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RESEARCH PRIORITIES IN EMERGENCY
PREPAREDNESS AND RESPONSE FOR
PUBLIC HEALTH SYSTEMS:
A LETTER REPORT

Bruce M. Altevogt
Andrew M. Pope
Martha N. Hill
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editors

2008

Research Priorities in Emergency Preparedness and Response for Public Health Systems

A Letter Report

Committee on Research Priorities in Emergency
Preparedness and Response for Public Health Systems

Board on Health Sciences Policy

Bruce M. Altevogt, Andrew M. Pope, Martha N. Hill,
and Kenneth I. Shine, *Editors*

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*"Knowing is not enough; we must apply.
Willing is not enough; we must do."*
—Goethe

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INDEPENDENT REPORT REVIEWERS

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the NRC's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their review of this report:

Edward Baker, University of North Carolina School of Public Health

Frederick M. Burkle, Jr., Johns Hopkins University Medical Institutions, and Harvard School of Public Health

Bruce Calonge, Colorado Department of Public Health and Environment

Linda C. Degutis, Yale Center for Public Health Preparedness and Yale University Section of Emergency Medicine

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Judith Monroe, Indiana State Department of Health

Eric K. Noji, The Pentagon
Peter Sandman, Risk Communication Consultant

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations nor did they see the final draft of the letter report before its release. The review of this letter report was overseen by **Don Detmer,** American Medical Informatics Association, and **David R. Challoner,** University of Florida. Appointed by the National Research Council and Institute of Medicine, they were responsible for making certain that an independent examination of this letter report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this letter report rests entirely with the authoring committee and the institution.

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INSTITUTE OF MEDICINE
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Committee on Research Priorities in Emergency Preparedness
and Response for Public Health Systems

January 22, 2008

Richard Besser, M.D.
Director
Coordinating Office for Terrorism Preparedness
    and Emergency Response
Centers for Disease Control and Prevention
1600 Clifton Road, NE
Atlanta, GA 30333

Dear Dr. Besser:

On behalf of the Institute of Medicine (IOM) Committee on Research
Priorities in Emergency Preparedness and Response for Public Health
Systems, we are pleased to report our conclusions and recommendations.
As requested, the report delineates a set of near-term research priorities
for emergency preparedness and response in public health systems that
are relevant to the specific expertise resident at schools of public health
and related fields. We understand that these priorities will be used by the
Coordinating Office for Terrorism Preparedness and Emergency Re-
sponse (COTPER) to develop research funding opportunity announce-
ments that must be issued and filled, according to congressional mandate,
during the 2008 fiscal year.

As described in the committee's statement of task, the committee consid-
ered areas of interest specifically articulated in the Centers for Disease
Control's (CDC's) *Advancing the Nation's Health: A Guide for Public
Health Research Needs, 2006–2015*, with special attention given to:

- Protecting vulnerable populations in emergencies (improving the
  identification of health vulnerability and evaluating interventions
  to lessen the risk of poor health outcomes);
- Strengthening response systems (developing and evaluating inte-
  grated systems of emergency public health services and incident
  management);

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- Preparing the public health workforce (developing and evaluating strategies and tools to train and exercise the public health workforce to meet responsibilities for detection, mitigation, and recovery in varied settings and populations);
- Improving timely emergency communications (evaluating characteristics of effective risk communication in emergency settings and system enhancements to improve effective information exchange across diverse partners and populations under emergency conditions); and
- Improving information management to increase use (scenario modeling and forecasting; information and knowledge management tools to improve the availability and usefulness during crisis decision making).

The committee conducted a public meeting and workshop (December 18–20, 2007), with invited experts giving their views on research priorities in emergency preparedness and response for public health systems. Based on the committee's expert judgment, as well as information exchanged in the public meeting and workshop, we identified four top-priority research areas.

The committee recommends that COTPER give priority to the following four areas of research in its upcoming funding solicitation for Centers for Public Health Preparedness (CPHPs):

> **Recommendation 1: Enhance the Usefulness of Training**
> CPHPs should conduct research that will create best practices for the design and implementation of training (e.g. simulations, drills, and exercises) and facilitate the translation of their results into improvements in public health preparedness.

> **Recommendation 2: Improve Communications in Preparedness and Response**
> CPHPs should conduct research that will identify and develop communications in relation to preparedness and response that effectively exchange vital and accurate information in a timely manner with diverse audiences.

Recommendation 3: Create and Maintain Sustainable Preparedness and Response Systems
CPHPs should conduct research that will identify the factors that affect a community's ability to successfully respond to a crisis with public health consequences, and the systems and infrastructure needed to foster constructive responses in a sustainable manner.

Recommendation 4: Generate Criteria and Metrics to Measure Effectiveness and Efficiency
CPHPs should conduct research that will generate criteria for evaluating public health emergency preparedness, response, and recovery and metrics for measuring their efficiency and effectiveness.

The committee acknowledges that—and indeed intends for—these areas to generate overlapping research initiatives. All research projects conducted under this initiative should address or be aware of issues regarding vulnerable populations, workforce, behavioral health, and the use and integration of new technologies as appropriate to the proposed area of study. In addition, research that is conducted in all of these areas needs to be translational—designed to result in practical, applicable, and sustainable outcomes that produce a more robust public health system for preparedness. Finally, research must be both multidisciplinary and crossdisciplinary. Centers should be strongly encouraged to seek collaboration and integration with expertise that may be outside the traditional arena of schools of public health. For example, disciplines may include social and behavioral sciences, engineering, economics, ethics, business, and law, for example.

The committee also acknowledges that the priority area on creating criteria and metrics to measure effectiveness and efficiency is a particularly challenging one and overlaps with the other three research needs. It is included as a separate research priority because of its central importance to the production of sound evidence regarding the state of public health preparedness. The committee discussed the importance of creating criteria for public health preparedness that would resemble the approach taken to describe the health-care delivery system in the 2001 IOM report *Crossing the Quality Chasm* report (IOM, 2001). Decisions about workforce needs, technology, and other resources depend critically on the re-

liable and valid evaluation of public health preparedness systems. Thus there is a need for specific endeavors that focus on research and development of well-defined measures for use in the assessment of public health preparedness systems.

The committee wishes to thank you for the opportunity to be of assistance to the Centers for Disease Control and Prevention and its Coordinating Office for Terrorism Emergency Preparedness and Response as they work to protect the nation's health.

Kenneth I. Shine, M.D., *Chair*
Martha N. Hill, Ph.D., R.N., *Vice Chair*
Committee on Research Priorities in Emergency Preparedness
and Response for Public Health Systems

BACKGROUND

In response to the *Pandemic and All Hazards Preparedness Act (PAHPA)* (Public Law 109–417, 2006, § 101 et seq.) there is an immediate and critical need to define research priorities for the Centers for Public Health Preparedness (CPHP) at schools of public health. The Coordinating Office for Terrorism Preparedness and Emergency Response (COTPER) of the Centers for Disease Control and Prevention (CDC) charged the Institute of Medicine (IOM) committee responsible for this study with the task of delineating a set of near-term research priorities for emergency preparedness and response in public health systems relevant to the expertise resident at schools of public health and related fields (Box 1). These priorities will be used by COTPER to help develop a research agenda that will be used to inform research funding opportunity announcements for an enhanced CPHP program. This letter report is not intended to obviate or substitute the need for a broader research agenda, but is focused on articulating near-term research priorities for public health systems research.

In accord with PAHPA, the research agenda, funding opportunity announcements, and initial funding must be completed by the end of fiscal year 2008. As a framework for their deliberations, the committee's statement of task required that they consider the areas of interest articulated in the CDC's *Advancing the Nation's Health: A Guide for Public Health Research Needs, 2006–2015* (CDC, 2006), with special attention given to

- protecting vulnerable populations in emergencies;
- strengthening response systems;
- preparing the public health workforce;
- improving timely emergency communications; and
- improving information management to increase use.

COTPER requested that the identified research priorities focus on an all-hazards approach and not agent-specific activities. Furthermore, it asked that the committee consider other federal preparedness frameworks—such as applicable Homeland Security Presidential Directives; the President's National Science and Technology Council, Subcommittee on Disaster Reduction; Department of Health and Human Services (DHHS) guidelines and policies; the CDC's *Advancing the Nation's*

BOX 1

Statement of Task

In response to a request from the Centers for Disease Control and Prevention's (CDC's) Coordinating Office for Terrorism Preparedness and Emergency Response (COTPER), the Institute of Medicine will convene an ad hoc committee to conduct a fast-track study and issue a letter report to the director of COTPER. The report will delineate a set of near-term research priorities for emergency preparedness and response in public health systems that are relevant to the specific expertise resident at schools of public health. These priorities will be used by COTPER to develop research funding announcements and requests for applications that must be issued and filled, according to congressional mandate, during the 2008 fiscal year. The committee will be responsible for identifying appropriate research opportunities and a list of three to five top-priority research areas, each of which may also include related short-term research opportunities-all with measurable outcomes and impact over the next 3 to 5 years. As a framework for deliberations, the committee will consider areas of interest specifically articulated in the CDC's *Advancing the Nation's Health: A Guide for Public Health Research Needs, 2006-2015,* with special attention given to

- protecting vulnerable populations in emergencies (improving the identification of health vulnerability and evaluating interventions to lessen the risk of poor health outcomes);
- strengthening response systems (developing and evaluating strategies and tools to train and exercise the public health workforce to meet responsibilities for detection, mitigation, and recovery in varied settings and populations);
- preparing the public health workforce (developing and evaluating strategies and tools to train and exercise the public health workforce to meet responsibilities for detection, mitigation, and recovery in varied settings and populations);
- improving timely emergency communications (evaluating characteristics of effective risk communication in emergency settings and system enhancements to improve effective information exchange across diverse partners and populations under emergency conditions); and
- improving information management to increase use (scenario modeling and forecasting; information and knowledge management tools to improve the availability and usefulness during crisis decision making).

The identified research priorities for public health systems should not focus on agent-specific research questions such as development of high-throughput diagnostic tests or medical countermeasures.

Health guide for research, preparedness goals and objectives, and relevant Department of Homeland Security programs—to focus on research and development that advances capabilities of the CDC/DHHS mission in public health preparedness systems.

Origin of the CDC-Funded
Centers for Public Health Preparedness

The CPHPs originated in 1999, when former CDC Director Dr. Jeffrey Koplan instructed the then-Public Health Practice Program Office to develop an agency-wide plan to address the CDC's training and continuing education needs.[1] The plan was to establish a cohesive, integrated approach to training that focused on the domestic public health workforce, a group that was found to have little formal training in public health, particularly in bioterrorism. This led to the establishment of CPHPs, whose purpose was to leverage existing expertise and educational materials developed by academic public health institutions and create linkages to public health practice (Council on Linkages between Academia and Public Health Practice, 2000).

In December 2007, 27 CPHPs were located within accredited schools of public health (CDC, 2007). A June 2004 Cooperative Agreement announcement, which was used as a funding mechanism for the Centers, listed three major goals for them:

1. Strengthen public health workforce readiness through implementation of programs for life-long learning.
2. Strengthen capacity at state and local levels for terrorism preparedness and emergency public health response.
3. Develop a network of academic-based programs that contribute to national terrorism preparedness and emergency response capacity by sharing expertise and resources across state and local jurisdictions (69 C.F.R. 30927, et seq.).

However, in response to the PAHPA legislation, the CPHP program is undergoing a change in emphasis. The legislation requires that accred-

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[1]Personal communication, L. Biesiadecki, Association of Schools of Public Health, December 17, 2007.

ited schools of public health that wish to receive funding to establish a center must perform work in one of three areas:[2]

1. Development, implementation, and dissemination of competency-based programs to train public health practitioners, integrating and emphasizing "essential public health security capabilities"
2. Evaluation of the public health preparedness and response needs of the school's community and development (if necessary) and dissemination of relevant education materials as well as evaluation of the effectiveness of new training and materials
3. Public health systems research that is consistent with an agenda to be developed by the Secretary of DHHS (Public Law 109–417; 120 STAT. 2861)

The first two areas of work are consonant with Centers' duties prescribed in the earlier Cooperative Agreements. However, the third—the public health systems research requirement—is new. Legislators realized that the Act "reflected new priorities in public health preparedness" (U.S. Senate, 2006, p. 5) and inserted this narrative into the report accompanying it:

> The committee finds that public health systems research is a priority because there has been tremendous financial investment made to date for public health preparedness with no evidence-based measures for evaluating progress or preparedness. Over time, this research will contribute sufficiently to the knowledge base to further develop benchmarks and standards (pp. 16–17).

The reference to this new area of focus, public health systems for preparedness, provides the impetus for the subsequent findings and recommendations.

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[2]The committee was informed by COTPER that the CDC has interpreted the congressional intent in this manner; that is, to have separate centers focusing on research on public health systems or the other two areas. However, in testimony received by the committee, it was stated that some individuals outside COTPER and the CDC believe the intent of Congress was to expand the mission of the CPHPs to include a focus on all three areas, not just one.

METHODS

To conduct this expert assessment and identify a set of research priorities, the committee met from December 18 through 21, 2007. This meeting was held in conjunction with a day-and-a-half long public meeting and workshop (see Appendix B). (Note: Some workshop speakers used slides in their presentations. Slides are available at http://www.iom.edu/PHSRpriorities.) The purpose of the workshop was to hear from experts about the importance, feasibility, and "ripeness" of areas of interest, focusing on broad, integrative research needs that would be helpful in creating successful systems for preparedness and response and then evaluating them. In addition, the committee also heard from relevant stakeholder organizations, including federal agencies and representatives from the key components of the public health system, to inform the committee about relevant ongoing and planned initiatives. This letter report is based on the committee's expert judgment and assessment of research priorities in emergency preparedness and response for public health systems.

Definitions

Public Health Emergency Preparedness

Before identifying research priorities in emergency preparedness and response for public health systems, the committee believed that it was necessary to establish a definition of "public health emergency preparedness." It chose to adopt the definition proposed by Nelson and colleagues in a 2007 editorial in the *American Journal of Public Health*:

> Public health emergency preparedness (PHEP) is the capability of the public health and health-care systems, communities, and individuals to prevent, protect against, quickly respond to, and recover from health emergencies, particularly those whose scale, timing, or unpredictability threatens to overwhelm routine capabilities. Preparedness involves a coordinated and continuous process of planning and implementation that relies on measuring performance and taking corrective action (Nelson et al., 2007, p. S9).

The committee recognizes that public health emergency preparedness, response, and recovery takes place in the context of scalable local, state, tribal, and federal response systems composed of traditional emergency response agencies, public safety agencies, and other governmental and nongovernmental organizations. Moreover, it recognizes that effective response requires that particular attention be paid to interfaces among these many interconnected response systems. The committee also referred to the key elements of preparedness described in Nelson et al. (2007) (see Box 2). Thus, for the purposes of this report, the committee uses the term "preparedness" to include the full breadth of preparedness-related activities, that is, the activities that range from prevention to recovery that are performed by all relevant organizations, including the many levels of governmental and community organizations.

Public Health and Public Health System

Considering preparedness in the context of the entirety of the public health system (as is required by the committee's charge to identify research priorities for preparedness and response in public health systems) also requires the definitions of "public health" and a "public health system." To that end, the committee adopted the definition of public health from the landmark 1988 IOM report *The Future of Public Health*, which defined public health as "what we, as a society, do collectively to assure the conditions in which people can be healthy" (IOM, 1988, p. 1). The 2002 IOM report *The Future of the Public's Health in the 21st Century* describes the concept of a "public health system" as "a complex network of individuals and organizations that have the potential to play critical roles in creating the conditions for health" (IOM, 2002, p. 28). It also lists various factors in a public health system, and explains that they can both act individually and together to affect health. Figure 1 illustrates these factors, which include communities, health-care delivery systems, employers and business, the media, homeland security and public safety, academia, and the governmental public health infrastructure. As highlighted in the 2002 IOM report, there are other less obvious actors that can play a significant role "by influencing and even generating the multiple determinants of health" (IOM, 2002). Included in this perspective are not only the individual and organizational participants, but also the relevant critical infrastructures that are associated with each. Although

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BOX 2
Key Elements of Preparedness, as Defined by Nelson et al. (2007)

A prepared community is one that develops, maintains, and uses a realistic preparedness plan that is integrated with routine practices and has the following components:

Preplanned and coordinated rapid-response capability
1. *Health risk assessment*. Identify the hazards and vulnerabilities (e.g., community health assessment, populations at risk, high-hazard industries, physical structures of importance) that will form the basis of planning.
2. *Legal climate*. Identify and address issues concerning legal authority and liability barriers to effectively monitor, prevent, or respond to a public health emergency.
3. *Roles and responsibilities*. Clearly define, assign, and test responsibilities in all sectors, at all levels of government, and with all individuals, and ensure each group's integration.
4. *Incident Command System (ICS)*. Develop, test, and improve decision making and response capability using an integrated ICS at all response levels.
5. *Public engagement*. Educate, engage, and mobilize the public to be full and active participants in public health emergency preparedness.
6. *Epidemiology functions*. Maintain and improve the systems to monitor, detect, and investigate potential hazards, particularly those that are environmental, radiological, toxic, or infectious.
7. *Laboratory functions*. Maintain and improve the systems to test for potential hazards, particularly those that are environmental, radiological, toxic, or infectious.
8. *Countermeasures and mitigation strategies*. Develop, test, and improve community mitigation strategies (e.g., isolation and quarantine, social distancing) and countermeasure distribution strategies when appropriate.
9. *Mass health-care*. Develop, test, and improve the capability to provide mass health-care services.
10. *Public information and communication*. Develop, practice, and improve the capability to rapidly provide accurate and credible information to the public in culturally appropriate ways.
11. *Robust supply chain*. Identify critical resources for public health emergency response and practice and improve the ability to deliver these resources throughout the supply chain.

Expert and fully staffed workforce
1. *Operations-ready workers and volunteers*. Develop and maintain a public health and health-care workforce that has the skills and capabilities to perform optimally in a public health emergency.
2. *Leadership*. Train, recruit, and develop public health leaders (e.g., to mobilize resources, engage the community, develop interagency relationships, and communicate with the public).

Accountability and quality improvement
1. *Testing operational capabilities*. Practice, review, report on, and improve public health emergency preparedness by regularly using real public health events, supplemented with drills and exercises when appropriate.
2. *Performance management*. Implement a performance management and accountability system.
3. *Financial tracking*. Develop, test, and improve charge capture,[a] accounting, and other financial systems to track resources and ensure adequate and timely reimbursement.

[a]Charge capture systems collect and analyze charges for medical care.
SOURCE: Reprinted with permission from Nelson et al., 2007, p. S10.
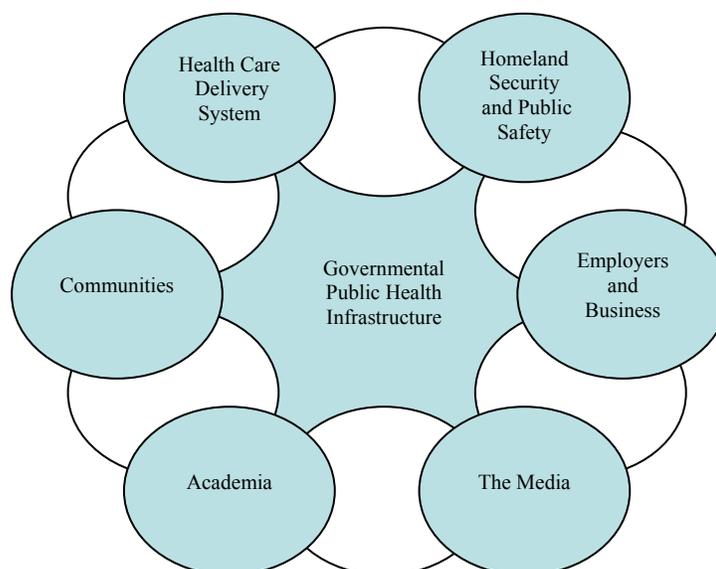
FIGURE 1 Public health emergency preparedness system.
SOURCE: Modified from the *Future of Public Health in the 21st Century,* the shaded ovals represent the key actors who can work individually or together as part of a public health system to create the conditions necessary for public health emergency preparedness, response, and recovery. While each of these actors is a separate entity, a robust public health system for preparedness requires that each work together when appropriate. The unshaded ovals represent the necessary overlap between the key actors as well as the many less obvious actors that play a significant role in integrating the public health preparedness system (adapted from IOM, 2002b, Figure 1-2, p. 30).

these factors have independent functions, their integration, coordination, and partnerships result in a public health system that can prevent, protect against, quickly respond to, and recover from public health emergencies.[3] In addition, although all parties share responsibility for the integration and coordination of community resources, the final accountable entity for resource integration is the local, state, tribal, and federal governmental public health infrastructure.

Together, these definitions, concepts, and elements provide the framework that the committee used in its deliberations to identify research priorities for emergency preparedness and response in public health systems.

FINDINGS

The organization and operations of effective systems of public health preparedness need to be constituted to cope with a wide range of threats—the all-hazards approach—including catastrophic health events. As discussed earlier these systems need to include state, local, tribal, and federal public health agencies; practitioners from emergency response and health-care systems; communities, homeland security and public safety, health-care delivery systems, employers and business, the media, academia, and individual citizens. Effective response requires that particular attention be paid to interfaces between these many interconnected systems. Broad integrated systems are needed to prevent, protect against, quickly respond to, and recover from public health emergencies. Public health emergencies will vary in scale, timing, predictability, and the potential to overwhelm routine capabilities and to disrupt the provision of daily life and health-care services.

Research on such systems will require the participation of experts traditionally represented in schools of public health as well as many other relevant disciplines, such as social and behavioral sciences, engineering, law, business, economics, communications and the media, ethics, and health professional expertise. The public health preparedness system requires a sufficiently large infrastructure to support a multi-

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[3]"Public health emergencies" have been defined by Burkle (2007) as those "that adversely impact the public health system and/or its protective infrastructure (i.e., water, sanitation, shelter, food, and health), resulting in both direct and indirect consequences to the health of a population, and occur when this protective threshold is absent, destroyed, overwhelmed, not recovered or maintained, or denied to populations."

agency, multi-professional, coordinated, and continuous process of planning, drilling and exercising against indicators and metrics, and implementing and testing improvements. Therefore, although PAHPA requires that CPHPs be established within accredited schools of public health, in delineating its recommendations, the committee recognizes the need to integrate additional areas of expertise from the public health system as well as other relevant areas of expertise that may not traditionally be represented in accredited schools of public health.

The CDC research agenda for CPHPs needs to support studies of public health systems that address questions whose answers directly impact "on the ground" efforts to protect, improve, and sustain health outcomes and generate results that are generalizable. The design and conduct of research programs needs to include input from communities and public health system service providers, particularly those in government. While the charge to this committee focuses upon research that will produce results in the near-term, over a 3- to 5-year period, it is understood that some important research questions can be answered only by longer and larger studies of broader scope than those contemplated by the funding available for the current programs.

After considering the information presented during the public meeting and workshop and based on its expert judgment, the committee identified four priority areas for research that represent specific important aspects of systems of public health preparedness. The four areas are

- enhancing the usefulness of training;
- improving timely emergency communications;
- creating and maintaining sustainable response systems; and
- generating effectiveness criteria and metrics.

This fourth research priority area, generating effectiveness criteria and metrics, does not preclude such criteria and metrics from being developed as part of the research in the other three priority areas. Instead, this priority emphasizes the central importance that the committee places on the generation of sound evidence regarding the effectiveness and efficiency of public health preparedness and the need for well-defined criteria and metrics for the overall assessment of the systems.

Research that is conducted in all of these areas needs to be translational—designed to result in practical, applicable, and sustainable outcomes that produce a more robust public health system for preparedness. It also needs to address relevant workforce needs, public involve-

ment in the enterprise, and especially, the effective participation of vulnerable populations. The vulnerabilities of population subgroups vary as a function of many environmental, sociodemographic, medical/health status, and other situational factors. Often misunderstood, vulnerability is not synonymous with ethnicity or race, but rather it varies as a function of attributes such as age (young and old), literacy, language, functional health/disability status, isolation, culture, and social networks. The committee also believes that the behavioral and social health of individuals and community resilience after an episode should be explicitly addressed in research in all priority areas.

Guiding Principles for the Organization of Centers and Evaluation of Proposals

The committee assumes that the currently contemplated CDC funding will support administrative functions and a limited number of program grants that could grow into broader support for the network of research centers. To maximize the research yield the committee offers the following guiding principles.

Given the limited resources currently allotted to the CDC's CPHP program, the committee advises the CDC to fund centers that focus on research depth, rather than breadth, by focusing primarily only on one of the committee's recommended areas, rather than several. To optimize the research opportunities across CPHPs, centers should also have the capacity to work in partnership with other schools of public health and relevant academic centers that have complementary research expertise. Further, the committee also advises the CDC to fund centers that agree to work together and collaborate, in a network, with other funded centers, and thereby leverage scarce resources. Through meetings held at least annually, the network of centers would have an opportunity to maximize analysis of projects, research opportunities, and funding strategies. Meetings of the network of centers might regularly include members of the practice community.

Each center should assemble investigators from the appropriate backgrounds and disciplines to allow them to bring their specific competency to their research. This would ensure that the network of centers would have the full range of competencies needed to answer questions of public health preparedness (e.g., at least one center would include experts in operations research or in decision analysis). The committee further suggests that each center include additional relevant competency

that they can bring to the research questions, which they might identify. As in any field of research, the objectives should include clear and well-defined questions and/or hypotheses about methodologies that will improve the preparedness, response, and recovery of systems of public health and outcomes for the public.

The evaluation of research proposals should consider the extent to which multidisciplinary, interdisciplinary, and/or crossdisciplinary knowledge, expertise and collaboration are employed to maximize effective and efficient response. Evaluation of proposals should also consider clear efforts to define criteria and metrics for effective programs that include vulnerable populations, an appropriately prepared workforce, the potential for appropriate and timely change, and the capacity for continuous quality improvement. Additionally, evaluation of issues related to communication among public health systems, the health-care system, political jurisdictions, the private sector, the media, the public, and particularly, vulnerable populations should be conducted. Ethical and legal issues also are pervasive concerns in a system of emergency preparedness and should be included in all research projects. Finally, each center should have strong connections with the public health practice community.

New technologies have important roles to play in systems of public health preparedness. These include communications technologies; computer technologies, such as grid computing or virtual reality simulations; and a host of engineering, biochemical, and medical strategies. Although these technologies should play a role in center proposals, they must be assessed in relation to the mission and goals of public health preparedness systems and should be evaluated by metrics that are created to indicate the extent to which they improve system outcomes.

RECOMMENDATIONS

The committee recommends that COTPER give priority to four areas of research in its upcoming funding solicitation for Centers for Public Health Preparedness:

> **Recommendation 1: Enhance the Usefulness of Training**
> CPHPs should conduct research that will create best practices for the design and implementation of training (e.g., simulations, drills, and exercises) and facilitate the

translation of their results into improvements in public health preparedness.

Recommendation 2: Improve Communications in Preparedness and Response

CPHPs should conduct research that will identify and develop communications in relation to preparedness and response that effectively exchange vital and accurate information in a timely manner with diverse audiences.

Recommendation 3: Create and Maintain Sustainable Preparedness and Response Systems

CPHPs should conduct research that will identify the factors that affect a community's ability to successfully respond to a crisis with public health consequences, and the systems and infrastructure needed to foster constructive responses in a sustainable manner.

Recommendation 4: Generate Criteria and Metrics to Measure Effectiveness and Efficiency

CPHPs should conduct research that will generate criteria for evaluating public health emergency preparedness, response, and recovery and metrics for measuring their efficiency and effectiveness.

The committee acknowledges that—and indeed intends for—these areas to generate overlapping research initiatives. All research projects conducted under this initiative should address or be aware of issues regarding vulnerable populations, workforce, behavioral health, and the use and integration of new technologies.

In relation to each priority area, the thinking that underlies each recommendation and a number of specific potential research questions are elucidated below. These questions are not meant to be all inclusive, but rather to provide further clarification of the overall direction the committee suggests for each priority area. However, these suggestions do indicate some of the more pressing issues, which the committee identified for consideration by the CDC and the research community.

Enhancing the Usefulness of Training

Recommendation 1: Enhance the Usefulness of Training
CPHPs should conduct research that will create best practices for the design and implementation of training (e.g., simulations, drills, and exercises) and facilitate the translation of their results into improvements in public health preparedness.

Public health preparedness systems should have the goal of creating a sustained, replicable capability through formal education, experiential learning, practice, and experience to plan for, detect, respond to and recover from all hazards. However, the current state of such systems often falls short of this goal. Training—which includes exercises, drills, the use of simulation methods, after action analysis of real-life events—does not readily translate into day-to-day public health practice. There are no agreed-upon competencies, standards, or performance measures for public health emergency preparedness; however, many groups have begun to work in this area and these efforts need to be validated and expanded. The role of public health in the all-hazards continuum is not well described, making it difficult to design training that is relevant and applicable to practice. At times heavily resource-dependent training and drills are conducted with little or no grounding in conceptual models to guide development and implementation, and with little or no evaluation of their cost-effectiveness. To address these deficiencies, the committee believes that it is necessary to

- better define the public health emergency response system and its performance outcomes;
- clarify the roles and responsibilities of public health emergency preparedness and response systems within and across local, state, tribal, and federal public health systems and the larger emergency response system;
- create measurable, meaningful input, process, and outcome performance measures; and
- evaluate how training, as defined above, improves the proficiency and performance of public health response systems.

Among the specific research questions that have merit are

- What training modalities build lasting capacity and improved performance?
  o Why are these modalities successful?
- What education and training promote administrative and operational collaboration and cooperation between public health and the health-care system?
- What are the characteristics of training simulations that produce the capabilities needed to enhance system performance in a cost-effective manner?
- What are the advantages and disadvantages of computer simulations compared to other training in enhancing system and specific personnel performance?
- What is the evidence that persons involved in different training modalities perform at a higher level, and for how long is this higher level of performance sustained? What is the frequency of training necessary to maintain desired skills?
- Which subsets of the public health workforce can best benefit from various training modalities and why?
- Which, and how valid are, training modalities that address the needs of special populations, including children and vulnerable populations, and that account for the effect of public health crises and disasters on behavioral health?
- Which, and how valid are, training modalities that prepare the workforce and the public to better respond to emergencies and to limit the effect of the additional stressors they engender?
- Which, and how valid are, training modalities that improve information management and visualization[4] to improve decision analysis and outcomes?
- How valid are case studies and standardized assessment tools for after-action reporting when applied retrospectively to actual public health emergency events?

To address such questions, the committee recommends that tools and measures be developed that will allow process and performance meas-

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[4]Visualization refers to techniques that allow data to be understood by seeing patterns that are detected by statistical methods, such as pattern recognition methods, and/or simply understood by seeing how geospatial relationships look on a map.

ures of training modalities for evaluation, analysis and comparison of types of training and experience models. Cost-effective simulation techniques should be given priority, based upon their ability to improve system performance, enhance personnel proficiency, and provide sustainability.

Improving Timely Emergency Communications

Recommendation 2: Improve Communications in Preparedness and Response

CPHPs should conduct research that will identify and develop communications in relation to preparedness and response that effectively exchange vital and accurate information in a timely manner with diverse audiences.

This recommendation considers all aspects of effective communication, including the importance of content, channels, mechanisms, target audiences, and other relevant components. Successful emergency communications is a crucial element in effective emergency management and should assume a central role from the start. It establishes public confidence in the ability of an organization or government to address an emergency, and to achieve a satisfactory outcome. Effective emergency communication is also integral to the larger process of information exchange aimed at eliciting trust and promoting understanding of the relevant issues or actions. However, while emergency communication is an integral component, pre-emergency preparedness communication, including risk communication, also plays a significant role in the development of resilient communities and sustainable response systems. Effective preparedness and emergency communication aids emergency management by building, maintaining or restoring trust; improving knowledge and understanding; guiding and encouraging appropriate attitudes, decisions, actions and behaviors; and encouraging collaboration and cooperation.

The committee believes that research in this area should concentrate on two topics: (1) evaluating the characteristics of effective risk communication in pre-emergency and emergency settings, and (2) developing system enhancements to improve effective information exchange across diverse populations and entities in pre-emergency and emergency situations.

Among the research questions that would generate practical, applicable, and sustainable results on the first topic—the evaluation of effective risk communication in pre-emergency and emergency settings—are

- What are the criteria and metrics for effective risk communication in emergency situations with (1) the public health workforce, (2) emergency response partners, (3) the media, (4) the public, and (5) vulnerable populations? (See also research opportunities associated with Recommendation 4: Criteria and Metrics.)
- Which risk communication messages motivate people, especially vulnerable populations, to take protective action and engage in appropriate behaviors related to emergencies at different scales?
- To what extent can market research techniques be used to test the effectiveness and cultural competence of risk communication messages developed for the emergency scenarios identified in the Department of Homeland Security's National Response Plan (DHS, 2007) and other relevant preparedness frameworks?
- To what extent can research techniques be used to improve the cultural competence of frontline responders and others involved disaster policy and decision-makers to improve the success and outcome of the community response in emergencies?
- How can new technologies (e.g., Internet and web-based technologies, and cellular/text messaging) be better used to fill risk communication gaps in emergency settings, including those experience by vulnerable populations?
- How does one optimize and leverage the use of existing channels of risk communication in emergency settings to reach diverse audiences, including nonprofit organizations, faith-based organizations, schools, business community, and relevant professional associations? What are the existing risk communication capacities of these community partners in pre-emergency and emergency settings?
- What are the barriers preventing effective translation of pre-emergency and emergency communication strategies to practitioners?
  o What organizational changes are required to implement effective communication strategies?

Research questions relevant to the second topic—system enhancements to improve effective information exchange across diverse populations in pre-emergency and emergency settings—include

- What are the criteria and metrics for system enhancements to improve effective information exchange within and across diverse partners and populations under pre-emergency and emergency conditions? (See also research opportunities associated with Recommendation 4: Criteria and Metrics.)
- How can information technology innovations (e.g., wireless technologies, electronic health records, systems integration, emergency medical response) strengthen emergency response systems by improving situational awareness, data sharing, and decision support for the public health workforce?
- How can challenges to information technology adoption (e.g., robustness, reliability, bandwidth limitations) be overcome for routine as well as emergency response use?
- How do we measure the value of "relationships" or "connectivity" of public health with traditional and nontraditional partners in information exchange in emergency settings?
- What are effective mechanisms for enhancing systems of information exchange to reach into vulnerable and special needs communities in pre-emergency and emergency settings?

Creating and Maintaining Sustainable Preparedness and Response Systems

Recommendation 3: Create and Maintain Sustainable Preparedness and Response Systems
CPHPs should conduct research that will identify the factors that affect a community's ability to successfully respond to a crisis having public health consequences, and the systems and infrastructure needed to foster constructive responses.

Systems of public health preparedness, response, and recovery should be organized to cope with a wide range of threats, including catastrophic health events and use the all-hazards approach. These systems should be accountable for achieving performance expectations. To

prevent, protect against, quickly respond to, and recover from health emergencies, they should include local, state, tribal, and federal public health agencies; practitioners from emergency response and health-care systems; communities (e.g., private-sector and civic entities, for example); and individuals. Although crises and disasters having public health consequences may vary in their scale, timing, and predictability, they all have the potential to overwhelm routine response capabilities and disrupt the provision of daily life and health-care services. While some research has been performed to examine how the different components of the system should interact and be organized, much more research is required to identify and develop the optimal components, arrangement, and interfaces of the public health system.

Preparedness systems also require infrastructure to support a multi-agency, multiprofessional, inclusive, coordinated and continuous process of planning, testing/exercising, and implementing that relies on measuring performance and taking corrective action. Effective response systems must have a complex matrix that includes broad use of social, behavioral, engineering, legal, business, economic, ethical, and media expertise, among other disciplines. Thus, to be useful, research requires multidisciplinary, interdisciplinary and/or cross-disciplinary expertise that reaches beyond the traditional boundaries of schools of public health. However, such public health preparedness systems are not systematically in place, and therefore the research is required to identify how this matrix should be developed so that the public health preparedness system as effective and efficient as possible.

History is full of with examples of communities responding to disasters and catastrophic events, with the quality of response ranging from exemplary to dysfunctional. These examples can inform more productive responses in the future. However, lessons can also be learned from other fields not traditionally a part of the public health system, including operations research, systems engineering, and the business sector.

The major issue to be addressed is what are the preparatory activities that public health officials can take—working with communities, agencies, and organizations—to maximize effective outcomes of the emergency response system that will have both planned and emergent self-organizing components? Research is needed to identify those factors that impact the community's ability to respond in a manner that allows for the best outcome. Among the research questions that would generate practical, applicable, and sustainable results are

- What are the critical elements of a public health system that make it scalable and thereby capable of responding to different levels of emergency?
- What are the lessons to be learned from other academic, professional, and international fields of research and practice (e.g., operations research, systems engineering, and the business sector) that can and should be integrated into the public health system?
- What strategies, if any, should be established improved coordination of the public health system with other critical infrastructures?
- To what extent does training (e.g., simulations, drills, and exercises) demonstrate the efficacy and capabilities of communities to become integrated into the response system? (See also research opportunities associated with Recommendation 1: Enhance the Usefulness of Training.)
- Can historical accounts, after-action reports, lessons learned, and similar data from real life events increase the understanding of how communities best respond, and if so how can this knowledge be better integrated into the public health preparedness system?
- To what extent do coordinated pre-event preparedness activities impact the efficacy and capability of the public health system to integrate into the broader response system, including public, community, and private sectors?
  o How can these findings be better integrated into the public health preparedness system?
- How can research results and findings be best applied to ensure a more effective and rapid response across all scales of emergencies, from small community to national events?
- Are there ways to collect and maintain data during events for later analysis that are not time or resource intensive and do not disrupt response?
- How can the "tipping points" that require abrupt changes to alternative response systems be identified, and how are these alternative systems sustained?

Generating Effectiveness Criteria and Metrics

Recommendation 4: Generate Criteria and Metrics to Measure Effectiveness and Efficiency
CPHPs should conduct research that will generate criteria for evaluating public health emergency preparedness, response and recovery, and metrics for measuring their efficiency and effectiveness.

The nation has invested large amounts of financial and human capital in enhancing the public health system's ability to prepare for, respond to, and recover from emergency events. However, it is difficult to measure objectively the progress that has been made and the preparedness gaps. A critical need exists for validated criteria and metrics that enable public health systems to achieve continuous improvement and to demonstrate the value of society's investment. The committee believes that work in this area should concentrate on the following issues:

1. *What are the appropriate criteria for evaluating public health emergency preparedness, response, and recovery?*
   Priority areas include (1) the public health workforce; (2) information management; (3) emergency communications; (4) vulnerable populations; and (5) response systems. The criteria should include components of planning, structure, process, and continuous improvement. The legal and ethical implications of recommended criteria should be analyzed. Likewise, recommendations should address how each criterion is applicable at the local, tribal, state, and federal levels.
2. *What are the appropriate metrics to quantify achievement with respect to these criteria, and how can they be validated?*
   Metrics should be practical, clear, and accessible to practitioners and the public. They should be designed to drive and reward continuous quality improvement, measuring both efficiency and effectiveness.

Among the research questions that would generate practical, applicable, and sustainable results in the development of criteria and metrics are

- What are appropriate criteria for decision-making processes in planning, response, and recovery? These include criteria for im-

plementation, testing, and improvement of the decision-making process. The criteria should take into account existing practice, experience, and theory.

- What are appropriate criteria for the application of continuous quality improvement of the structure and process of planning, response, and recovery?
- What are appropriate criteria for planning and implementation of clear and accessible communication with the public, recognizing the specific needs of vulnerable populations? (See also Recommendation 2: Communications.)
- What are appropriate criteria to quantify the effectiveness with which the public health system addresses the social and behavioral impacts of events in planning, response, and recovery?
- What are appropriate criteria to measure the public's expectations, experience and satisfaction with respect to public health emergency planning response and recovery efforts?
- To what extent, if any, will accreditation standards for state and local health departments contribute to an agency's preparedness as it relates to capacity and performance?

Finally, the committee discussed the importance of creating criteria for public health preparedness that would resemble the approach taken to describe the health-care delivery system in the 2001 IOM report *Crossing the Quality Chasm* (IOM, 2001).

CONCLUSIONS

Although the overall success of this research initiative will necessitate substantially more resources than those currently available, the committee believes the thrust of this activity is extremely important and potentially powerful for the field of public health preparedness. The proposed research projects seek to provide evidence on which important decisions about the nature and distribution of public health preparedness resources can be based. By insisting on well-described metrics, the research offers the chance for more rational decisions about these resource requirements as well as the opportunity to undertake continuous quality improvement in the preparedness field.

This initiative needs to bring research rigor to the analysis of existing data about previous events and test hypotheses that can further advance

the field. It will stimulate important new collaborations between two groups: (1) traditional public health researchers and practitioners, and (2) collaborators from a variety of other disciplines not previously engaged in public health systems of research.

Through the engagement of those who provide public health preparedness services in the community, this initiative offers the opportunity for research that is practical, applicable, and sustainable. In so doing, it will strengthen the growing relationships between academic public health and public health practitioners, in addition to the broader public and other emergency preparedness practitioners. The committee is convinced that the creative energies of those in academia and in the public health community can provide a body of well-researched evidence that will contribute to the best possible system for maintaining the health and welfare of the American people.

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B

Public Meeting and Workshop Agenda

Research Priorities in Emergency Preparedness and Response for Public Health Systems
Board on Health Sciences Policy

Public Meeting
Tuesday, December 18, 2007

National Academy of Sciences Keck Building
Room 100
500 Fifth St., NW
Washington, DC 20001

BACKGROUND AND OVERVIEW

Session Objective: To obtain a better understanding of the background to the study and the charge to the committee. To have a discussion with the key stakeholders and others about existing frameworks and viewpoints on the critical research gaps and challenges for public health preparedness systems.

3:00 p.m.   Welcome and Introductions

KENNETH SHINE
Committee Chair
Executive Vice Chancellor for Health Affairs
The University of Texas System

MARTHA HILL
Committee Vice Chair
Dean
The Johns Hopkins University School of Nursing

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3:15   Background and Charge to the Committee

             RICHARD BESSER
             Director
             Coordinating Office for Terrorism Preparedness and
             Emergency Response
             Centers for Disease Control and Prevention

3:45   Panel Discussion: Stakeholder Perspectives
             Each panelist will be asked to limit remarks to 15 minutes;
             committee discussion will follow all panelist presentations.

             Related Activities Underway by the DHHS Office of the
             Assistant Secretary for Preparedness and Response

             WILLIAM RAUB
             Science Advisor to the Secretary
             Department of Health and Human Services

             Related Activities Underway by the Department of Homeland
             Security

             JEFF RUNGE
             Chief Medical Officer
             Department of Homeland Security

             Related Activities Underway at the State Level

             JUDITH MONROE
             President-Elect
             Association of State and Territorial Health Officials

             What Should the PHEP Evidence Base Look Like?

             CHRISTOPHER NELSON
             Senior Political Scientist
             Thomas Lord Distinguished Scholar
             RAND Corporation

             Science Functions in Public Health Emergency Response and
             Key Support Systems

             EDDY BRESNITZ
             President
             Council of State and Territorial Epidemiologists
             Deputy Commissioner/State Epidemiologist
             NJ Department of Health and Senior Services

Perspectives from the American Public Health Association

> LINDA DEGUTIS
> President
> American Public Health Association

5:00   Committee Discussion

> KENNETH SHINE
> Committee Chair
> Executive Vice Chancellor for Health Affairs
> The University of Texas System

6:00   Adjourn

**Research Priorities in Emergency Preparedness and Response
for Public Health Systems**

Board on Health Sciences Policy

Public Workshop
Wednesday, December 19, 2007

**National Academy of Sciences Keck Building
Room 100
500 Fifth St., NW
Washington, DC 20001**

Workshop Goals
- Identify the most promising near-term (3- to 5-year) opportunities to improve the public health systems responsible for emergency preparedness and response for catastrophic events.
  - o   Each speaker has been asked to specifically identify 1–2 areas where there are gaps in knowledge in public health systems and a set of short-term research priorities to help address them.
- Identify research opportunities for emergency preparedness and response in public health systems that are relevant to the specific expertise resident at schools of public health.
  - o   Each priority should have measurable outcomes that will likely result in near-term improvements to public health systems for preparedness over the next 3 to 5 years.

8:00 a.m.   Welcome and Introductions

                        KENNETH SHINE
                        Committee Chair
                        Executive Vice Chancellor for Health Affairs
                        The University of Texas System

8:15   Background and Charge to the Committee

                        RICHARD BESSER
                        Director
                        Coordinating Office for Terrorism Preparedness and
                           Emergency Response
                        Centers for Disease Control and Prevention

8:30   Public Health System Research: Survey of the Field, Gaps and
              Near-Term Needs

                        DAVID ABRAMSON
                        Director of Research
                        National Center for Disaster Preparedness
                        Mailman School of Public Health
                        Columbia University

8:45   Perspectives from Schools of Public Health

                        HARRISON SPENCER
                        President and CEO
                        Association of Schools of Public Health

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**SESSION I: PANEL DISCUSSION:
PREPARING THE PUBLIC HEALTH WORKFORCE**

Session Objective: To identify research opportunities that may be used to
develop and evaluate strategies and tools that can be used to train and exercise
the public health workforce to meet responsibilities for detection, mitigation,
and recovery in varied settings and populations.

                        KENNETH SHINE, *Session Chair*
                        Committee Chair
                        Executive Vice Chancellor for Health Affairs
                        The University of Texas System

9:00   Panel Discussion: Preparing the Public Health Workforce
                Each panelist will be asked to speak for 10 minutes to give his
                or her perspective on research gaps and priorities.

           ED BAKER
           Director
           North Carolina Institute for Public Health
           University of North Carolina School of Public Health

           DEBRA OLSON
           Associate Dean of Public Health Practice
           University of Minnesota School of Public Health

           BRIAN FLYNN
           Associate Director of the Center for the Study of
              Traumatic Stress
           Adjunct Professor of Psychiatry
           Department of Psychiatry
           Uniformed Services University of Health Sciences

           SALLY PHILLIPS
           Director
           Public Health Emergency Preparedness
           Agency for Healthcare Research and Quality

           REBECCA HEAD
           Health Officer
           Monroe County Public Health Department
           National Association of County and City Health Officials

10:00   Discussion with Committee

           KENNETH SHINE, *Session Chair*
           Committee Chair
           Executive Vice Chancellor for Health Affairs
           The University of Texas System

10:40   Break

**SESSION II: PANEL DISCUSSION:
IMPROVING INFORMATION MANAGEMENT**

Session Objective: To identify research opportunities that would allow for improved availability and usefulness of scenario modeling and forecasting and knowledge management tools during crisis decision making.

> MARTHA HILL, *Session Chair*
> Committee Vice Chair
> Dean
> The Johns Hopkins University School of Nursing

10:55   Panel Discussion: Improving Information Management
               Each panelist will be asked to speak for 10 minutes to give his
               or her perspective on research gaps and priorities.

> STEVEN PHILLIPS
> Associate Director for Specialized Information Services
> National Library of Medicine
>
> JOHN HARRALD
> Director
> Institute for Crisis, Disaster, and Risk Management
> George Washington University
>
> STEVEN H. HINRICHS
> University of Nebraska
> Stokes-Shackleford Professor of Pathology
> Department of Pathology/Microbiology
> Director, Center for Biosecurity
> Director, Nebraska Public Health Laboratory
>
> GUS BIRKHEAD
> Deputy Commissioner, Office of Public Health
> New York State Department of Health

11:40   Discussion with Committee

> MARTHA HILL, *Session Chair*
> Committee Vice Chair
> Dean
> The Johns Hopkins University School of Nursing

**SESSION III: PANEL DISCUSSION:
IMPROVING TIMELY EMERGENCY COMMUNICATIONS**

Session Objective: To identify research opportunities and evaluate characteristics of effective risk communication in emergency settings and system enhancements to improve effective information exchange across diverse partners and populations under emergency conditions.

> KENNETH SHINE, *Session Chair*
> Committee Chair
> Executive Vice Chancellor for Health Affairs
> The University of Texas System

1:00 p.m.   Panel Discussion: Improving Timely Emergency Communications
Each panelist will be asked to speak for 10 minutes to give his or her perspective on research gaps and priorities.

> NANCY MCKELVEY
> Chief Nurse
> American Red Cross
>
> DAVID ROPEIK
> Risk Communication Consultant
>
> BARBARA COCHRAN
> President
> Radio-Television News Directors Association
>
> JAYNE LUX
> Director
> Global Health Benefits Institute
> National Business Group on Health

1:45   Discussion with Committee

> KENNETH SHINE, *Session Chair*
> Committee Chair
> Executive Vice Chancellor for Health Affairs
> The University of Texas System

**SESSION IV: PANEL DISCUSSION:
PROTECTING VULNERABLE POPULATIONS IN EMERGENCIES**

Session Objective: To identify research opportunities that will result in
improved identification of health vulnerabilities and evaluation of interventions
designed to lessen the risk of poor health outcomes.

MARTHA HILL, *Session Chair*
Committee Vice Chair
Dean
The Johns Hopkins University School of Nursing

2:45   Panel Discussion: Protecting Vulnerable Populations in
Emergencies
Each panelist will be asked to speak for 10 minutes to give his
or her perspective on research gaps and priorities.

GEORGE FOLTIN
Director
Center for Pediatric Emergency Medicine
NYU Medical Center

ERIC BAUMGARTNER
Director
Office of Policy and Program Development
Louisiana Public Health Institute

MAUREEN LICHTVELD
Chair
Department of Environmental Health Science
Tulane University School of Public Health and Tropical
Medicine

MICHELLE GOURDINE
Deputy Secretary of Public Health Services
Maryland Department of Health and Mental Hygiene

MONICA SCHOCH-SPANA
Senior Fellow
Center for BioSecurity
University of Pittsburgh Medical Center

3:40   Discussion with Committee

     MARTHA HILL, *Session Chair*
     Committee Vice Chair
     Dean
     The Johns Hopkins University School of Nursing

GENERAL DISCUSSION WITH ATTENDEES

4:25   Discussion with Meeting Participants and Audience

     KENNETH SHINE
     Committee Chair
     Executive Vice Chancellor for Health Affairs
     The University of Texas System

     MARTHA HILL
     Committee Vice Chair
     Dean
     The Johns Hopkins University School of Nursing

5:00   Workshop Adjourns for the Day

Thursday, December 20, 2007

10:00 a.m.   Welcome and Introductions

     KENNETH SHINE
     Committee Chair
     Executive Vice Chancellor for Health Affairs
     The University of Texas System

SESSION V: PANEL DISCUSSION: STRENGTHENING RESPONSE SYSTEMS

Session Objective: To identify research opportunities that will assist in the development and evaluation of integrated systems of emergency public health services and incident management, including performance measurement and evaluation.

     KENNETH SHINE, *Session Chair*
     Committee Chair
     Executive Vice Chancellor for Health Affairs
     The University of Texas System

10:10   Panel Discussion: Strengthening Response Systems
               Each panelist will be asked to speak for 10 minutes to give his
               or her perspective on research gaps and priorities.

                         DREW DAWSON
                         Director
                         Office of Emergency Medical Services
                         National Highway Traffic Safety Administration

                         LESLEE STEIN-SPENCER
                         Program Advisor
                         National Association of State EMS Officials

                         LEONARD MARCUS
                         Co-Director
                         National Preparedness Leadership Initiative: A joint
                            program of the Harvard School of Public Health and the
                            Kennedy School of Government Director Program for
                            Health Care Negotiation and Conflict Resolution
                         Harvard School of Public Health

                         JOSEPH BARBERA
                         Co-Director
                         Institute for Crisis, Disaster, and Risk Management
                         The George Washington University

10:55   Discussion with Committee

                         KENNETH SHINE, *Session Chair*
                         Committee Chair
                         Executive Vice Chancellor for Health Affairs
                         The University of Texas System

SUMMARY AND GENERAL DISCUSSION

11:30   Panel Discussion: Summary of Major Issues and Potential
               Research Priorities

                         LYNN GOLDMAN
                         Chair
                         Interdepartmental Program in Applied Public Health
                         Johns Hopkins Bloomberg School of Public Health

JOHN HARRALD
Director
Institute for Crisis, Disaster, and Risk Management
The George Washington University

JUDITH MONROE
President-Elect
Association of State and Territorial Health Officials

12:00 p.m.   General Discussion with Committee and Attendees

KENNETH SHINE
Committee Chair
Executive Vice Chancellor for Health Affairs
The University of Texas System

MARTHA HILL
Committee Vice Chair
Dean
The Johns Hopkins University School of Nursing

1:00   Adjourn Workshop