, State and Local agencies in Planning for a Worst Case Scenario: A Broad Aerosolized Dispersal of Weaponized Anthrax in a Major Metropolitan Area. By Alonzo Plough, PhD, MPH, Director, Emergency Preparedness and Response of the Los Angeles County Department of Public Health and Member of the Board of Directors of the Trust for America's Health*

B. Modernizing biosurveillance to rapidly and accurately detect outbreaks and threats;

C. Improving the research, development and availability of vaccines and medications;

- *Commentary: Surveillance: Essential for Public Health Preparedness and Response, By, Jeffrey Engel, M.D., State Health Director, Division of Public Health, North Carolina Department of Health and Human Services*

D. Increasing the ability of the public health and health care systems to provide mass care during emergencies;

E. Working with communities to cope with and recover from emergencies, particularly for the more vulnerable members of communities including children, seniors, people with underlying health conditions, racial and ethnic minorities and lower-income individuals;

- *Commentary: Vulnerability, Resilience and Mental Health Considerations in Disaster Planning and Response: Do Resources Match the Rhetoric? By David Abramson, PhD, MPH and Irwin Redlener, MD, Columbia University Mailman School of Public Health*

F. Coordinating public health preparedness with strategic implementation of the FDA Food Safety Modernization Act of 2011.

- *Commentary: Food Safety: New Law Takes a Big Bite Out of the Problem, but Leaves Much on the Plate. By Erik D. Olson, Director of Food Programs at The Pew Charitable Trusts*

A. ASSURING DEDICATED FUNDING AND STRENGTHENING PUBLIC HEALTH PREPAREDNESS INFRASTRUCTURE

The United States made a significant investment to improve public health preparedness after the September 11, 2001 and anthrax tragedies. The main funding streams have included bolstering basic federal capabilities; improving national vaccine and medication development, stockpiling and distribution; improving state, local and hospital preparedness; and a one-time funding influx to support pandemic flu preparedness.

While the funding has resulted in significant progress in the past decade, the Ready or Not? reports have documented a number of major gaps that still remain, particularly in maintaining a fully-staffed and trained workforce, vaccine and medical countermeasure research and production, biosurveillance programs, medical surge capacity and providing support for communities to cope with and respond to crises.

Historically, the federal approach to preparedness has not provided a stable or sustained level of support for federal, state or localities. The most consistent pattern in U.S. preparedness funding is inconsistency. These inconsistencies make it difficult for states to maintain programs, capabilities and enough employees, particularly trained scientific experts, for emergencies.

Preparedness requires ongoing funding dedicated to ensure that basic capabilities are in place and that experts have the training and systems to quickly act in the face of emergencies.

Ten years ago, the nation was caught off-guard when the public health system was unprepared for emergencies. Many core public health functions, including epidemiology, laboratories and outbreak surveillance were lacking. Reviews by the IOM, CDC, GAO and other experts found the country's public health "infrastructure had greatly deteriorated."[229, 230, 231] On top of that, little groundwork was in place for hospitals and public health departments to respond to the massive influx of potential anthrax samples and there was a lack of coordination, training, leadership and communication within the field and for public health departments to work with other first responders.

The United States has learned several lessons from the September 11, 2001 and anthrax tragedies, Hurricane Katrina, the H1N1 pandemic flu and other emergencies, most notably that being prepared means having:

- Functional core public health systems in place, including epidemiology, laboratories, communication and outbreak surveillance; and
- Emergency-specific training and systems across a variety of threats. Similar to military-readiness, public health emergency readiness necessitates ongoing planning, training and upgrading of systems and technology.

Basic preparedness involves:

- Rapid **detection** of and **response** to emergency disease threats, including those caused by bioterrorism.
- Intensive **investigative** capabilities to quickly diagnose an infectious disease outbreak or to identify the biological or chemical agent used in an attack.
- **Surge capacity** for mass events, including adequate facilities, equipment, supplies and trained health professionals.
- **Mass containment strategies**, including pharmaceuticals needed for **antibiotic or antidote administration and isolation and quarantining** when necessary.
- Streamlined and effective **communication** channels so health workers can swiftly and accurately communicate with each other, other front line workers and the public about 1) the nature of an emergency or attack, 2) the risk of exposure and how to seek treatment when needed, and 3) any actions they or their families should take to protect themselves.
- **Communication** that is able to reach and take into consideration at-risk populations.
- Streamlined and effective **evacuation** of at-risk populations with special medical needs.
- An **informed and involved public** that can provide material and moral support to professional responders, and can render aid when necessary to friends, family, neighbors and associates.

Dedicated funding is needed to support the unique capabilities and training required to maintain adequate levels of emergency preparedness, including:

- **Leadership, planning and coordination:** An established chain-of-command and well defined roles and responsibilities for seamless operation across different medical and logistical functions and among federal, state and local authorities during crisis situations, including police, public safety officials and other first responders.
- **Core public health capabilities:** Basic public health systems and equipment, including laboratory testing and communications that keep pace with advances in science and technology.
- **An expert and fully-staffed workforce:** Highly trained and adequate numbers of public health professionals, including epidemiologists, lab scientists, public health nurses and doctors, and other experts, in addition to back-up workers for surge capacity needs.
- **Modernized technology:** State-of-the-art laboratory equipment, information collection and health tracking systems.
- **Rapid development and ability to manufacture vaccines and medications:** A streamlined, safe, effective system to ensure rapid research and production of medical countermeasures to protect people from emerging threats.
- **Pre-planned, safety-first rapid emergency response capabilities and precautions:** Tested plans and safety precautions to mitigate potential harm to communities, public health professionals and first responders.
- **Immediate, streamlined communications capabilities:** Coordinated, integrated communications among all parts of the public health system, frontline responders and the public. Communications capabilities must include back-up systems in the event of power loss or overloaded wireless channels.

It is also essential to consider the costs of responding to disasters and the toll it takes on health departments — to find mechanisms to provide support for rebuilding after an incident and response have happened.

The current economic situation is compounding the problems created by the historic inconsistent funding for emergency preparedness. Combined federal, state and local budget cuts are resulting in the loss of core programs and functions and major staff losses. Even before the recession, federal support for preparedness began to decline. Federal funds for state and local preparedness declined by 38 percent from fiscal year (FY) 2005 to 2012 (adjusted for inflation) — and additional cuts are expected under budget sequestration.

A decade of progress in preparedness is at risk due to the cuts. Federal, state and local health departments will no longer be able to maintain basic functions needed to respond to emergencies.

For the future, this is likely to mean a reliance on emergency supplemental funding to try to quickly ramp up response efforts after an event has happened.

This puts states and localities in the position of trying to respond without core capabilities — and trying to build capacity during an emergency response. In these situations, as was evident during the anthrax attacks and H1N1 outbreak, states and localities have to deal with contracting and bureaucratic restrictions, which often limit the ability to spend funds quickly or to enter into fast, short-term contracts. Developing emergency capacity as an event is unfolding is particularly challenging when health departments do not know how long they will have resources to sustain their capabilities or needs.

States and localities have reported it will take them longer to achieve the 15 national capabilities for public health preparedness due to limited resources.[232]

Many states and localities have taken creative approaches to budget and spending restrictions, such as making flexible use of their public health employees during disasters, to reassign individuals to other duties for the time of emergencies. But in some cases, federal grants restrict this ability if the personnel are funded to support other specific programs, such as maternal and child health. CDC and ASPR are currently working with the states and localities to find ways to be able to make quick use of emergency supplemental funds easier, but emergency support cannot fill ongoing gaps.

RECOMMENDATIONS

In addition to dedicated and sustained support for preparedness, TFAH also recommends a series of actions to ensure preparedness funding is more predictable, to cut down on federal bureaucratic red tape and to ensure flexibility so that when emergencies happen, resources and emergency supplemental support can be used quickly and effectively. This effort requires:

- **Establishing multi-year grant cycles with greater flexibility in states' retention and use of carry forward and unexpended funds;**
- **Creating a mechanism to fast track the awarding and programming of emergency supplemental funds into existing grant mechanisms without additional requirements;**
- **Granting authority to the U.S. Secretary of HHS to allow states to also use personnel that are part of other federal programs in response to a public health emergency; and**
- **Improving coordination among emergency preparedness grant programs, including PHEP, HPP, FEMA and CDC grants, through increased leadership and direction and by encouraging uniformity of guidelines and requirements to maximize efficiency, carrying out the MOU agreements that the agencies have entered into.**

OVERVIEW OF FEDERAL FUNDING FOR PREPAREDNESS SINCE 2001

In early 2002, HHS announced $1.1 billion in funding for state public health, hospital and medical preparedness planning for a bioterrorist event.[233] In June 2002, Congress passed the Public Health Security and Bioterrorism Act and appropriated new federal funds to fill gaps and help modernize the public health system to be able to respond to bioterror and health threats. The funds were devoted to:

- Improving national capabilities and policies at CDC and other areas within HHS;
- Expanding the SNS, which is a federal repository of vaccines, medications and other medical equipment for use in emergencies;
- Creating a medical reserve corps and volunteer networks for support; and
- Developing two grant new programs, PHEP, which supports state and local public health preparedness, was initially funded just under $1 billion annually in FY 2003 — and the Hospital Preparedness Program (HPP) was funded at around $400 million annually.

In 2004, Congress passed the BioShield Act and appropriated $5.6 billion to help fill a major gap in the country's ability to quickly develop and procure vaccines and other medications that could be needed to prevent or respond to health threats.

In 2005 and 2006, following Hurricanes Katrina and Rita, national awareness of the implications of a potential pandemic flu outbreak made it clear that while initial progress had been made to begin to improve federal, state and local public health preparedness, major areas of vulnerability could not be addressed with the level of resources provided. In 2005, President Bush announced the National Strategy for Pandemic Influenza and in FY 2006, Congress appropriated more than $5.6 billion in one-time funds to support pandemic flu preparedness activities, particularly to support vaccine research, production and delivery and surveillance, and included $600 million in grants to state and local health departments.

In 2006, Congress passed PAPHA, reauthorizing the 2002 bill to expand the focus toward more of an "all-hazards" approach to improve readiness for a wider range of potential threats. The bill created ASPR to better coordinate and develop policy at HHS, which included BARDA to provide an integrated, systematic approach to the development and purchase of the necessary vaccines, drugs, therapies and diagnostic tools for public health medical emergencies, which includes overseeing Project BioShield, as well as taking over management of the medical reserve corps and volunteer programs, the HPP grants and other programs.

When the H1N1 pandemic flu began, Congress allocated more than $8 billion in one-time funds in FY 2009 to fill immediate needs and gaps to respond to the outbreak.[234, 235]

CDC OFFICE OF PUBLIC HEALTH PREPAREDNESS AND RESPONSE FUNDING TOTALS AND SELECT PROGRAMS

	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
CDC Total	$1,747,023,000	$1,533,474,000	$1,507,211,000	$1,622,757,000	$1,631,173,000	$1,472,553,000	$1,479,455,000	$1,514,657,000	$1,522,339,000	$1,415,416,000	$1,306,906,000
State and Local Preparedness and Response Capability*	$940,174,000	$1,038,858,000	$918,454,000	$919,148,000	$823,099,000	$766,660,000	$746,039,000	$746,596,000	$760,986,000	$664,294,000	$658,850,000
SNS	$645,000,000	$298,050,000	$397,640,000	$466,700,000	$524,339,000	$496,348,000	$551,509,000	$570,307,000	$595,661,000	$591,001,000	$509,486,000

*Includes Public Health Emergency Preparedness (PHEP) cooperative agreements, Centers for Public Health Preparedness, Advanced Practice Centers (FY2004-09), Cities Readiness Initiative, U.S. Postal Service Costs (FY 2004), All Other State and Local Capacity, and Smallpox Supplement (FY 2003)

CDC Funding
Source: FY 2002-09: http://www.cdc.gov/phpr/publications/2010/Appendix3.pdf
Source: FY 2010-11: U.S. Centers for Disease Control and Prevention. 2011 Operating Plan. http://www.hhs.gov/asfr/ob/docbudget/2011operatingplan_cdc.pdf.
Source: FY 2012: http://rules.house.gov/Media/file/PDF_112_1/legislativetext/HR1540crSOM/psConference%20Div%20F%20-%20SOM%20OCR.pdf, p. 26

OFFICE OF ASSISTANT SECRETARY FOR PREPARDNESS AND RESPONSE FUNDING TOTALS AND SELECT PROGRAMS

	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
ASPR Totals	--	--	--	--	$632,000,000	$694,280,000	$632,703,000	$788,191,000	$891,446,000	$913,418,000	$926,724,000
HPP ^	$135,000,000	$514,000,000	$515,000,000	$487,000,000	$474,000,000	$474,030,000	$423,399,000	$393,585,000	$425,928,000	$383,858,000	$380,466,000
BARDA	--	--	--	$5,000,000	$54,000,000	$103,921,000	$101,544,000	$275,000,000	$304,948,000	$415,000,000	$415,000,000
Bioshield Special Reserve Fund	--	--	$5,600,000,000*	--	--	--	--	--	--	--	--

* One-time Funding
^ HPP moved from HRSA to ASPR in 2007 and includes ESAR-VHP

Source: HPP FY 2002: http://archive.hhs.gov/budget/04budget/fy2004bib.pdf, p. 14
Source: HPP FY 2003: http://archive.hhs.gov/budget/05budget/fy2005bibfinal.pdf, p. 16
Source HPP FY 2004:http://archive.hhs.gov/budget/06budget/FY2006BudgetinBrief.pdf, p. 16
Source: HPP FY 2005: http://archive.hhs.gov/budget/07budget/2007BudgetInBrief.pdf, p. 20
Source: BARDA FY 2005-06: http://www.hhs.gov/asrt/ob/docbudget/2010phssef.pdf, p. 45.
Source: FY 2006: http://www.hhs.gov/asfr/ob/docbudget/2008budgetinbrief.pdf, p. 109
Source: FY 2007: http://www.hhs.gov/budget/09budget/budgetfy09cj.pdf, p. 288
Source: FY 2008-09: http://www.hhs.gov/asfr/ob/docbudget/2010phssef.pdf, p. 8
Source: FY 2010-11: http://www.hhs.gov/asfr/ob/docbudget/2011operatingplan_phssef.pdf
Source: FY 2012: http://rules.house.gov/Media/file/PDF_112_1/legislativetext/HR1540crSOM/psConference%20Div%20F%20-%20SOM%20OCR.pdf, p. 26

FLU FUNDING TOTALS AND SELECT PROGRAMS

	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Flu Total[1]	$50,000,000	$183,000,000	$5,590,000,000*	$138,000,000	$299,000,000	$8,456,000,000	$572,000,000	$300,525,000	$159,681,000[2]
State and Local Pandemic Grants	--	--	$600,000,000 ^	--	--	$1,444,000,000	--	--	--
Vaccine Development and Purchase	$50,000,000	$183,000,000	$2,963,000,000	--	--	$1,944,000,000	$158,000,000	--	--

1 May include HHS agency budgets, Office of the Secretary and one-time funding.
2 This only reflects CDC's influenza budget, other Agency budgets were unavailable as of publication
^ Appropriated in FY2006 to be used over the following three years
* Obligated over three years

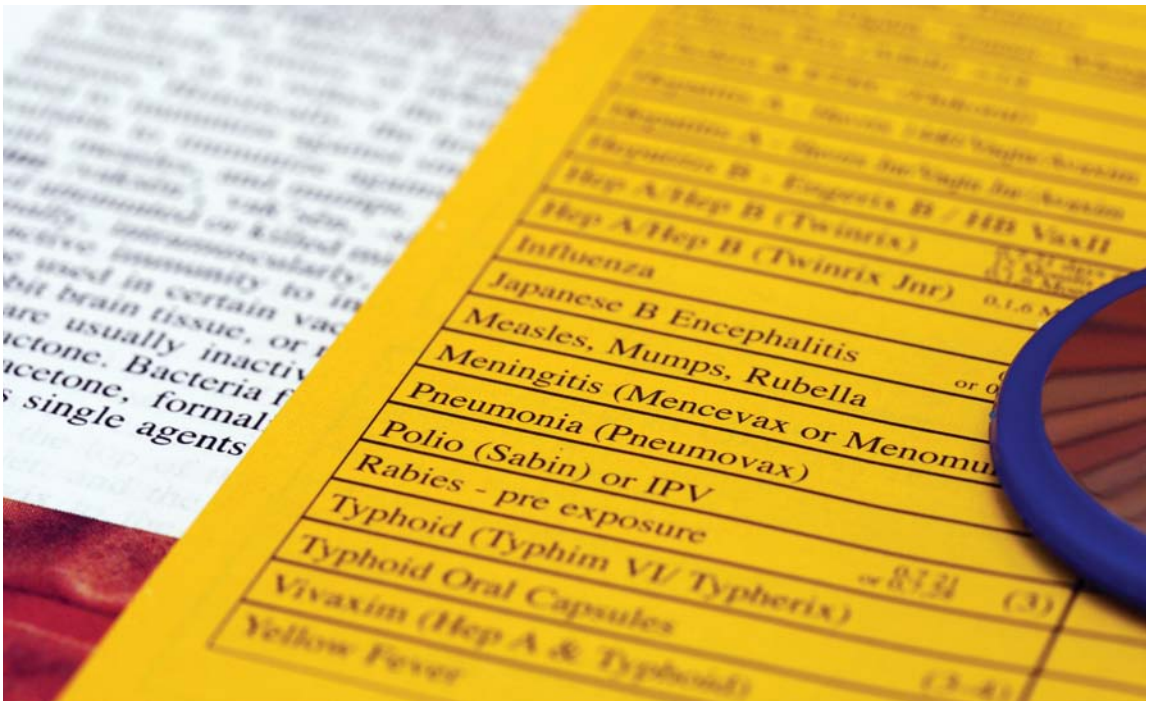
Flu Funding
Source: FY 2004-05: http://www.fas.org/sgp/crs/misc/RS22576.pdf, p. 2-3
Source: FY 2006: http://www.hhs.gov/asfr/ob/docbudget/2008budgetinbrief.pdf, p. 105
Source: FY 2007: http://www.hhs.gov/budget/09budget/2009BudgetInBrief.pdf p. 107
Source: FY 2008: http://dhhs.gov/asfr/ob/docbudget/2010budgetinbrief.pdf p. 107
Source: FY 2009: http://dhhs.gov/asfr/ob/docbudget/2011budgetinbrief.pdf, p. 9
Source: FY 2010: http://dhhs.gov/asfr/ob/docbudget/2011budgetinbrief.pdf p. 104
Source: FY 2011: Correspondence with Liz DeVoss at HHS November 4, 2011
Source: FY 2012: http://thomas.loc.gov/cgi-bin/cpquery/T?&report=hr331&dbname=112&

PREVENTION AND PUBLIC HEALTH FUND: BUILDING PREPARED COMMUNITIES

The Affordable Care Act (ACA) included the creation of a Prevention and Public Health Fund (Fund) to provide communities around the country $16.5 billion over the next 10 years to invest in effective, proven prevention efforts and to build the public health infrastructure. The Fund is being used to support community and clinical prevention efforts, strengthen state and local health departments and the public health workforce, and support science and research.

The Fund has the potential to have a tremendous impact on the nation's preparedness. The Fund is helping to build resilient communities through investments in:

- Laboratory and epidemiology capacity — Prevention Fund money has been used to hire and train epidemiologists and laboratory scientists and expand the number of public health laboratories using electronic laboratory information systems.[236, 237] As part of public health infrastructure grants, HHS is also promoting the capacity of health departments to use electronic health records through participation in electronic laboratory reporting and training health information specialists. These specialized systems are critical to the public health system's ability to quickly detect, pinpoint and respond to an emergency such as an emerging infectious disease or foodborne outbreak.
- Workforce training and fellowships — Grants may help mitigate the devastating impact of budget cuts on the public health workforce, allowing more trained personnel to engage in preparedness and response activities.
- Immunizations — Grants have been allocated to improve the Immunization Information Systems (registries) and other immunization information technologies and to expand adult immunization programs and vaccination capacity in schools.[238] Growing the ability to quickly and accurately vaccinate the population and improving vaccine access and acceptance will be vital during an infectious pandemic that requires mass vaccination of the public.
- Community prevention — In addition to access to vaccines and clinical prevention, the Fund is supporting chronic disease prevention through community-level efforts to combat obesity, tobacco use and poor nutrition. Individuals with chronic conditions are particularly vulnerable during a disaster because of the need for specialized equipment and medicines and difficulty with evacuation and sheltering. Healthy communities, with an informed population and strong connections between the public, healthcare system, and public health, are better able to weather a disaster.



A Decade of Public Health Preparedness: A Focus on Oregon

By Mel Kohn, M.D., MPH, State Health Officer and Public Health Director, Oregon Health Authority

I must be getting old because I remember the days before we had a public health preparedness program. Outbreak investigations were handled almost exclusively by our communicable disease epidemiologists. Even in Oregon, which witnessed the only bioterrorist incident on U.S. soil in recent memory prior to 2001 — the salmonella outbreak engineered by followers of Bhagwan Shree Rajneesh in a small town near the Dalles, Oregon — preparedness was not a core public health activity. It almost seems quaint in retrospect, but I remember when we got our first federal preparedness grant, and used it to hire a single staff person.

But everything changed with the 9/11 and anthrax attacks of 2001. These events, together with the SARS outbreak of 2003 and Hurricane Katrina in New Orleans in 2005, spurred a dramatic federal investment in public health preparedness at the state and local level. After many years of neglect of the public health infrastructure, preparedness dollars were used to plug holes in our fraying epidemiologic and laboratory infrastructure, as well as to build new capacity in incident command structures, agency operations centers, and communications.

In Oregon, here's a list of some of the most important things that these investments have bought for us:

- Capacity for laboratory testing that enables us to investigate and respond to threats in a more timely way (think the spate of white powder incidents in the wake of the anthrax attacks, or the rapid testing in-state of flu samples during the H1N1 influenza pandemic);
- 24-7 responsiveness of the public health system so when someone calls the health department for an emergency there is someone to answer the phone and provide help;
- Communications hardware, software and training that enable us to provide accurate and timely information to the public — the best antidote to the fear and anxiety that are a major part of any disaster;
- The ability to use incident command methodology so that we can quickly and effectively communicate with partners in other agencies and utilize the state and local emergency management system including our National Guard; and
- The capacity to monitor healthcare system capacity and needs so that life-saving resources in short supply during an emergency can be targeted to where they are most needed.

These investments have yielded substantial returns numerous times in recent years. Without our preparedness program, our response to the (hopefully) once-in-a-lifetime H1N1 influenza pandemic would have been impossible to mount; we could not have effectively coordinated vaccine distribution, provided information to the public and monitored and helped manage our health care systems' needs. Because Oregon is on the Pacific rim, there was a very high level of concern about how the nuclear accident in Japan would affect the safety of our food and water. Our Agency Operations Center and our communications skills and infrastructure made it possible for us to provide reliable information to a fearful public on these issues.

While by definition none of us can predict what the next major emergency will be, climate change, regardless of one's beliefs about its causes, is likely to be a major factor. Climate change-related extreme weather events such as floods, forest fires, droughts and heat waves, are already becoming more common, and each of these will bring the potential for serious health effects that a robust public health preparedness system can do a great deal to mitigate.

Today there is no doubt that the public expect the public health system to have the capability to competently protect their health during emergencies. This is not an optional service. So in the face of major budget cuts, how will we be able to meet those expectations?

We should use this budget crisis to look for efficiencies and new ways of working that will enable us to stretch our dollars further. For example, integration of healthcare and community-based preparedness activities could yield some efficiencies, and should be done whether or not there is a budget crisis. But it's fantasy to think that we will be able to absorb reductions of this magnitude simply by finding efficiencies. Next year we are expecting additional reductions in federal preparedness funding. Should they come to pass, public health in Oregon will be forced to reduce our capacity in some serious ways that will not be overcome by finding efficiencies. We have reached the point where we will lose ground on the investments we've made, and our ability to do this work will be seriously compromised, with life and death consequences.

It's difficult to predict how or where the funding-induced deficiencies in our preparedness system will manifest themselves. New Orleans survived for many years, despite design defects and insufficient maintenance of its levee system. Funds that would have been spent on the levees were used for other priorities that probably seemed more urgent at the time. Those funding decisions either went unnoticed, or perhaps were even applauded as good stewardship of public funds. And each individual decision about funding may have appeared at the time as if it could be absorbed with little impact. But in the hindsight of Hurricane Katrina, it's clear that over time the net effect of all those decisions was disastrous and tragic.

We should think of our public health preparedness system as a levee system that protects us at times of critical need and cannot be fixed on the spur of the moment. Can we really afford to let that erode?

TRAINING AND EXERCISES: MAJOR COMPONENT OF READINESS

Training and exercises are essential for public health workers to be ready for emergencies. Training is important so public health workers have the skills to perform in situations that are outside of day-to-day activities, so they are prepared ahead of time to deal with unexpected issues that arise during crises.

Exercises provide public health workers the opportunity to test out their plans and capabilities before an actual event arises, and are an important aspect of training, to understand roles and responsibilities during crises and to understand how to coordinate with other first responders. These are often the only time and mechanism for understanding the roles and responsibilities of other first responders — and often the only way other first responders, ranging from fire and police departments, gain an understanding of the capabilities and limits that public health departments have. They are essential for minimizing confusion and maximizing efficiency during emergencies.

According to a June 2011 paper, The Impact of State and Local Budget Cuts on Public Health Preparedness, by PRTM, commissioned by the IOM, "from table-top exercises to more realistic event simulations, exercises provide a chance to analyze the strengths, weaknesses, and areas of improvement in public health response."[239]

The paper found that training "has been one of the first areas to be de-prioritized during budget cuts. In general, state and local health departments are running low funding, human resources and time necessary to train staff…. Efforts to standardize and align training throughout the states, such as by integrating core curricula and standardizing core competencies, have also suffered."[240] In addition, according to the paper, exercises are being cut back, particularly in scope and sophistication.

Photo courtesy of APHL: Anthony Barkey, MPH, Senior Specialist, Public Health Preparedness and Response, APHL, providing information on public health laboratory outreach to first responder communities.

Improving Collaboration between Federal, State and Local agencies in Planning for a Worst Case Scenario: A Broad Aerosolized Dispersal of Weaponized Anthrax in a Major Metropolitan Area

By Alonzo Plough, PhD, MPH, Director, Emergency Preparedness and Response of the Los Angeles County Department of Public Health and Member of the Board of Directors of the Trust for America's Health

On September 8, 2011, the Los Angeles County Department of Public Health hosted a tabletop exercise requested by FEMA's National Exercise Division's. Goals were to review and discuss emergency response plans, policies, and procedures for rapid MCM dispensing. The exercise was prompted by Presidential Executive Order 13527 to establish the federal capability for the timely provision of MCM following a biological attack, and involved several federal agencies including DHS, FEMA, HHS, CDC, DoD, and others.

Even though Los Angeles County and other large urban areas have worked extensively with the CDC, especially under the Cities Readiness Initiative (CRI) — which is directly responsible for enhancing our ability to distribute MCMs through the SNS — this work was not well known by many other federal agencies, including those who could play an integral role in WMD response. The exercise expanded the list of federal agencies participating in this planning, and aligned them on how they could best support local and state efforts to provide prophylaxis to at-risk populations within 48 hours of a decision to dispense if aerosolized weaponized anthrax was broadly dispersed using the newly drafted Federal Interagency Concept of Operations (CONOPS)—Rapid Medical Countermeasures Dispensing.

Months before we began planning for the exercise, Los Angeles County had begun working with the Department of Defense Northern Command to develop interagency plans for rapid medical countermeasure dispensing in an anthrax-type event (the worst case scenario for a widespread weapons of mass destruction (WMD) type event). At the request of the National Security Council and White House, we welcomed the opportunity to show how ready large jurisdictions are to respond to such an event, and how willing we are to partner with federal agencies to further improve timely response.

The goal during those meetings was to develop DoD's concept of operations and to establish requirements for a federal rapid response to dispense MCM to an affected population following a large-scale biological attack. In short, the DoD wanted to learn from us how we would respond to a WMD situation, what resources and plans we had in place and how best they could support our efforts to organize and distribute federal resources.

The DoD came to Los Angeles in December of 2009, and went through our anthrax response plans in detail. They quickly learned that we had been doing this planning, training and testing for nearly a decade under CRI, and that these plans had been strengthened and honed by experiences during the H1N1 pandemic. The agency began to digest what supporting roles they could play to improve response to a WMD event.

In March of 2011, we met in Colorado Springs at Northern Command headquarters with representatives from DoD, DHS, HHS, CDC, and the City of Chicago and District of Columbia health departments to develop the Commander's estimate for deploying DoD assets (for example, the National Guard) in this kind of scenario. The focus was on what kind of supports could be delivered to large urban areas such as Los Angeles County in 24 hours. At this point, this project showed the wonderful interaction between public health and DoD — something that had not previously existed. As a result, DoD realized the agency had to adopt and adapt strategies to what public health had already built up and put in place. These findings, plans and outcomes were taken to the Pentagon.

Following this planning project, this summer, we received a request from the White House to host a national level anthrax exercise, with an eye toward the 10th anniversaries of the 9/11 and anthrax tragedies. The objectives of the exercise were to:

- Examine the approach and mechanisms for organizing and managing the federal response to support medical countermeasure dispensing operations in a large urban area as outlined in the draft the Federal Interagency CONOPS–MCM Rapid Dispensing;
- Assess the viability of the Federal Interagency CONOPS–MCM Rapid Dispensing; and
- Identify policy and operational issues associated with the effectiveness and timeliness of the federal capability to support initial State and local dispensing of MCM.

In addition to the federal agencies mentioned above, state and national guards, local, county and state health departments, city, county and state emergency management agencies and local/first responders (fire, police, etc.) took part.

Improving Collaboration between Federal, State and Local agencies in Planning for a Worst Case Scenario

The exercise was based on a massive anthrax attack that was identified by multiple Biowatch monitors across the county. It was designed for a "worst case" type scenario: broad aerosolized dispersal of weaponized anthrax. We did not design the exercise to test capabilities beyond dispensing to focus the play (i.e., what happens once an attack is identified and whether 10 million people could receive prophylaxes in 48 hours). Hopefully, at the end, we would have the framework of how the federal family could assist state and local government in improving timely response during such a situation.

The exercise went extremely well. Planning for it opened a dialogue between federal response agencies and public health. Prior to this exercise, there had not really been a deep knowledge at DHS, FEMA or DoD of all that was accomplished by the CDC investments, especially in directly funded cities like LA. Federal agencies came out of the exercise with a much clearer idea of what local and state capabilities had been built up through CDC funding. Specifically, opportunities for federal MCM support in the first 48-hours were identified in the area of logistics (drivers and vehicles, or access to federal logistics contractors to move supplies to dispensing sites), and less so on access to federal personnel to assist with dispensing because of planning efforts with DoD. The exercise also provided the backdrop for a good discussion of what types of nearby federal resources can be put into place (postal trucks, military bases, people etc.) in the 48 hour dispensing window.

Basically, the participating federal agencies learned about the return on investment from the CDC dollars and saw that local MCM distribution plans were solid and had been tested both through annual exercises and actual response during the H1N1 pandemic. Before the exercise, there just wasn't a lot of knowledge about the planning, training, exercises and performance measure requirements that go with the CRI — there wasn't widespread understanding of the accountability mechanisms that have been in place for years.

While the exercise was successful, it did expose some gaps in a unified federal-state-local response to a WMD. There is clearly still confusion and lack of widespread information on the capabilities of large urban areas (especially if you look the WMD Center Bio-Response Report Card which was released on October 12, 2011). The exercise and that report card reflects a lack of engagement and understanding of the great successes and advances that have been made in high threat areas as a result of CDC funding, particularly for MCMs.

As a result of these meetings and the exercise, we were able to show how federal investment has improved local response to WMDs, and how closer interagency planning can improve response even further. This work is not finished; if these resources don't continue or are cut, we're in trouble. The public health emergency preparedness budget should be protected the same way other national security budgets are protected.

Over the last ten years, through the CDC funding and CRI, large urban areas have built up a tremendous capacity to respond to and stave off a WMD attack. CDC should be applauded for what they have put on the ground, especially in highly populated high threat large urban areas.

Quite simply, there is a logic of preparedness and response that operates inside the Beltway that is sometimes divorced from what has been accomplished by and what would happen in the rest of the country during a WMD attack. It is encouraging that federal agencies are reaching out to local and state governments to see what has been built, and to develop interagency plans to improve readiness to response. This enhanced partnership will allow us to save lives, reduce human suffering, and speed recovery after a WMD attack.

B. IMPROVING BIOSURVEILLANCE:

The United States lacks an integrated, national approach to biosurveillance — which hampers the country's ability to rapidly detect and track bioterrorism attacks or disease outbreaks.

In a 2009 review, the National Biosurveillance Advisory Subcommittee (NBAS) found that there "are more than 300 separate biosurveillance efforts underway in various federal, state and local government agencies. These efforts are, for the most part, neither integrated nor interoperable, and propose to serve an array of purposes. The effectiveness of many of these systems remains untested and, in some cases, undefined."[241]

The existing structure is an assortment of many different systems that were built one disease or crisis at a time, and the result is a set of fragmented, uncoordinated systems that cannot share information effectively or quickly.

Remaining constantly aware of surrounding threats and our capacity to respond is critical to dealing with emergencies. The U.S. disease surveillance system has been built one disease or crisis at a time, resulting in archaic and static silos of information rather than as an interoperable system with a focus on prevention. Fixing the system will require that the nation fundamentally rethinks how to do biosurveillance — for both emergencies and routine public health issues. The particular challenge in the field of preparedness is that officials don't necessarily know in advance what they will need to know, and thus the most comprehensive approach to data collection is needed. Right now, the fragmented system of data reporting drastically weakens our nation's defense against emergency outbreaks.

Improving the system means harnessing the opportunities afforded by the nation's transition to an integrated health information technology (HIT) system with electronic health records at the core. This could create economies of scale and provide more useful information to public health and national security officials. Currently, the White House is examining the national biosurveillance system. TFAH believes that any new national strategy should examine means to achieve interoperability, efficiency, and transparency among various surveillance systems in order to create an integrated biosurveillance operation. In particular, HIT must strengthen meaningful use requirements, which currently contain weak public health reporting requirements. Building the capacity of health departments to receive this data started through grants from the Recovery Act and Prevention and Public Health Fund, but these investments need to continue and grow. TFAH also urges ongoing, enhanced communication between Congress, CDC and the Office of the National Coordinator for Health IT (ONC) to ensure that ONC considers the preparedness implications of EHRs.

RECOMMENDATIONS

TFAH recommends modernizing and coordinating the biosurveillance system — using up-to-date health information technology (HIT) to be able to receive, compile and analyze data in a more rapid and accessible fashion. This requires:

- **Implementing a new national strategy that examines means to achieve interoperability, efficiency and transparency among various surveillance systems in order to create an integrated biosurveillance operation;**
- **Leveraging new epidemiological data that results from health IT developments and electronic health records (EHRs) through enhanced communication between CDC and the Office of the National Coordinator for Health Information Technology (ONC);**
- **Ensuring the system includes electronic reporting of laboratory test requests and results; and**
- **Allowing Poison Control Centers to be eligible for grants to establish surveillance networks, along with hospitals, public health and other facilities.**

THE CURRENT STATE OF BIOSURVEILLANCE

Biosurveillance is complicated by the fact that:

- Different data is required for detecting and managing different types of emergencies;
- Health departments rely on receiving information from hospitals and doctors — and there is often a lag time in the transmission of that information and another lag in the types of technologies used (phone reports, faxes, emails that are not linked directly to databases). Currently, only a small number of health departments have agreements with hospitals to obtain direct access to a hospital's electronic medical records for investigations; and
- Many health departments lack the capacity to receive and analyze data from electronic health records.

Recent developments in HIT — both from the standpoint of technologies and standardization — are providing new opportunities to rethink and harness new capabilities for biosurveillance. Issues of how to quickly and effectively standardize, transfer, sort, analyze and store data are keys for building an effective system. Major retail chains, which rapidly track inventories and customer patterns, and insurance companies, could serve as models for developing such a system that tracks health patterns, claims and billings, among other factors.

According to a recent study from Harvard University researchers, allowing practitioners (hospitals, doctors and clinicians) access to data on infections in their community as diagnoses occur would greatly improve patient care. While hospitals, clinics and doctors report symptoms to public health departments, the information typically stops there. If two doctors in different hospitals report the same symptoms, it is unlikely they will ever know there are similar cases in a neighboring hospital. However, based on the Harvard study, if there were real-time relays of information, more than 166,000 patients would be prevented from receiving unnecessary antibiotics to treat suspected strep throat, for example.[242]

Moving from the current system, which is comprised of a range of different systems in each state and for different diseases and health conditions, to a standardized, interoperable, rapid system will require a full modernization of U.S. biosurveillance. For instance, a recent report from GAO outlined a set of common challenges state and city official identified as obstacles to developing and maintaining their biosurveillance capabilities: "(1) state policies that restrict hiring, travel, and training in response to budget constraints; (2) ensuring adequate workforce, training, and systems; and (3) the lack of strategic planning and leadership to support long-term investment in cross-cutting core capabilities, integrated biosurveillance, and effective partnerships."[243]

Key findings from a November 2011 article examining the state of biosurviellance in the United States today in Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science by the Center for Biosecurity of UMPC included that:[244]

1. A single comprehensive biosurveillance system is probably not possible, and many systems would be needed.
2. Rapid laboratory reporting or clinical care reporting are the most important means by which health departments detect outbreaks.
3. Public health departments have systems to answer a number of the key outbreak questions, but this takes time.
4. Private sector medical resource and logistical information is often not readily available to public health departments.
5. State and local health agencies do not have sufficient numbers of professionals with the special skills needed to build or run biosurveillance systems.
6. Federal grant language may prevent health departments from reassigning staff during a public health crisis.
7. Exchange of electronic health information between clinical and public health communities has the potential to substantially improve biosurveillance.
8. State and local public health information technology infrastructure has improved over time, but budget cuts threaten to erode this infrastructure.

The authors provided a series of recommendations, including to:

1. Provide appropriate levels of funding and explicit grant guidance for state and local public health surveillance.
2. Improve public health agencies' ability to access and use electronic health information.
3. Promote the integration of electronic laboratory reporting and electronic death registries.
4. Address key gaps in biosurveillance for responding to public health emergencies: advanced epidemiology and supply/logistical information.

Surveillance: Essential for Public Health Preparedness and Response

By, Jeffrey Engel, M.D.; State Health Director, Division of Public Health, North Carolina Department of Health and Human Services

Surveillance, the Science of Gathering Data on Populations

Surveillance has always been a core public health function and it is essential to effectively monitor the health of a community.

Over the last 60 years, the science of surveillance has been refined and is the cornerstone on which we base every public health intervention. As public health practice is largely performed at the state and local level, so it is for surveillance.

The U.S. Constitution leaves this responsibility up to states in their police powers. The major role of the federal government, largely through CDC, lies in coordinating and standardizing surveillance across jurisdictions to ensure reports can be compared and to provide a national profile.

After the 9/11 and anthrax attacks, gaps in surveillance systems became apparent: most notably there was no formal portal into the hospitals (anthrax disease was best tracked in emergency departments). This was just a decade ago, yet, basically, our surveillance system was a handful of epidemiologists on the phone calling hospitals to obtain information and ask if they had seen patients with particular symptoms. Out of this experience, public health and the hospitals recognized that they had to build a more robust and real time system — which is what North Carolina has now.

Implementation of Surveillance: Influenza

During 2009 pandemic influenza A (H1N1), surveillance was essential for understanding the activity and severity of the pandemic. To monitor seasonal flu and potential flu pandemics, public health departments rely on non-specific case definitions because of the common nature of flu.

With pandemic H1N1, public health had to quickly understand the activity of the strain, in particular the proportion of the population that would be affected and the subsequent severity measured by hospitalizations and mortality. In the early days of the pandemic, states needed to understand rapidly what was going on since there was no available vaccine. Antiviral stockpiles needed to be deployed to providers in a way that made sense based on the surveillance. Community isolation and quarantine decisions relied on timely and accurate estimates of disease activity and severity.

Because pandemic H1N1 had its origins in North America, international port plans were already out of play: the first step in disease prevention is to keep it off shore as long as possible. Instead, public health had to shift and rely on rapid assessments of community disease, which was based on existing biosurveillance systems.

At the local and state level, surveillance begins with clinician and lab reporting. Public health relies heavily on the medical care system to be the "boots on the ground" for initiating reports and intelligence. North Carolina has two systems for influenza reporting.

The first is the CDC's sentinel provider network which includes volunteer clinics/private care providers that file reports to CDC on a weekly basis. Our State Laboratory of Public Health uses the sentinel sites (we have 70 in North Carolina serving our population of 9.5 million people) to request that approximately one of every ten patients presenting with influenza-like illness (fever and respiratory symptoms) submit a nasal swab for inoculation. The samples are then transported to the state lab for isolation and characterization of flu viruses.

The second system is a syndromic surveillance system operated through the emergency departments across the state. The emergency departments gather data elements for every hospital emergency department visit and state law mandates reporting all visits electronically. To my knowledge, we are the only state that has mandated emergency department reporting. For every visit, we collect 18 data elements and use natural language algorithms from the chief complaint and nurses notes to categorize a human illness into various syndromes. For flu, the surveillance system looks for temperature (if it is greater than 100.5 degrees) and respiratory symptoms.

This syndromic surveillance system is much timelier because it is reported to the state every 12 hours via an automated transfer to our analytical partner, the University of North Carolina School of Medicine. They then analyze the data and provide aggregated summaries to state public health officials and to the CDC's BioSense system.

Consequently, we rely on our two parallel systems to track and understand the development of pandemics and other serious public health threats.

Surveillance: Essential for Public Health Preparedness and Response

North Carolina also has a third system that focuses on morbidity and mortality of unusual events. This system revolves around public health epidemiologists which are stationed in 10 of the largest hospital systems in the state. The epidemiologists report on patients admitted to the hospital with suspected reportable community acquired infections. While the other systems are centered more on population dynamics, this last surveillance system would be the most important one early on in the event of an anthrax attack or other bioterror event.

The hospital emergency department syndromic surveillance system and hospital-based epidemiologist positions were made possible by the CDC's emergency preparedness funding to the states after 9/11 and the anthrax attacks. Unfortunately, these funds have been dwindling for the past two years and we have lost some hospital positions.

The Ideal Surveillance System

Enhanced electronic health records (EHRs) and reporting has the potential to be, at least on the data collection side, completely automated from the second a patient has an encounter with the health system. Ideally, if a person presents with an illness and goes to a "doc in a box", emergency department or any other provider, all symptoms and information are entered into the EHR and key data elements are automatically reported to a repository where they are analyzed and translated into actionable information.

The steps would be synchronous and automated: a patient has the clinical encounter, then a specimen is obtained, then the lab isolates an organism on the specimen and health data and reports are sent to the relevant parts of the public health system.

The lab reporting is actually the easiest to automate first and we are beginning to do this. In North Carolina, we have implemented the CDC's National Electronic Disease Surveillance System (NEDSS) that can capture lab reports through a health information exchange interface. For example, a patient has diarrhea: a specimen is transferred to lab, toxin-producing E. coli is identified and the information is electronically transferred to the local and state health department. The local health department contacts the patient and begins an investigation as to where the E. coli came from. Electronic lab reporting is beginning to work; the problem is every lab needs its own interface to NEDSS, and this is costly.

Barriers to Building the Future Surveillance Systems

A completely seamless, ideal surveillance system faces several barriers at the moment.

The barrier to building the electronic lab reporting mentioned above is finding the money to create the interfaces: each lab would need to communicate via standard messaging to NEDSS and this function can cost up to $50,000 per lab.

When it comes to fully optimizing EHRs, a larger barrier is going to be confidentiality and permissions for health information exchanges and proper governance of the exchanges. While in public health we have certain exemptions (HIPAA exemptions for reportable diseases and conditions within state laws, for example), public health and state law has to sort what falls under these exemptions and then how the information can be transferred securely.

Lastly, sustainability is a huge piece. Currently, we are building systems largely on federal dollars via health information technology grants and others. However, there is a big question of where sustained funding will come from. Ultimately is this going to be funded by the health care financing system? Or will it be the duty of government to pay for? This remains an unanswered issue because we do know that funding for health care financing is getting less and less and state governments don't have money to invest in these systems.

The Future of Surveillance

We are now on the cusp of modernization of our state and federal public health surveillance system. That said, the system will always rely on the standardization and epidemiologic science that was established and promulgated over the last 60 years by the CDC and state and local public health departments. Regardless of the technological advancements, accurate and timely surveillance will always need the human element to determine national case definitions for reporting, data collection tools, analysis and communication of actionable information to the agencies and people that need to know.

There are two possible, realistic scenarios for the development of automated surveillance systems:

Surveillance systems will be built steadily and slowly one brick at a time, i.e., one hospital system will agree to submit EHR lab reports and pay for it and set up the interface, then others will follow as they see fit. This is, mostly, what is happening now. Occasionally we will find federal dollars to assist, but mostly modernization is born from public-private partnerships with private entities taking on a large burden. Here, modernization of surveillance will be an iterative accomplishment. This is slow and not strategic, because progress will involve whether it is financially advantageous for a system to come on board. This is, likely, the best case scenario.

The worst case scenario would be a horrible event that is exacerbated by weaknesses in the system. The public and policymakers will be appalled and there will finally be the political will to do something and modernize the surveillance systems. That event will likely be an act of bioterrorism — the biggest and most plausible fear that everyone is concerned about in public health.

History of Biosurveillance in the United States

A modern biosurveillance system would allow public health departments to quickly detect a catastrophic biological event and then rapidly share pertinent and accurate information across jurisdictions, counties and states.

How Federal Policies and Biosurveillance have developed over time:

- **July 2002:** *Public Health Security and Bioterrorism Preparedness and Response Act of 2002* requires the establishment of a system of public health alerts and surveillance.
- **January 2004:** *Homeland Security Presidential Directive-9 (HSPD): Defense of United States Agriculture and Food* directs several federal agencies to create surveillance systems coordinated across agencies for animals, plants, wildlife, food, human health and water.
- **April 2004:** *HSPD-10: Biodefense for the 21st Century* begins the process of developing a system capable of quickly recognizing and analyzing potential biological attacks.
- **December 2006:** *Pandemic and All-Hazards Preparedness Act of 2006* calls for the creation of a nationwide, interconnected, electronic surveillance system.
- **August 2007:** *Implementing Recommendations of the 9/11 Commission Act of 2007* requires the creation of the National Biosurveillance Integration Center.
- **October 2007:** *HSPD-21: Public Health and Medical Preparedness* calls for establishing an operational national epidemiologic surveillance system for human health, with international connectivity where appropriate and created the National Biosurveillance Advisory Subcommittee (NBAS) and requires the United States to develop biosurveillance capabilities across the country that can link with international systems.

Homeland Security Presidential Directive-21 *(HSPD-21) was largely focused on surveillance. Dr. Engel was co-chair of the National Biosurveillance Advisory Subcommittee to the Advisory Committee to the Director of CDC sanctioned under HSPD-21.*

The directive, which began under President Bush, was extended by President Obama to allow the committee to publish the second report in April 2011 (www.cdc.gov/osels/pdf/NBAS_Final_Report_2011.pdf).

The report identified four major areas for recommendation for improvement for national biosurveillance:

1. Governance: coordinate under the Executive Office of the President the federal agencies that oversee biosurveillance, including CDC, Homeland Security, Department of Defense, USDA and others that have a hand in surveillance.

2. Information exchange: methods used in acquiring biosurveillance data are highly variable; efficient and comprehensive aggregation of these data must occur among the human health, animal, food, vector and environmental sectors.

3. Workforce development: need more skilled workers, particularly in the area of public health informatics and social and behavioral epidemiology (community resiliency).

4. Research and development: the federal government needs to invest in new areas including information technology, molecular and cellular sciences and communication.

"Biosurveillance in the context of human health is a new term for the science and practice of managing health-related data and information for early warning of threats and hazards, early detection of events, and rapid characterization of the event so that effective actions can be taken to mitigate adverse health effects. It represents a new health information paradigm that seeks to integrate and efficiently manage health-related data and information across a range of information systems toward timely and accurate population health situation awareness."[245] *— National Biosurveillance Strategy for Human Health*

"Biosurveillance is the process of active data-gathering with appropriate analysis and interpretation of biosphere data that might relate to disease activity and threats to human or animal health — whether infectious, toxic, metabolic, or otherwise, and regardless of intentional or natural origin — in order to achieve early warning of health threats, early detection of health events, and overall situational awareness of disease activity."[246] *– HSPD-21*

BioSense 2.0

BioSense 2.0, launched in November 2011, is the first HHS program to move to a distributed computing platform (Internet cloud) which allows for rapid sharing of data across jurisdictions and with CDC. It is also designed to support enhanced interchange of critical public health information necessary for accurate early notification of outbreaks, pandemics, and terrorist events. By integrating local and state-level information, it is expected that BioSense will be able to provide a more timely and cohesive picture at regional and national levels by:

- Having a health monitoring infrastructure and workforce capacity where needed at the state, local, tribal, and territorial (SLTT) levels;
- Having a user-centered approach to increase local and state jurisdictions' participation in BioSense;
- Supporting Meaningful Use adoption at the SLTT levels; and
- Supporting state and local capability to conduct syndromic surveillance is key in helping to implement Meaningful Use.

C. IMPROVING MEDICAL COUNTERMEASURE RESEARCH, DEVELOPMENT AND MANUFACTURING

Anthrax vaccine, botulinim antitoxin and smallpox vaccine all have something in common: the government is the only real customer for these products. As a result of the lack of a natural marketplace, the U.S. government has invested in the research, development and stockpiling of emergency MCM for a pandemic, bioterror attack or emerging infectious disease outbreak.

Development of medical products for the nation's biodefense is a key piece of any public health emergency response. By preparing for a bioterror attack with adequate supplies of countermeasures, the nation can effectively neutralize that threat. A successful domestic MCM enterprise will prepare the nation for new threats, expected or unexpected, by building the science, policy and production capacity in advance of an outbreak.

Congress created Project BioShield in 2003 to spur development and procurement of MCM and authorized BARDA in 2006 to support the development of domestic manufacturing capacity. However, industry was still reluctant to invest in vaccine and countermeasure development in large part due to limited profit incentives and slow bureaucratic processes.

In August 2010, the Secretary of HHS released The Public Health Emergency Medical Countermeasures Enterprise Review, which laid out strategies for addressing chokepoints in research and advanced development, improvements in domestic manufacturing capacity and enhancing public-private partnerships.[247] The review concluded that new strategies were needed to creative incentives for private industry while protecting the public's interest and safety, including:

- Enhancing regulatory innovation, science and capacity;
- Improving domestic manufacturing capacity;
- Providing core advanced development and manufacturing services to development partners;
- Creating novel ways for the enterprise to work with partners;
- Developing financial incentives;
- Addressing roadblocks from concept development to advanced development; and
- Improving management and administration within the enterprise.

Since release of the Review, the national countermeasure enterprise has made progress in some notable ways:

- BARDA has issued a request for proposals for Centers for Innovation in Advanced Development and Manufacturing (CIADM), a strategy from the Review which would create flexible facilities to produce MCM on a routine basis for CBRN threats as well as a manufacturing process for emergency or pandemic conditions.[248] The proposals are currently being reviewed, with awards expected in FY2012. HHS is using $478 million in unspent H1N1 funds for these facilities.
- FDA launched the Medical Countermeasures Initiative (MCMi) to establish regulatory pathways to accelerate MCM development, including modernizing the review process and updating the legal and policy framework for regulating these products.[249] FDA has allocated $170 million from H1N1 emergency funds for this initiative.
- The National Institute for Allergy and Infectious Diseases (NIAID) has introduced the Concept Acceleration Program, which enables coordination of teams of scientific, medical and product development experts to guide MCM researchers with the goal of nurturing promising concepts that might otherwise not be pursued.[250] NIH has begun staffing the program.[251]
- ASPR has convened interagency coordination, including an Enterprise Senior Council, which meets regularly to discuss lifecycle management of biodefense products. Participants include representatives from ASPR, CDC, FDA, NIAID, DHS, Veterans Affairs (VA), USDA and DOD.
- BARDA has issued significant new contracts, including for recombinant vaccine technology, which could significantly shorten the production timeline for seasonal and pandemic flu vaccine;[252] and new contracts under the Broad Spectrum Antimicrobial Program, including what would be the first new class of antibacterial agents to treat Gram-negative infections in 30 years.[253]
- HHS has begun to develop a five-year budget planning process to help project funding needs for development and stockpiling throughout the countermeasure lifecycle.[254]

The national countermeasure enterprise still faces challenges in fully implementing the strategies laid out in the Review, including:

- BARDA has requested congressional authorization as well as $100 million to launch a MCM Strategic Investor, which would be an independent 501(c)(3) venture capital firm that would provide both investment and business management to biotechnology companies to bring commercially-viable platforms to fruition. Although the Strategic Investor would be independent, BARDA would house an Interface Center to communicate with the firm.
- Funding for research and development is still far below recommended levels.[255] Although the President requested $655 million for BARDA for FY 2012, in addition to funding for the Strategic investor, the enacted FY 2012 budget only approved $415 million.
- After its initial investment, future funding for FDA's MCM Initiative is uncertain, and proposed cuts to that agency could significantly hamper the program's potential.
- Cuts to the public health workforce could hinder the success of any dispensing plans. ASPR has begun outreach to the public health community to discuss these plans, but these conversations need to be more extensive and take into account drastic workforce reductions.
- The Bipartisan WMD Terrorism Research Center recently issued a "D" grade for the nation's MCM development and approval process, based on failure to meet criteria such as clearly defined requirements, a common set of prioritized research and development goals, coordinated budget requests and sufficient, sustained funding.[257]

RECOMMENDATIONS

TFAH recommends that the United States must place a higher priority on research and development of MCM, including vaccines, medicines and technology. Policymakers must ensure that the public health system is involved in this process, from initial investment through distribution and dispensing. The nation's MCM enterprise could be advanced through the following activities:

- **Authorizing the President's requests for MCM advancement: building an MCM Strategic Investor to leverage capital for new technologies; and developing end-to-end leadership to oversee products from initial research to dispensing;**
- **Improving oversight and management of national stockpiles through ongoing replacement of expiring products and expansion of the Shelf-Life Extension Program (SLEP) to state stockpiles to maintain supplies in a cost-effective manner;**
- **Building increased flexibility for FDA to issue Emergency Use Authority of medical products necessary to respond to an emergency; and**
- **Increased focus on special pediatric needs, including in the development, testing and dosages of MCMs.**

EXAMPLES OF BARDA ACTIVITIES

In September 2010, BARDA awarded contracts, worth up to $100 million over three years, to eight biotech and pharmaceutical companies researching a range of innovative countermeasures. One company, Pfenex, is working to develop a faster way to make anthrax vaccine; others, including Novartis and Rapid Micro Biosystems, are looking into methods to speed up flu vaccine manufacturing.[258]

In September 2011, BARDA awarded $153 million to Cellerant Therapeutics, a biotech firm working on a new drug that may protect humans from nuclear radiation and awarded up to $94 million to GlaxoSmithKlein for a dual-purpose broad spectrum antibiotic with potential to treat illnesses caused by bioterrorism threats such as plague and tularemia, as well as certain life-threatening infections, known as Gram-negative infections, associated with prolonged hospitalization.[259, 260]

INNOVATIONS FOR FDA AND MEDICAL COUNTERMEASURES

FDA is responsible for getting lifesaving drugs and devices to market as quickly as possible while ensuring safety. The spectrum of the MCM enterprise includes vaccines, antiviral and other lifesaving drugs and devices such as diagnostics that are used to determine if someone has been exposed to a biologic, chemical, nuclear or radiologic threat.

MCMs pose unique challenges, since it is often impossible or unethical to safely test these products on humans. For instance, while it is possible to test a product for safety in humans, it is not feasible to expose people to the threat itself to test whether the vaccine or the treatment works. It is essential that new vaccines, antiviral medications and devices intended to save lives do not cause unintentional harm and endanger the health of Americans — but it is also essential to have effective countermeasures in place to respond to man-made and natural threats.

FDA must take steps to minimize red tape, maximize innovation and maintain safety when it comes to reviews and standards for medical countermeasures. Additional coordination with BARDA and private industry is essential to understand priorities and to find ways to improve processes to make them less burdensome on companies.

The agency is developing new scientific and analytic tools to speed the approval of lifesaving drugs and devices. Innovative approaches can be used to more efficiently manage the movement of potential treatments from idea to reality.

In August 2010, the agency launched a new Medical Countermeasures Initiative (MCMi), which was first limited to preparing for responding to a flu pandemic.[261] In April 2011, Congress enacted legislation to allow the project to also address chemical, biological, radiological and nuclear (CBRN) threats.[262]

Examples of the efforts FDA is taking to expand and be more flexible in testing and review of products include:

- Developing genetically modified animals for testing, such as an engineered modified mouse to test the smallpox vaccine and potential side effects;
- Expanding testing on cell cultures created in labs combined with more research into how humans are likely to react differently than test animals conducted lab-created materials or rodents;
- Implementing supercomputing and IT enhancements to better simulate the effect of MCMs on humans;
- Creating research metrics, such as biomimetrics, which create artificial ways to model natural biology;
- Researching adjuvants to maximize the amount of vaccine available during crises;
- Advancing treatment for acute radiation syndrome;
- Enhancing the ability to test for multiple pathogens simultaneously;
- Improving the ability to rapidly and accurately test for new potential threats; and
- Focusing significant research on the impact of MCMs on children and other at risk patients.

Examples of FDA efforts to expand and be more flexible to ensure life-saving drugs and devices are sped to market and available for use in crises include:

- Enhancing clarity and flexibility for emergency use authorization (EUA), which permits FDA to approve the emergency use of drugs, devices, and medical products (including diagnostics) that were not previously approved, cleared, or licensed by the agency or the off-label use of approved products in certain well-defined emergency situations;
- Issuing an EUA so doxycycline can be used as a prophylaxis for people exposed to anthrax;
- Expanding the shelf-life extension program to use drug stockpiles beyond formal expiration dates when safe;
- Improving risk-benefit analyses; and
- Developing models for predicting and mitigating the potential for shortages of MCM drugs, biologics and devices during emergencies.

"The mission of the FDA should continue to ensure that new devices and drugs reaching the public in the U.S. are safe and effective. We encourage fostering innovation, without lowering evidence standards or putting the public at risk."[263]

—Testimony from America's Health Insurance Plans (AHIP) to the House Oversight and Government Reform Committee in June 2011

D. ENHANCING SURGE CAPACITY

The ability of our health care system to quickly provide care for an influx of patients during an emergency is critical.

During a severe health emergency, the health care system would be stretched beyond normal limits. Patients would quickly fill emergency rooms and doctors' offices, exceed the existing number of available hospital beds, and cause a surge in demand for critical medicines and equipment.

The challenge of how to equip hospitals and train health care staff to handle the large influx of critically injured or ill patients who show up for treatment after or during a public health emergency remains the single, most challenging issue for public health and medical preparedness.[264]

In public health emergencies, such as a new disease outbreak, a bioterror attack, or catastrophic natural disaster, U.S. hospitals and health care facilities are on the front lines providing triage and medical treatment to individuals. In the best of times, however, most emergency rooms and intensive care units (ICUs) must confront bed shortages and staffing issues; in a mass casualty event — particularly a pandemic influenza or mass bioterror attack — the situation could quickly spiral out of control.

RECOMMENDATIONS

TFAH recommends:

- **Enhancing the HPP to create coalitions among hospitals to share surge burdens within a region with emphasis on developing creative strategies, intensive training and providing additional funding, particularly in large urban centers;**
- **Clarifying crisis standards of care via creation of a national framework to guide states and local entities in the event of a mass casualty or crisis;**
- **Eliminating the need for dual declarations to be made by the President and U.S. Secretary of HHS to implement Section 1135 waivers to allow rapid availability of healthcare services for individuals affected by a disaster; and**
- **Clarifying federal laws to implement a broad liability protection that applies to all volunteer health professionals during a nationally-declared public health emergency, creating a Federal Tort Claims Act protection for Medical Reserve Corps volunteers year-round, as these personnel participate in public health drills and training during times of non-disaster, and mechanisms for ensuring hospital and provider costs incurred during disaster response are covered.**

E. IMPROVING COMMUNITY RESILIENCE: HELPING COMMUNITIES COPE AND RECOVER

Ensuring communities can cope with and recover from emergencies is a significant challenge to public health preparedness.

The most vulnerable members of a community, such as children, the elderly, people with underlying health conditions and racial and ethnic minorities, face special challenges that must be planned for prior to emergencies happening.

Building community resilience is one of the two overarching goals identified by HHS in the release of the draft Biennial Implementation Plan for the National Health Security Strategy. It calls for fostering informed, empowered individuals and communities.

Improving relationships with the community and the health of the community are both strongly tied to resiliency. The aftermath of Hurricane Katrina provides a strong reminder of the importance of engaging all members of a community to be prepared for emergencies. For instance, according to one study in the Annals of Emergency Medicine, 55.6 percent of individuals displaced in the aftermath of Hurricane Katrina had a chronic disease, such as hypertension, hypercholesterolemia, diabetes or pulmonary disease, which compounded the challenges of evacuation and support.[265] Similarly, during Hurricanes Gustav and Ike, 40 percent of evacuees were obese and many were unable to stay in local shelters because they were morbidly obese or on oxygen.[266] Currently, two-thirds of Americans are overweight or obese.

Experts recommend that improving resiliency, particularly among vulnerable populations, requires:

- Improving the overall health status of communities, so they are in better condition to weather and respond to emergencies, such as through initiatives and programs supported by the Public Health and Prevention Fund's Community Transformation Grants (CTGs);
- Providing clear, honest, straightforward guidance to the public;
- Health officials developing ongoing relationships with members of the community, so, when emergencies arise, they are trusted and understood; and
- Engaging members of the community directly in emergency planning efforts.

To reach diverse communities, experts also recommend information must be provided in channels beyond the Internet, such as radio and racial and ethnic publications and television, and in languages other than English. In addition, idiomatic translations are important to reach specific cultural perspectives effectively, and messages should be delivered by trusted sources, such as religious and community leaders.

RECOMMENDATIONS

TFAH recommends leveraging new opportunities created by the ACA, which includes several provisions to improve overall health of communities that support community resiliency, including:

- **The Prevention and Public Health Fund provides a $16.5 billion investment over the next 10 years for communities around the country to use for proven, effective ways to keep Americans healthier and more productive;**
- **A National Prevention Strategy which aims to improve health and reduce disease rates by ensuring health departments work with other sectors, such as housing, transportation, education and businesses, to ensure healthy choices are more widely available and accessible to Americans in their daily lives and during emergencies;**
- **As part of the Prevention Fund, CTGs, in particular, support building community coalitions to address obesity, tobacco and other public health problems, which also help forge ongoing relationships between the community and public health professionals, particularly with underserved communities.**

PREVENTION, PREPAREDNESS, THE ARMED FORCES AND TOTAL FORCE FITNESS

"Total Force Fitness is more than a physical fitness. It is the sum total of the many facets of individuals, their families, and the organizations to which they serve. It is not something someone achieves twice a year for a test. It is a state of being."[267]
— ADM Michael Mullen, (former) Chairman of the Joint Chiefs of Staff

In 2009, the Chairman of the Joint Chiefs of Staff (JCS), ADM Michael Mullen asked the Consortium for Human and Military Performance (CHAMP) to develop what has become known as Total Force Fitness (TFF) to ensure service members and their families are prepared for the rigors of war and a constant state of readiness.

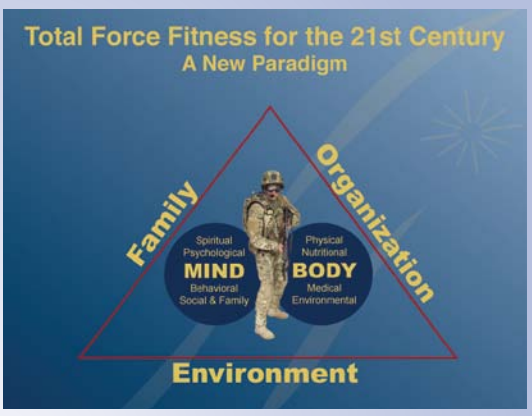
Lessons learned from the Total Force Fitness initiative can be used to help inform engagement and resiliency planning for communities around the country.

During wartime, service members are trained and forced to adapt to chaotic and life-threatening situations. When they return home, service members must maintain a state of preparedness while, at the same time, living according to the norms of a civil society. Consequently, the fitness of service members is not merely physical, it has to be holistic.

Per the Chairman's directive, CHAMP coordinated with the Samueli Institute, the Institute of Alternative Futures and members of the JCS to create a new fitness doctrine that took a holistic approach to military preparedness and the fitness and resiliency of service members. The project sought to expand the definition of health promotion and prevention and create a different model from the typical medical approach, i.e. one that is more comprehensive.

The group worked with over 70 scientists, health, social, community and spiritual leaders to define, evaluate and measure everything involved in keeping service members fit, resilient and prepared.

Ultimately, the group created a framework focused on the mind, body and the communities and environments supporting a service member. The final structure depicts the service member surrounded by family, community and environment as these impact health and resiliency. In addition, the framework found eight domains of



Total Force Fitness: 1) Physical, 2) Nutritional, 3) Medical, 4) Environmental, 5) Behavioral, 6) Psychological, 7) Spiritual and 8) Social.

As the military views it, total fitness is a state where mind and body are one: the perfect balance between readiness and well-being, where each condition supports the other. A service member who achieves total fitness is healthy, ready and resilient. Under TFF, to support service members, the military takes the preventive steps to ensure health across all fronts. For example, diet and nutrition are just as important as mental acuity and physical strength. To be completely fit, a service member must go beyond maintaining an ideal body weight to instead combine diet, nutrition and physical and mental training.

Consequently, TFF provides the foundation for how any military fitness program could be evaluated and measured. The framework includes metrics that could be used for monitoring program effectiveness and for improving and comparing programs that already exist. TFF has become a new military doctrine that builds a dialogue and strategy among everyone involved with health.

Vulnerability, Resilience and Mental Health Considerations in Disaster Planning and Response: Do Resources Match the Rhetoric?

By David Abramson, PhD, MPH and Irwin Redlener, MD, Columbia University Mailman School of Public Health

Over the past decade, policymakers, leading public health officials and scientists have acknowledged the importance of addressing mental health issues in the wake of a disaster, but the practice of disaster mental health has yet to match the rhetoric. This rhetoric, embodied in such recent policy documents as the President's policy directive on national preparedness (PPD-8, released March 30, 2011)[268] and the CDC's Public Health Emergency Preparedness Capabilities (March 2011),[269] appropriately links mental health with disaster resilience. The capacity of individuals and communities to withstand, adapt or recover quickly from emergency events and disasters is clearly related to their mental welfare both before and after a disaster. And yet the practice of disaster mental health is mired in old and generally untested thinking, still mainly focused on the identification and treatment of Post-Traumatic Stress Disorder (PTSD), using practices that are only minimally-related to an evidence base. Moreover, public health practice is often overseen by public health systems generally ill-equipped and under-funded to coordinate or provide complex mental and behavioral health services.

Mental health effects

Disasters and complex emergencies leave their mark on those exposed to them, although perhaps in ways contrary to popular belief. Responders to a disaster can certainly suffer psychological consequences, as can the populations affected by them. But in one recent comprehensive review of the disaster mental health research, the authors pointed out that severe cases of PTSD, in which survivors "re-experience" the event, may occur at most in 30 percent or fewer of the exposed population, and that generally within one to two years people have returned to a psychological "equilibrium".[270] The bigger issues noted in this seminal review are those pre-disposing factors of risk and resilience which protect individuals and communities or make them more vulnerable.

Nearly a decade ago, Norris and colleagues reviewed the research literature regarding the individual-level risk factors complicit in poor mental health outcomes following a disaster.[271] One very important finding was that the exposure to the devastating effects of a disaster were compounded by pre-disaster stressors in people's lives, such as living in blighted communities and dealing with the stresses of poverty. A household's composition made a difference as well: regardless of income, women were more susceptible to poor mental health outcomes, particularly if they were married and had children in the home. Furthermore, those individuals who had lost confidence in their ability to cope or control outcomes, or who had few social resources, were highly susceptible to mental health problems.

Community-level factors make a difference in survivors' mental health as well. Disasters can sever social networks, particularly when populations are evacuated or displaced. Disasters also undermine the capability of civic institutions to support the physical and social welfare of people in the community — hospitals and health systems, as well as social services and systems of justice. International disaster mental health providers have witnessed this time and again. When the social supports and institutions in a community unravel, the mental health of its residents plummets.[272]

Our own studies of the mental health of individuals affected by the 2005 Hurricane Katrina and the 2010 Deepwater Horizon Oil Spill have certainly reinforced these findings. Our Gulf Coast Child & Family Health Study, which followed 1,079 randomly sampled households in Louisiana and Mississippi for five years after the hurricane, revealed the long tail of mental health distress, and how much of it was due to neighborhood conditions, chronic uncertainty, and pre-disposing economic risk factors. When we first interviewed parents in 2006, over 60 percent were suffering mental health distress and disability. By the fourth time we spoke to them in 2010, things had improved — although 40 percent of them were still experiencing lingering mental health effects. And among their children, even years after the hurricane they were five times as likely as similar "non-exposed" children to be experiencing serious emotional disturbance. Over one in three children was still experiencing depression, anxiety or behavioral effects.[273] These mental health effects were far subtler than PTSD, since they reflected depression, anxiety, and complicated grief, and interfered with people's ability to recover and return to stable and productive lives.

Shortly after the rupture of the Deepwater Horizon Macando well in the Mississippi Gulf last year, we conducted town hall meetings and focus groups in communities along the Gulf Coast. Residents were clearly distressed by the environmental disaster, and even children expressed concerns for their futures and for their way of life. When we followed this with a random survey of 1,203 residents living within ten miles of the coast in Louisiana and Mississippi, we found that slightly

less than 20 percent of parents reported that their children had emotional or behavioral problems since the Oil Spill, and among those families who thought they might have to move as a result of the oil spill, over a third reported mental health problems among their children.[274]

These studies, and many others, serve to illustrate the complexity of the problem. Communities are more resilient to a disaster when they are psychologically stronger before the event occurs, yet there is little political impetus to recognize this link. After the event, mental health problems are not restricted to PTSD, can last for years after an event, and are often the consequence of household, neighborhood, and larger political forces. The solution has to extend beyond "Psychological First Aid" (PFA), the "intervention du jour" in most disaster response circles.

The disaster mental health practice environment

Although not the sole mental health intervention, PFA is one of the federal government's primary tools. Under provisions of the Stafford Act, FEMA employs the Crisis Counseling Assistance and Training Program, in consultation with SAMHSA, to fund states and localities to deliver PFA, often through the use of community health workers. As noted in a recent report to the National Biodefense Science Board, the administrative rules and constraints imposed by this program are so restrictive that some states have decided not to even apply for the funds after a disaster.[275] When deployed, these community health workers serve a critical community outreach function, although once cases have been identified there are meager or no resources available for addressing complex psychological problems. The case-finding may be good, but the follow-through treatment is often non-existent; furthermore, the Stafford Act cannot adequately pay for the treatment needed.[276] Perhaps most importantly, the "treatment" needs to be able to address the larger household and community factors that have led to the mental health problems. This requires a systems-view entirely absent from most recovery efforts — not because it's not valued, but because it's not funded.

Organizationally, the responsibility for disaster mental health efforts falls within Emergency Support Function 8, as articulated in the National Response Framework, and is squarely within the public health domain, although crisis counseling is a task designated to Emergency Support Function 6 (Mass Care, led by FEMA and the American Red Cross). Compounding the problem is that local public health has little experience overseeing or assuring networks of mental health services. According to a 2010 profile of 2,033 local health departments conducted by the National Association of City and County Health Officials (NACCHO), over 84 percent of all health departments do not offer mental health or behavioral services, nor do they oversee them.[277] And, as noted in the report to the National Biodefense Science Board, "Responders often do not know what mental and behavioral health resources and interventions are available, useful, and effective, and do not have training in principles of disaster behavioral health" (p. 6).[278] The source of the problem, the authors conclude, is that, "Federal Agencies do not have a clear understanding of State and local capabilities in disaster mental and behavioral health response (p. 10)."

The responsibility sits with public health, but it is essentially an unfunded mandate. As the country's economic crisis deepens, public health and emergency preparedness have absorbed enormous funding cuts. Over one year's time, preparedness and response funding within DHHS and DHS dropped by nearly $900 million, from $5.3 billion in FY10 to $4.4 billion in FY11, a 17 percent overall reduction. According to the NACCCHO 2010 health department survey, the average local health department receives $2 per capita within its catchment for emergency preparedness activities, and even that meager amount is being eroded. With that money, smaller health departments fund a .5 FTE to do their emergency preparedness, and the largest agencies fund an average of 4 FTE. As often occurs in public health, its mandate increases even as its budget shrinks.

Conclusion

Many challenges remain with respect to meeting the complex mental health needs of individuals and communities exposed to disasters. Perhaps most challenging — and most demanding of resources — is the capacity to reduce vulnerability and increase resilience prior to a major catastrophic event. This, of course, speaks to broader public policy issues such as poverty reduction, improved access to health care and early, effective intervention for mental health concerns long before the disaster exposure. In the current economic environment, where public spending on discretionary programs is on a clearly downward trajectory, the likelihood of substantive investments in these critical areas is virtually inconceivable.

Where does this leave us?

At the very least, we have to develop strategies that:

- maximize existing resources;
- reverse the cuts which have left the nation's public health workforce dangerously depleted and underfunded;
- ensure that interventions deployed in post-disaster public health practice are based on data-driven, evidence-influenced recommendations; and,
- remove bureaucratic barriers which have been memorialized in existing regulations or legislation (a poignant example being the service restrictions imposed by current Stafford Act provisions).

Failure to provide pro-active improvements in U.S. capacity to prevent and intervene effectively with respect to the mental health consequences of disasters will leave the nation increasingly vulnerable to the catastrophic events which are sure to appear with regularity in the years to come.

PUBLIC COMMUNICATION AND SOCIAL MEDIA USAGE DURING H1N1

Reaching diverse communities during a public health emergency requires providing information to the public via multiple channels including the Internet, social media and traditional, racial and ethnic publications and broadcast outlets.

According to the Pew Internet & American Life Project, 93 percent of 12-17 year-olds go online and 65 percent utilize a social networking platform; 87 percent of 18-32 year-olds go online and 67 percent use social media.[279] Meanwhile, older generations prefer traditional media: 56 percent of 64-72 year-olds are online and 31 percent of those older than 73 go online.[280]

During the 2009 outbreak of H1N1, while traditional media was utilized, social media played a special role in the government's response, especially because of that medium's ability to reach younger populations.[281] CDC focused on social media to ensure messages about the outbreak reached younger populations which were most at-risk during H1N1.[282] The agency also continues to use Twitter and Facebook to communicate about H1N1 and other public health information programs, and their Facebook page has more than 20,000 "fans."[283]

Going beyond communication and education, the National Institutes of Health (NIH) used Twitter to monitor the spread of the H1N1 outbreak.[284]

Increased outreach on social media and via the Internet may be necessary to reach a younger audience during a pandemic. In addition, traditional media is important when trying to reach older and poorer populations that typically do not engage in comparable rates of Internet communication.

F. COORDINATING OVERALL PREPAREDNESS AND FOOD SAFETY PREVENTION: STRATEGIC IMPLEMENTATION OF THE FDA FOOD SAFETY MODERNIZATION ACT OF 2011

In addition to the reauthorization of overall public health emergency preparedness, the FDA Food Safety Modernization Act was signed into law in 2011. The law contained many provisions to help reorient the nation's food safety system to prevent outbreaks instead of detecting problems after they already occurred.

TFAH recommends that sufficient resources and administration actions be taken to fully implement the law.

TFAH asked Erik Olson, Director of Food Programs for The Pew Charitable Trusts to provide an overview of the opportunities and challenges for implementing the new act.

EXPERT PERSPECTIVE

Food Safety: New Law Takes a Big Bite Out of the Problem, but Leaves Much on the Plate[285]

By Erik D. Olson, Director of Food Programs at The Pew Charitable Trusts

The Promise of the Food Safety Modernization Act

The FDA Food Safety Modernization Act (FSMA), a landmark law passed with broad bipartisan support in December 2010 and signed into law by President Obama on January 4, 2011, will help tackle foodborne illness by setting up a new, prevention-based safety system for the 80 percent of our food supply that is regulated by FDA. This was the first significant overhaul of FDA's food safety authorities since the Great Depression when President Franklin Roosevelt signed an update of the law in 1938. Major advances anticipated under this important new law include new national standards for the safety of produce and processed foods, stronger inspection requirements, stricter imports controls, and more muscular FDA authorities to help the agency deter practices that can cause foodborne illnesses.

However, as the late-summer 2011 outbreak of *Listeria monocytogenes* infections from Colorado cantaloupe that killed at least 28 people (with a staggering fatality rate of over 20 percent) has reminded us, substantial challenges lie ahead. For all of the crucial steps forward included in the new FSMA law, it will take many years to reverse over 100 years of accumulated neglect of the food safety system's basic infrastructure, which was designed primarily to track down the causes of illnesses and contamination problems after they have occurred. These problems have gradually manifested themselves since the original Pure Food and Drug Act of 1906 was enacted.

Remaining Concerns with Foodborne Illness

According to CDC, each year, an estimated 47 million Americans suffer from foodborne illnesses caused by pathogens — disease-causing microbes such as bacteria or viruses. These illnesses send 127,000 people to the hospital and kill approximately 3,000, CDC estimates.[286,287] In addition, according to CDC, about two to three percent of those who are stricken with the illnesses will suffer from long-term chronic complications — approximately one million Americans, many of whom were not originally hospitalized for their infection. These complications can include reactive arthritis, autoimmune thyroid disease, kidney disease, neural and neuromuscular dysfunctions, and heart and vascular disease.[288]

To more effectively reduce foodborne illnesses, FDA needs substantial additional human, scientific, and financial resources and quite honestly needs to reinvent itself — to make the shift to a prevention-based approach in order to give real life to the ambitious new food safety law. The President identified FDA's overhaul of its food safety program as a top priority, recommending an increase of $118 million dollars for Fiscal Year (FY) 2012 above the previous year's budget; these additional funds would help the agency beef up its scientific staff, expand its inspection efforts, strengthen its ability to check up on imports, and take other key steps to improve the safety of the food supply. The House of Representatives disagreed with the proposed increase, and, instead, passed an austere budget for FDA, slashing its food safety budget by $87 million compared to the previous year (FY 2011). The Senate approved a modest $40 million increase, and in the final law enacted in November, Congress approved a $39 million bump-up in FDA's food safety funding.

A wide range of stakeholders — the food industry(including the Grocery Manufacturers Association, which represents food processing companies), consumer and public health groups (including Pew and the Trust for America's Health), organizations representing the victims of foodborne illness and their families, and others — have been urging Congress to provide FDA with the resources it needs to carry out the critical components of the food safety law to enable the agency to protect the American public and reduce the scourge of foodborne illness.

Concerns with Heavy Non-Therapeutic Use of Antibiotics in Animal Agriculture

Even if the FSMA were to be fully funded, however, key food safety issues untouched by the 2011 statute include the lack of effective restrictions on antibiotic use in animal agriculture, and aging laws governing meat and poultry safety, and the use of chemicals in food. These laws should be reviewed and updated as necessary — using the latest science — to tighten the focus on preventing disease.

Of particular continuing concern is the extensive non-therapeutic use of antibiotics in animal agriculture — that is, antibiotic use to promote the animal's growth or to compensate for the effects of overcrowding or unsanitary conditions, not to treat clinically ill animals with curative doses. Such practices carry the potential to breed antibiotic-resistant bacteria, which can cause human illnesses that do not respond to the most commonly used antibiotics.[289] In one example of a serious public health problem that some experts have been warning about for years there was a large outbreak of multi-drug resistant *Salmonella* infections linked to consumption of ground turkey; as of September 29, 2011 CDC confirmed that 129 people were sickened by a *Salmonella* strain a strain that is resistant to many forms of commonly-prescribed antibiotics.[290] CDC noted that this "antibiotic resistance may be associated with an increased risk of hospitalization or possible treatment failure in infected individuals."[6]

New Law Takes a Big Bite Out of the Problem

FDA data show that 29.2 million pounds of antimicrobial active ingredients were sold for use in food-producing animals in 2010, an increase of nearly 1.3 percent from the previous year.[291] Because the agency does not publicly track comparable data for human use, it currently is not possible to determine with certainty the exact percentage of antibiotics sold for use in food animals. However, recent estimates are that approximately 70 percent of all antibiotics in the United States are used non-therapeutically in food animal production; earlier estimates were lower.[292, 293, 294]

CDC, FDA, the U.S. Department of Agriculture, the World Health Organization, and others have noted the link between the use of non-therapeutic antibiotics in animal agriculture and antibiotic-resistant pathogens that can impair the usefulness of antibiotics prescribed to treat human disease.[295, 296, 297, 298] Some representatives of the meat and poultry industry, however, contend that the problem of antibiotic resistance in humans is "overwhelmingly an issue related to human antibiotic use," rather than from the consumption of antibiotics in food animals.[299]

Concerns with Chemicals Added to Food

In addition to pathogen-related illnesses attributable to food production, processing, handling, or preparation, there are other risks posed by chemicals that are added, intentionally or not, to the food supply. Often these chemical hazards are less well characterized than the microbiological risks, which have been studied for decades.

According to a review published in a peer-reviewed journal by experts from the Pew Health Group's food additives program, more than 10,000 chemicals were allowed to be added to human food in the United States as of January 2011.[300] Of particular concern, the study found that the safety of more than 3,000 chemicals added to food has not been reviewed or evaluated by FDA. This is because under the current outdated system, food companies or trade associations are allowed to make their own determination that a chemical they want to add to the food supply is "generally recognized as safe," or "GRAS," and they need not inform FDA or the public of this determination. Moreover, this analysis found that in order to encourage food companies to voluntarily ask FDA to examine the safety of chemicals they want to add to food, FDA has moved almost exclusively to a system in which it evaluates chemicals without notifying the public or providing an opportunity for the public to comment on the chemical's safety.

In sum, under the current system, FDA is unaware of a large number of chemical uses in food and, therefore, cannot ensure that safety decisions regarding these uses were properly made.

Additionally, food manufacturers are not required to notify FDA of relevant health and safety studies, thereby placing the agency in the difficult position of tracking safety information for more than 10,000 chemicals with limited resources and information. Moreover, the agency's expedited approach to reviewing safety decisions in the past decade and a half occurs with little public engagement. Finally, Pew's research concluded FDA lacks the resources and information needed to identify and prevent potential health problems or to set priorities for systematic reevaluation of safety decisions made during the past half-century. This is a troublesome set of findings, and Pew expects to look at carefully at potential policy solutions to these and other concerns identified in its ongoing scrutiny of the FDA food additives program, and to recommend changes as needed in 2012.

The Need for Additional Reforms

The FDA Food Safety Modernization Act of 2011 and the pesticide residue provisions in the Food Quality Protection Act of 1996 have addressed some of the more serious risks posed by contaminants in food.

The newly enacted food safety law will not fulfill its promise, however, if the FDA lacks the resources to carry out its new responsibilities. The House of Representatives' originally-passed version of the food safety legislation included a measure, which did not make it into the final act, that would have established a registration fee for food facilities to help fund the FDA's food-safety activities.[301] Congress should consider establishing a similar fee through another appropriate act, to ensure that the FDA has a stable source of funding for its food safety program.

It also is important to note that the new food-safety law does not address the shortcomings in the U.S. Department of Agriculture's powers to prevent or address meat and poultry contamination. For example, a court decision handed down under the decades-old meat safety law has blocked the department from closing down meat processing plants where repeated tests have found Salmonella contamination.[302] Additionally, there is continued discussion about consolidating all federal food safety activities into a single agency: a Government Accountability Office report issued in 2011 has reiterated its previous recommendation that serious consideration be given to consolidating or restructuring the fragmented food safety system, which they found is splintered among 15 federal agencies, including USDA and FDA, implementing 30 laws.[303]

Moreover, the FDA's science and risk analysis are in need of modernization and additional resources; FDA's Science Board found that the "agency suffers from serious scientific deficiencies and is not positioned to meet current or emerging regulatory responsibilities" because the demands on the FDA have soared in recent years, and the resources have not increased in proportion to the demands.[304] The agency's oversight of food additives—especially the procedures for substances that are generally recognized as safe—in particular needs closer scrutiny, as the Government Accountability Office recommended.[305] Issues that have been proposed for evaluation include whether there is a need for regular reevaluations of current research on the risks posed by all substances added to food, and for establishing a an open and publicly transparent system to evaluate all risks in assessing the safety of these compounds.

Legislative or administrative actions should be considered to prevent problematic nontherapeutic uses of antibiotics in animal agriculture, to reduce the risk of creating and spreading antibiotic-resistant "superbugs." Bills to mandate such reform were introduced in Congress in 2009 and reintroduced in 2011, but they have not moved beyond the hearing stage.[306, 307, 308] FDA has proposed a voluntary guidance document intended to encourage the judicious use of antibiotics in food-producing animals, but has not yet finalized it.[309] Completion of a strong guidance could be a helpful first step, but ultimately, mandatory requirements are needed.

Finally, measures that prevent the tainting of food by environmental contaminants, such as untreated sewage or manure that enter waters and pollute crops downstream, and requirements to strengthen controls on air and water discharges of mercury and other common pollutants that are widely found in the food supply would help to reduce the health risks to the American public.

In the end, while the new 2011 food safety law will update and strengthen portions of the nation's food- safety net, there remain significant gaps. America's food safety infrastructure must take advantage of rapidly-developing scientific knowledge, meet the ever-growing needs for scientific capacity and other resources at FDA, address emerging pathogens and other newly-recognized health risks, and keep up with the constantly-morphing global food industry. We must review and, as necessary, update our mid-20th Century food laws and programs, to ensure that they are preventing 21st Century threats to public health.

APPENDIX A: CDC AND ASPR PREPAREDNESS GRANTS BY STATE

ALL-HAZARDS PREPAREDNESS FUNDING BY SOURCE AND YEAR								
FY 2010				FY 2011				% Change FY 10 - FY 11
State	CDC	ASPR	Total	State	CDC	ASPR	Total	
Alabama	$10,048,584	$5,959,171	$16,007,755	Alabama	$8,633,983	$5,386,508	$14,020,491	-12.4%
Alaska	$5,165,000	$1,295,371	$6,460,371	Alaska	$5,177,600	$1,211,937	$6,389,537	-1.1%
Arizona	$14,047,671	$7,819,583	$21,867,254	Arizona	$11,894,861	$7,051,765	$18,946,626	-13.4%
Arkansas	$7,393,805	$3,836,580	$11,230,385	Arkansas	$6,469,981	$3,486,575	$9,956,556	-11.3%
California	$49,301,738	$31,967,442	$81,269,180	California	$41,661,534	$28,666,533	$70,328,067	-13.5%
Colorado	$10,875,195	$6,142,385	$17,017,580	Colorado	$9,397,930	$5,550,503	$14,948,433	-12.2%
Connecticut	$8,719,806	$4,660,301	$13,380,107	Connecticut	$7,553,479	$4,223,889	$11,777,368	-12.0%
Delaware	$5,150,000	$1,513,099	$6,663,099	Delaware	$5,422,932	$1,406,825	$6,829,757	2.5%
D.C.	$6,616,482	$1,682,835	$8,299,317	D.C.	$6,730,903	$1,558,756	$8,289,659	-0.1%
Florida	$33,481,834	$21,973,177	$55,455,011	Florida	$27,687,829	$19,720,658	$47,408,487	-14.5%
Georgia	$18,481,819	$11,615,246	$30,097,065	Georgia	$15,653,814	$10,449,266	$26,103,080	-13.3%
Hawaii	$5,249,782	$2,025,920	$7,275,702	Hawaii	$5,260,290	$1,865,852	$7,126,142	-2.1%
Idaho	$5,495,096	$2,240,733	$7,735,829	Idaho	$5,181,907	$2,058,131	$7,240,038	-6.4%
Illinois	$19,496,622	$12,357,745	$31,854,367	Illinois	$16,845,953	$11,113,877	$27,959,830	-12.2%
Indiana	$12,995,857	$7,994,316	$20,990,173	Indiana	$11,146,909	$7,208,168	$18,355,077	-12.6%
Iowa	$7,565,448	$4,039,814	$11,605,262	Iowa	$6,595,869	$3,668,490	$10,264,359	-11.6%
Kansas	$7,530,021	$3,781,030	$11,311,051	Kansas	$6,595,020	$3,436,853	$10,031,873	-11.3%
Kentucky	$9,455,848	$5,492,721	$14,948,569	Kentucky	$8,275,695	$4,968,989	$13,244,684	-11.4%
Louisiana	$9,999,458	$5,589,694	$15,589,152	Louisiana	$8,632,297	$5,055,790	$13,688,087	-12.2%
Maine	$5,259,067	$2,068,743	$7,327,810	Maine	$5,206,160	$1,904,184	$7,110,344	-3.0%
Maryland	$12,720,551	$7,166,017	$19,886,568	Maryland	$11,057,196	$6,466,757	$17,523,953	-11.9%
Massachusetts	$15,229,770	$8,141,119	$23,370,889	Massachusetts	$13,459,602	$7,339,572	$20,799,174	-11.0%
Michigan	$20,143,034	$12,483,796	$32,626,830	Michigan	$16,543,509	$11,226,706	$27,770,215	-14.9%
Minnesota	$12,911,644	$6,633,486	$19,545,130	Minnesota	$10,842,711	$5,990,088	$16,832,799	-13.9%
Mississippi	$7,527,286	$3,954,888	$11,482,174	Mississippi	$6,565,242	$3,592,473	$10,157,715	-11.5%
Missouri	$12,572,343	$7,435,455	$20,007,798	Missouri	$10,717,722	$6,707,932	$17,425,654	-12.9%
Montana	$5,166,198	$1,621,303	$6,787,501	Montana	$5,178,911	$1,503,679	$6,682,590	-1.5%
Nebraska	$5,876,388	$2,599,056	$8,475,444	Nebraska	$5,234,954	$2,378,867	$7,613,821	-10.2%
Nevada	$7,511,623	$3,462,259	$10,973,882	Nevada	$6,585,802	$3,151,521	$9,737,323	-11.3%
New Hampshire	$5,349,356	$2,060,815	$7,410,171	New Hampshire	$5,398,877	$1,897,087	$7,295,964	-1.5%
New Jersey	$18,015,661	$10,856,284	$28,871,945	New Jersey	$16,184,853	$9,769,919	$25,954,772	-10.1%
New Mexico	$7,643,606	$2,820,161	$10,463,767	New Mexico	$6,526,120	$2,576,778	$9,102,898	-13.0%
New York	$22,932,149	$13,666,210	$36,598,359	New York	$19,284,669	$12,285,085	$31,569,754	-13.7%
North Carolina	$16,552,440	$11,012,906	$27,565,346	North Carolina	$14,020,450	$9,910,111	$23,930,561	-13.2%
North Dakota	$5,021,860	$1,254,791	$6,276,651	North Dakota	$5,180,405	$1,175,614	$6,356,019	1.3%
Ohio	$20,947,527	$14,124,698	$35,072,225	Ohio	$17,618,925	$12,695,478	$30,314,403	-13.6%
Oklahoma	$8,487,239	$4,748,620	$13,235,859	Oklahoma	$7,509,542	$4,302,943	$11,812,485	-10.8%
Oregon	$8,871,324	$4,892,898	$13,764,222	Oregon	$7,829,790	$4,432,087	$12,261,877	-10.9%
Pennsylvania	$22,808,671	$15,267,347	$38,076,018	Pennsylvania	$19,774,638	$13,718,265	$33,492,903	-12.0%
Rhode Island	$5,150,000	$1,767,281	$6,917,281	Rhode Island	$5,302,058	$1,634,345	$6,936,403	0.3%
South Carolina	$11,034,653	$5,629,437	$16,664,090	South Carolina	$9,308,851	$5,091,363	$14,400,214	-13.6%
South Dakota	$5,150,000	$1,428,159	$6,578,159	South Dakota	$5,169,600	$1,330,796	$6,500,396	-1.2%
Tennessee	$12,711,428	$7,668,219	$20,379,647	Tennessee	$10,845,628	$6,916,279	$17,761,907	-12.8%
Texas	$43,194,539	$28,404,362	$71,598,901	Texas	$37,545,665	$25,477,218	$63,022,883	-12.0%
Utah	$7,328,511	$3,526,992	$10,855,503	Utah	$6,464,082	$3,209,463	$9,673,545	-10.9%
Vermont	$5,193,078	$1,240,595	$6,433,673	Vermont	$5,192,031	$1,162,908	$6,354,939	-1.2%
Virginia	$17,063,098	$9,572,306	$26,635,404	Virginia	$14,483,987	$8,620,629	$23,104,616	-13.3%
Washington	$13,731,541	$8,091,982	$21,823,523	Washington	$11,711,066	$7,295,589	$19,006,655	-12.9%
West Virginia	$5,898,188	$2,658,572	$8,556,760	West Virginia	$5,336,731	$2,432,140	$7,768,871	-9.2%
Wisconsin	$13,276,438	$7,095,720	$20,372,158	Wisconsin	$11,235,615	$6,403,834	$17,639,449	-13.4%
Wyoming	$5,000,000	$1,111,323	$6,111,323	Wyoming	$5,169,600	$1,047,196	$6,216,796	1.7%
	CDC Total FY 10**	ASPR* Total FY 10**	Grand Total FY 10**		CDC Total FY 11**	ASPR* Total FY 11**	Grand Total FY 11**	Grand Total Percent Change FY 10 - FY 11
	$633,349,277	$356,452,963	$989,802,240		$553,303,778	$321,736,271	$875,040,049	-11.6%

* Note that state CDC total funding include funding for Cities Readiness Initiative funding, Level 1 chemical laboratory funding, EWIDS funding and Risk funding although not every state receives funding in all of these supplemental categories.**Note that totals do not include funds for three major U.S. metropolitan areas, Chicago, L.A. County, and New York City, U.S. Territories, such as Puerto Rico and Guam, and Freely Associated States of the Pacific, such as the Marshall Islands.

Source: FY2011 Funding 1) CDC. Public Health Emergency Preparedness Cooperative Agreement Budget Period 11 (FY 2011) Funding. <http://www.cdc.gov/phpr/documents/FundingTable_FY_2011.pdf> (accessed September 8, 2011). 2) HHS.gov. HHS Grants Boost Disaster Preparedness in Hospitals, Health Care Systems. News Release, July 1, 2011. <http://www.hhs.gov/news/press/2011pres/07/20110701a.html> FY2010 Funding 1) CDC. Public Health Emergency Preparedness Cooperative Agreement Budget Period 10 Extension (FY 2010) Funding. <http://www.bt.cdc.gov/cdcpreparedness/coopagreement/10/Revised_PHEP_BP10_Extension_Funding_Table_Aug2010.pdf> (accessed October 14, 2010). 2) HHS.gov. HHS Provides $390.5 Million to Improve Hospital Preparedness and Emergency Response. News Release, July 7, 2010. <http://www.hhs.gov/news/press/2010pres/07/20100707h.html> (accessed July 8, 2010.)

APPENDIX B: DATA AND METHODOLOGY FOR STATE PUBLIC HEALTH BUDGETS

TFAH conducted an analysis of state spending on public health for the last budget cycle, fiscal year 2010-2011. For those states that only report their budgets in biennium cycles, the 2009-2011 period (or the 2010-2012 and 2010-2011 for Virginia and Wyoming respectively) was used, and the percent change was calculated from the last biennium, 2007-2009 (or 2008-2010 and 2009-2010 for Virginia and Wyoming respectively).

This analysis was conducted from August to October of 2011 using publicly available budget documents through state government web sites. Based on what was made publicly available, budget documents used included either executive budget document that listed actual expenditures, estimated expenditures, or final appropriations; appropriations bills enacted by the state's legislature; or documents from legislative analysis offices.

"Public health" is defined to broadly include all health spending with the exception of Medicaid, CHIP, or comparable health coverage programs for low-income residents. Federal funds, mental health funds, addiction or substance abuse-related funds, WIC funds, services related to developmental disabilities or severely disabled persons, and state-sponsored pharmaceutical programs also were not included in order to make the state-by-state comparison more accurate since many states receive federal money for these particular programs. In a few cases, state budget documents did not allow these programs, or other similar human services, to be disaggregated; these exceptions are noted. For most states, all state funding, regardless of general revenue or other state funds (e.g. dedicated revenue, fee revenue, etc.), was used. In some cases, only general revenue funds were used in order to separate out federal funds; these exceptions are also noted.

Because each state allocates and reports its budget in a unique way, comparisons across states are difficult. This methodology may exclude programs that, in come cases, the state may consider a public health function, but the methodology used was selected to maximize the ability to be consistent across states. As a result, there may be programs or items states may wish to be considered "public health" that may not be included in order to maintain the comparative value of the data.

Finally, to improve the comparability of the budget data between FY 2009-2010 and FY 2010-2011 (or between biennium), TFAH adjusted the FY 2010-2011 numbers for inflation (using a 0.9652 conversion factor based on the U.S. Dept. of Labor Bureau of Labor Statistics; Consumer Price Index Inflation Calculator at http://www.bls.gov/cpi/).

After compiling the results from this online review of state budget documents, TFAH coordinated with the Association of State and Territorial Health Officials (ASTHO) to confirm the findings with each state health official. ASTHO sent out emails on October 26, 2011 and state health officials were asked to confirm or correct the data with TFAH staff by November 11, 2011. ASTHO followed up via email with those state health officials who did not respond by the November 11, 2011 deadline and were given until November 18, 2011 to respond. The states that did not reply by that date were assumed to be in accordance with the findings.

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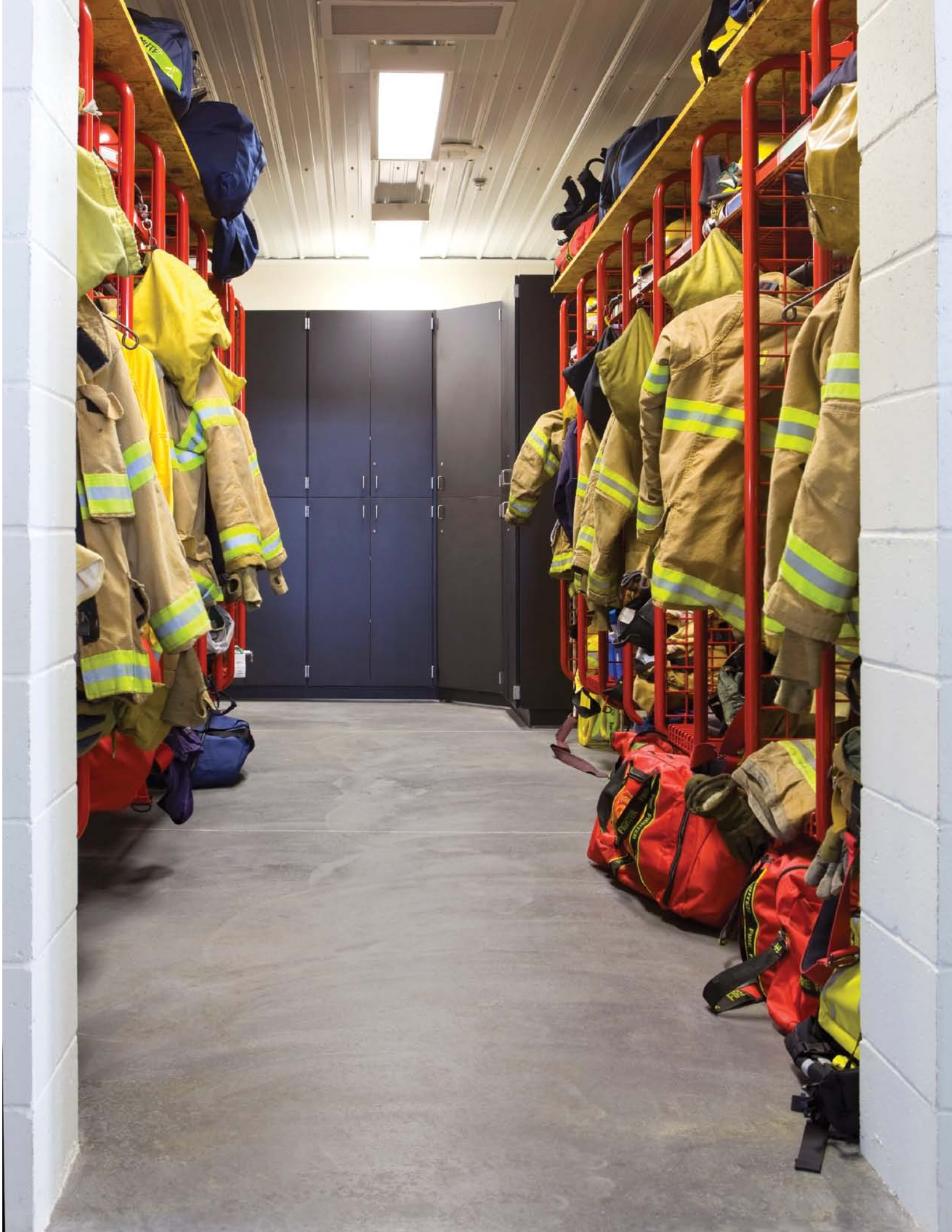

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