

WORKING P A P E R

Conceptualizing and Defining Public Health Emergency Preparedness

CHRISTOPHER NELSON

NICOLE LURIE

JEFFREY WASSERMAN

SARAH ZAKOWSKI

KRISTIN J. LEUSCHNER

WR-543

May 2008

Prepared for the US Department of Health and Human Services

This product is part of the RAND Health working paper series. RAND working papers are intended to share researchers' latest findings and to solicit additional peer review. This paper has been peer reviewed but not edited. Unless otherwise indicated, working papers can be quoted and cited without permission of the author, provided the source is clearly referred to as a working paper. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors. **RAND**® is a registered trademark.

INTRODUCTION

Since September 11, 2001 (9/11) and the anthrax attacks that followed, a substantial federal investment – totaling well in excess of \$6 billion – has been made to increase our nation’s ability to prepare for, and respond to, public health emergencies. Increasingly, Congress, the White House and the public want to know whether these expenditures have left the nation’s public health system adequately prepared. The Pandemic and All Hazards Preparedness Act of 2006, for instance, requires the Department of Health and Human Services to develop evidence-based performance measures and objective standards, and (beginning in 2009) to link federally-awarded funding to achievement of these standards and measures.

Despite anecdotal reports suggesting that progress has been made, it is unclear whether these investments have improved the nation’s ability to respond to a bioterrorist attack, influenza pandemic, or any other large-scale public health emergency. The problem lies, in part, in the lack of agreement – among policymakers, public health officials, and the public – about exactly what public health emergency preparedness (PHEP) is and how it should be measured.

This lack of agreement about what constitutes preparedness is not due to a lack of effort. Recent years have seen numerous attempts to improve the U.S. public health system’s ability to respond to large-scale public health crises. The Federal Government, for instance, has invested in mass prophylaxis capability, academic centers of excellence and, most recently, pandemic influenza preparedness. In addition, vigorous efforts at the state and local level have focused on partnering with other response disciplines, adopting incident command structures, adopting new technology, and developing measures of preparedness (see, e.g., Lurie, Wasserman, & Nelson, 2006).

The myriad PHEP performance measures that have been developed vary considerably across agencies and shift dramatically from year to year. Further, it is unclear how various measures, goals, and guidance documents fit together. As a result, officials in state and local health agencies, leaders of businesses and nonprofits, and citizens have been left confused and perplexed by a maze of overlapping and sometimes contradictory requirements, checklists, and ideas about what constitutes preparedness (Fraser, 2007; Nelson, Lurie, & Wasserman, 2007; Asch, Stoto, & Mendes, et al., 2005).

In an effort to clarify the nation’s public health preparedness goals, the Department of Health and Human Service’s Office of the Assistant Secretary of Preparedness and Response (HHS/ASPR)¹ asked RAND to convene an expert panel to develop a clear and widely-applicable definition of public health emergency preparedness that can provide common terms for discussion and establish a basis on which to develop a small core of critical standards and measures. The panel was convened at RAND’s offices in Arlington, VA, on February 8-9, 2007.

¹ This office was formerly known as the Office of Public Health Emergency Preparedness.

In this paper, we provide the candidate definition of PHEP developed by the panel and describe its key elements. We also discuss the approach used by the panel to develop the definition and elements.

The discussion of the PHEP definition and elements focuses on three key questions:

- What constitutes a public health emergency?
- What does emergency preparedness require?
- Who is involved in emergency preparedness?

We describe the points emphasized by the panel in responding to these questions and explain the rationale behind the panel's choices.

APPROACH

Literature Review and Discussions with Experts

In preparation for the panel meeting, we conducted (a) an extensive review of existing program guidance on public health preparedness and homeland security, (b) a review of academic publications² on preparedness, and (c) discussions with key stakeholders inside and outside government and across professional disciplines involved in PHEP. Literature reviewed included peer-reviewed journal articles and books from the fields of public health, emergency medicine, and emergency management. Some of the definitions identified by that review are presented in Appendix A. The point of the review was to identify a range of options rather than provide a complete survey of approaches to conceptualizing and defining PHEP.

To be certain that we did not omit important perspectives in developing the definition, we conducted numerous interviews with experts in the field; current officials in federal agencies, including HHS/ASPR, the Centers for Disease Control and Prevention (CDC), and the Department of Homeland Security (DHS); and state and local government preparedness and emergency managers. Following the panel meeting, we discussed the panel's conclusions with many of these same individuals, with the goal of identifying issues that had not been covered by the panel process.³ Although we did not seek consensus on the definition or its elements, we did achieve it.

² The references in this paper are meant to be representative of the works reviewed in writing this paper and are not a complete list.

³ These individuals were promised anonymity in order to encourage open and honest discussion.

Expert Panel

We sought to ensure that a broad range of perspectives would be represented on the expert panel. The panel included people with recent experience in federal, state, or local government position, as well as representatives from universities and other non-governmental organizations. A list of participants is provided in Appendix B. We made a deliberate decision not to include individuals in *current* governmental positions or representatives from groups representing those individuals in order to avoid situations where participants might feel the need to protect their “turf.”

Guidance to the Panel

Before the meeting, panelists were provided with a short discussion paper that described the main tasks for the panel. These tasks were: 1) develop a brief definition of PHEP, 2) develop a short list of PHEP elements (more specific action-items related to preparedness), and 3) take one or two elements and begin the process of developing operational measures. (However, we eventually deemed the development of measures as too ambitious for the expert panel meeting).

The discussion paper included some provisional definitions of PHEP (Table 1) and a short list of possible elements for consideration (Table 2). The list of suggested PHEP elements is divided into two sections. The “crosscutting” category refers to items that apply to a broad range of public health functions (e.g., leadership, planning), while the second category is “function-specific” (e.g., lab testing, investigation). Additional definitions of PHEP as found in guidance documents were provided to the panel.

Panelists were also provided with a separate document that provided a more comprehensive listing of elements drawn from various program guidance. These documents were intended to provide a point of departure for discussion, and panelists were advised that they were free to revise, replace, or ignore these documents, as seemed appropriate.

Table 1. Sample Definitions of PHEP Provided to the Panel

<p>Initial Sample Definition:</p> <p>“Public health emergency preparedness is the ability to reduce morbidity and mortality arising from hazards and vulnerabilities whose scale, rapid onset, or unpredictability stresses or overwhelms routine capabilities. This involves proactive efforts to prevent, detect, and mitigate threats by deploying and adapting plans and resources to meet the emerging needs of the situation.”</p>
<p>Definition revised to reflect a cause-based view of public health emergencies:</p> <p>“Public health emergency preparedness is the ability to reduce morbidity and mortality arising from naturally occurring and terrorist activities whose scale, rapid onset, or unpredictability stresses or overwhelms routine capabilities. This involves proactive efforts to prevent, detect, and mitigate threats by deploying and adapting plans and resources to meet the emerging needs of the situation.”</p>
<p>Revision revised to include interruptions in routine health care:</p> <p>“Public health emergency preparedness is the ability to reduce morbidity and mortality arising from hazards, vulnerabilities, or interruptions in healthcare whose scale, rapid onset, or unpredictability stresses or overwhelms routine capabilities. This involves proactive efforts to prevent, detect, and mitigate threats by deploying and adapting plans and resources to meet the emerging needs of the situation.”</p>
<p>Definition revised to reflect the narrower view of preparedness as including only pre-event activities designed to support responses:</p> <p>“Public health emergency preparedness involves proactive efforts to improve the public health system’s ability to reduce morbidity and mortality arising from hazards and vulnerabilities whose scale, rapid onset, or unpredictability stresses or overwhelms routine capabilities.”</p>
<p>Revision revised to reflect a broad range of PHEP actors:</p> <p>“Public health emergency preparedness is the ability to reduce morbidity and mortality arising from hazards and vulnerabilities whose scale, rapid onset, or unpredictability stresses or overwhelms the routine capabilities of government, the private sector, and individuals. This involves proactive efforts by all sectors designed to prevent, detect, and mitigate threats by deploying and adapting plans and resources to meet the emerging needs of the situation.”</p>

Table 2: List of Sample PHEP Elements Provided to the Panel

Crosscutting

- Community health risk assessment
- Clear political and institutional base for PHEP
- Clear legal basis
- Integration, mutual aid, interoperability with other responders
- Leadership
- Community engagement
- Adaptiveness
- Workforce training and development, including just-in-time training
- Incident command system/decision making
- Tactical communication
- Public information and risk communication
- Planning
- Continuous quality improvement
- Resource management and logistics (supplies, volunteers, staff)
- Development of PHEP knowledge base
- Linkages to routine practice
- Clear trigger points for activation

Function-Specific

- Detection
- Reporting
- Investigation
- Lab/testing
- Mass care and medical surge
- Mass dispensing of countermeasures
- First responder prophylaxis/vaccination
- Isolation and quarantine
- Evacuation

Process for Finalizing the Definition and List of Elements

A complete definition was agreed to, drafted, and reviewed by the panel during the meeting. After the panel meeting, members of the RAND team reviewed their notes from the panel discussion and made some revisions to the definition and list of elements. We then drafted a short paper on the definition and elements. This paper was sent to the panelists for review and comment before submission to a journal.

DEFINITION OF PUBLIC HEALTH EMERGENCY PREPAREDNESS

We now describe the definition proposed by the panel and discuss key issues raised by panelists in developing this definition. Box 1 displays the definition.

Box 1. Definition of PHEP Proposed by the Panel

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.

In developing the definition, panelists were asked to focus on the questions mentioned earlier:

- What constitutes a public health emergency?
- What does public health emergency preparedness require?
- Who is involved in emergency preparedness?

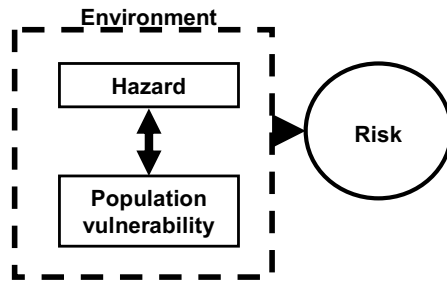
We will refer to these questions as we discuss the panel's definition of PHEP.

What Constitutes a Public Health Emergency?

Panelists were first asked to consider what constitutes a public health emergency. Determining what constitutes a public health emergency is critically important to defining the scope of PHEP activities, i.e., the range of things that must be done in order for a community to be considered "prepared." Panelists settled on the following definition of emergencies: "*health emergencies, particularly those whose scale, timing, or unpredictability threatens to overwhelm routine capabilities.*"

A key consideration for the panel was whether an emergency should be defined more in terms of its *cause* (e.g., natural disease outbreak, natural disaster, terrorist attack) or its *consequences* (e.g., severe interruptions in routine health care). The first view is reflected in the CDC's program guidance for the PHEP Cooperative Agreements, which states that public health emergencies might include "terrorism and non-terrorism events, including infectious disease, environmental and occupation-related emergencies" (CDC, 2006). The second view has been discussed in the literature (see, e.g., Auf der Heide, 1989; Quarantelli & Dynes, 1977) and is reflected in Figure 1 below, which shows that a community's risk results from a combination of the disaster or hazard and the level of vulnerability (see Lindell & Perry, 1992).

Figure 1: Conceptualizing Public Health Emergencies



Panelists felt strongly that public health emergencies need to be defined as much by their health consequences as by their causes and precipitating events (Auf der Heide, 1989; Keim & Giannone, 2006; Lindell & Perry, 1992). That is, the panel shifted the terms of the debate from hazards to health impacts, or, more precisely, *the potential for health consequences*. It was noted that the magnitude of the precipitating event is not as important as the scope of its consequences, since a small event can lead to a monumental response of large scale. According to panel members, a situation becomes emergent when its health consequences have the potential to overwhelm routine community capabilities to address them. Panelists indicated that an emergency should *not* be defined as something that “stresses or overwhelms” a community since – if a community is truly prepared--an event should *not* overwhelm the system. Thus, the definition speaks of events “whose scale, timing, or unpredictability *threatens* to overwhelm routine capabilities.”

Panelists also emphasized that preparing for public health emergencies should not include only preparing for disasters, but also building a strong and resilient community. Panelists noted that a population that is less vulnerable and more resilient will be better able to withstand the consequences of and recover faster from the emergency, thus reducing the likelihood that the system will become overwhelmed. Moreover, some panelists stressed that the definition should have a “positive” emphasis. As one noted, “It’s impossible to get people to respond to a ‘negative definition.’ We need to tell people what they should be doing that is positive.” It was felt that an emphasis on preserving individual and community health and functionality not only gives appropriate emphasis to the positive, but would also be easier to measure than a “negative” outcome, such as “reducing morbidity and mortality” from an event.

Panelists stated clearly that a public health emergency occurs when the *routine* capabilities of the system have the potential to be overwhelmed by an event. One panelist stressed the need to make the “everyday system sufficiently strong and malleable so that it can deal with an emergency.” Another noted, “If we neglect the everyday, then none of these things make much sense for a disaster.” Panelists felt that the more robust the underlying public health system, the less likely it is to be overwhelmed. If public health agencies are able to perform their routine duties extremely well, they are less likely to be overwhelmed, and better able to scale up during an emergency.

The panel's emphasis on reducing a population's vulnerability before an event has important implications for other aspects of the definition (e.g., who is involved in PHEP), as will be discussed further below. At this point we note that the panel stressed that both individual and community-level education as well as efforts to improve population health are needed to prepare a community to cope with a potentially catastrophic event. This idea challenges the notion that public health emergencies are best left to the professionals—emergency responders, public health officials, etc. Instead, the panel consistently emphasized a view of public health emergencies that emphasizes the role of the entire population in building a strong and resilient community.

Panelists also emphasized an “all-hazards” approach to PHEP. Such an approach was felt to allow for the optimal development of capabilities across scenarios and to better prepare communities for the broad spectrum of potential risks. Some panelists noted that a definition should not be driven by a specific type of event, or, in the words of one panelist, the “disaster du jour,” since risks vary across locations and often change over time. Others emphasized the need for a comprehensive definition of emergencies. One stressed the importance of preparing people to be “generalists” in emergency response: “All types of events occur. You can't train people for one event. You need to train them to prepare for uncertainties.” However, while the need for a broad definition of a public health emergency was generally agreed upon by the panelists, some also cautioned that boundaries were needed on what constitutes an emergency: “We can't try to put too much on the PHEP goal.”

What Does Public Health Preparedness Require?

The second question considered by panelists in formulating their definition was the range of activities, resources, or capabilities that are included in PHEP. Taking a *narrow* perspective, PHEP might be defined only as those actions taken ahead of time to support a response once an emergency has taken place. In this view, PHEP would be just one part of a continuum of pre- to post-event functions. For example, the *National Preparedness Goal* and related DHS documents consider preparedness as one of four critical emergency planning functions, which also include prevention, response, and recovery. On the other hand, a more *comprehensive* view might regard PHEP as a general category that includes both pre- and post-emergency actions. For instance, in the CDC's PHEP Cooperative Agreement guidance, “preparedness goals” include prevention, detection, investigation, control, recovery, and improvement.

The panel chose the broader view, determining that PHEP should include a full range of activities “*to prevent, protect against, quickly respond to, and recover from*” health emergencies. Moreover, the definition specifies that preparedness “*involves a coordinated and continuous process of planning and implementation that relies on measuring performance and taking corrective action.*”

Panelists repeatedly stressed that PHEP involves *operational* capabilities – the ability to quickly execute preparedness tasks. Panelists noted that, while possessing capabilities also requires capacity (e.g., infrastructure, personnel, plans), capacity alone does not

ensure readiness. PHEP is not a steady state. Staff turnover, the need for maintaining steady state readiness, and the rapidly changing knowledge base and potential threats require continuous improvement, including frequent testing of plans through drills and exercises and the formulation and execution of corrective action plans. PHEP also includes the practice of improving the health and resiliency of communities.

Panelists stressed repeatedly that a system of PHEP must be built upon existing systems and functions in public health, rather than requiring the creation of a new system or set of procedures applicable to emergencies only. They noted the difficulty of getting a weakened public health system to add a wholly “new” task to its list of responsibilities and emphasized that routine events provided numerous opportunities for health departments to ‘practice preparedness’ while simultaneously improving existing systems and practices. Panelists argued that a separate system that is stood up only in a rare event is unlikely to function well because its procedures are not used regularly.

Who Is Involved in PHEP?

A third issue considered by the panel in formulating their definition of PHEP was *who* needs to be involved. This issue has received considerable attention in recent years. Reports on the public health system by the Institute of Medicine (IOM 1988, 2003), for instance, argued that while governmental public health agencies are ultimately responsible for public health, they often act through partnerships with private and nonprofit organizations. Similarly, NACCHO’s “Operational Definition of Functional Health Department” notes that:

The LHD [local health department] may have the capability to perform all of the functions on its own; it may call upon the state to provide assistance for some functions; it may develop arrangements with other organizations in the community or with neighboring LHDs to perform some functions; or it may control the means by which other entities perform some functions (NACCHO, 2005, 4; also see Lenihan, Welter, Chang, & Gorenflo, 2007).

The National Preparedness Goal also emphasizes the need for multi-agency coordination as well as coordination with partners outside the government:

All required capabilities and expertise will not be present in the State or jurisdiction. Many will be secured through multi-agency coordination (i.e., mutual aid, acquisition through contracting, and resources from non-governmental and private sector partnership (DHS, 2005, 6).

Panelists were thus asked to consider whether the definition should apply primarily to *governmental* public health, primarily to the larger public health *system* (including non-public health and non-governmental actors), or perhaps to governmental public health with the expectation that it lead and coordinate system-wide efforts.

Panelists rapidly concluded that it was a broadly shared responsibility of “*public health and health care systems, communities, and individuals.*”

This aspect of the definition was informed by the fact that a large share of first aid, search-and-rescue, and other initial response activities are provided by on-site civilians prior to the arrival of response personnel (Auf der Heide, 2006). Panelists noted repeatedly that bystanders are often the first responders in any emergency, large or small, and that bystander response has been credited repeatedly with saving lives, whether in the event of a cardiac arrest, or a building collapse resulting from a natural or manmade disaster. Involving a broad range of actors in PHEP requires coordination. Accordingly, the definition characterizes PHEP as a “coordinated” effort in which partners’ efforts are undertaken with awareness of the how they fit into the whole system.

Panelists called for building resiliency among individuals and communities in advance of an event, including providing more information and education about how all individuals can exercise and improve their personal preparedness and knowledge of helping others in an emergency event. They highlighted the role that individual, family, and community preparedness play in both improving resiliency and reducing the underlying vulnerability of a population. At the same time, some panelists emphasized that involving the community does not stop with educating the public. Because preparedness is a “bottom-up” system, the community must be integrated into all aspects of PHEP, including both planning and exercising.

That said, panelists also noted that governmental public health agencies have a unique role in mobilizing, convening, and coordinating the activities of these many and diverse community partners.

ELEMENTS OF PHEP

What Does Emergency Preparedness Require?

The next task for the panel was to identify a short list of PHEP “elements” that focus on some of the things necessary to achieve public health emergency preparedness. The elements are important because they help to convey more specific priorities than can be included in a short definition. The elements are also intended to serve as bridges to link the overarching definition of PHEP with specific, concrete measures of performance.

In thinking about which elements should be included, the panel was asked to consider which specific “capabilities” or “functions” are needed to cover the range of activities that are part of PHEP (e.g., prevention, response).

The sixteen elements of preparedness identified by the panel are shown in Table 3.

Table 3. Key Elements of Preparedness Identified by the Panel

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

Pre-planned 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 in legal authority and liability barriers to effectively monitor, prevent, and/or respond to a public health emergency.
3. *Roles and responsibilities.* Clearly define, assign and test responsibilities at all sectors, levels of government, and individuals, and ensure their integration.
4. *Incident Command System.* Develop, test and improve decision-making and response capability using an integrated Incident Command System (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, radiologic, toxic or infectious.
7. *Laboratory functions.* Maintain and improve the systems to test for potential hazards, particularly those that are environmental, radiologic, 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 them throughout the supply chain.

Expert and fully staffed workforce

12. *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.
13. *Leadership.* Train, recruit, and develop public health leaders (e.g., to mobilize resources, engage the community, develop interagency relationships, communicate with the public).

Accountability and quality improvement

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

Crosscutting Themes

The panel identified several themes that apply across all the elements. As already noted, panelists felt that, to the extent possible, PHEP should be integrated with and expand upon day-to-day public health practices, and should build upon existing systems. Thus, the list of key elements specifies that the elements should be “integrated with routine practices.” Panelists emphasized that PHEP should involve scalable responses, with core building-block capabilities and functions that can be used during small, routine events and scaled up for larger events. Panelists also stressed that a preparedness plan was one of the “absolute, critical elements.”

Specific Elements of PHEP

In developing the list of specific elements, panelists stressed the need for “action-oriented” elements that specify what communities need to do. Each element is intended to point to specific and measurable aspects of PHEP. In developing its list of action-oriented elements, the panel emphasized that communities must attain the *operational capability* to perform *each and every* one of the elements specified below. Operational capability must be demonstrated by actions, either in response to a real but smaller scale event in which the capability is assessed, or through drills and exercises with clear metrics attached to them.

Elements are grouped into three categories: pre-planned and coordinated rapid-response capability, expert and fully staffed workforce, and accountability and quality improvement. Below we highlight salient aspects of each element.

Pre-Planned and Coordinated Rapid-Response Capability

The first eleven elements focus on the capabilities needed to provide a pre-planned and coordinated rapid response.

Health risk assessment. The element of community health risk assessment flows from the definition’s inclusion of hazards *and* vulnerabilities as components of public health emergencies. Panelists felt that it would be impossible to plan for, or improve, underlying vulnerabilities of their populations without having a strong sense about who their populations are and what health needs they have. Panelists noted that mental health

should be integrated with other forms of health in both planning for and responding to emergencies.

A health risk assessment was felt to be particularly useful for identifying and addressing the needs of high-risk populations, structures, and industries. For instance, planners would benefit from knowing about the number and location of citizens without access to routine healthcare, those who are frail or at high risk of dying, and those who are difficult to reach with routine communication channels. The ability to mount effective responses would also be enhanced by knowing the location of high-hazard industries (e.g., petrochemical plants) and other physical structures that might be targets of attacks. This element provides a reminder that whether or not an event becomes a public health emergency depends in large part on the pre-existing characteristics and resiliency of the community and the potentially affected population.

Panelists also noted that, while health risk assessments are already a core component of a public health agency's responsibility, these assessments are not always up to date or sufficiently comprehensive to support community planning. Thus, this element provides an example of a routine function that health departments need to do extremely well in order to support the ability to mount rapid and effective responses. The health risk assessment can also provide a basis for broader PHEP planning.

Legal climate. The second element involves identifying and addressing potential legal and liability barriers that might limit a community's ability to monitor, prevent, and respond to a public health emergency. Such issues might include liability, professional credentialing, and public health agencies' ability to impose restrictions on the movement of persons. Concerns about personal liability and credentialing, for instance, might discourage volunteer medical professionals from rendering care during an emergency (see, e.g., Martin, 2004).

Roles and responsibilities. In addition to stressing that everyone has a role in PHEP, the panel sought to highlight the necessity to be clear about 'who does what?' in an emergency. They stressed the need to clearly define, assign, and test responsibilities across all sectors, all levels of government, and with all individuals; as well as to ensure the integration of all groups in the overall response.

The panel noted that confusion often arises about roles of various responder communities (e.g., police, EMS, public health, health care facilities) both within jurisdictions, and across jurisdictions, e.g., when a local health department transfers responsibility for certain functions to a state government, or when states transfer it to the federal government. In some cases, such as evacuation or care of special needs populations, many entities would be capable of carrying out the required responsibilities; what is critical is to ensure that the responsibility has been assigned and all parties know who has been assigned the leading role.

Incident Command System (ICS). This element underscores the importance of identifying and notifying professional first responders about their functions in a rapid-

response operation. Panelists stressed the importance of having leaders who can “make decisions in a timely way.” The ICS was felt to be critical to staying “in front of the disaster at every turn.”

Panelists also emphasized that an ICS should be able to function effectively at all levels of response. Frequent exercising was therefore felt to be necessary to develop, test, and improve decision-making and response capability. System integration was also considered to be key. Leaders need to address issues associated with the coordination and application of resources under mutual aid agreements.

Public engagement. As noted above, while the panel acknowledged the critical role played by the professional response community, they also felt strongly that the broader public needs to take an active role in PHEP, above and beyond receiving messages from public officials. It was felt that citizens are less likely to be fearful during an emergency if they are fully engaged and involved in the PHEP system. This public engagement should be carried out in the most culturally competent and appropriate manner possible. Educating the public is a key component of this capability, but active engagement and mobilization were also felt to be critical. The panel was emphatic that all citizens must be full and active participants in PHEP.

Epidemiology functions. Epidemiology functions are one of several core public health capabilities highlighted by the panel as being critical for PHEP. Epidemiology includes the ability to monitor, detect, and investigate potential hazards – and to maintain and improve the systems necessary to support this capability. Panelists felt the epidemiology functions would be especially important to address hazards that are environmental, radiological, toxic, or infectious in nature.

Laboratory functions. An effective laboratory infrastructure is needed to test for potential hazards at all levels of response. As with epidemiology capability, laboratory capacity must be regularly maintained and upgraded, as needed. Laboratory functions are also especially important to address environmental, radiological, toxic, or infectious hazards.

Countermeasures and mitigation strategies. This element focuses especially on the response and recovery aspects of PHEP and includes such activities as mass antibiotic dispensing, mass vaccination, social distancing, and so on. Panelists felt that a prepared community must have the capacity to reduce or mitigate the level of hazard and to provide mass distribution of medications to the entire population, if warranted. Capabilities for isolation and quarantine are also important. Each of these capabilities needs to be developed, tested, and improved, when needed.

Mass health care. A related element is the ability to provide mass health care services during an emergency. The panel was clear that this element includes all modes of health provision including both hospital and clinical settings, field medical stations, and any other venue in which health care might be provided. Thus, the panel explicitly declined to use the conventional term “hospital surge,” in order to emphasize that what is important

is taking care of large numbers of people, rather than simply attempting to expand the current system. They stressed that care can take place outside of hospital and clinical settings.

Public information and communication. Panelists repeatedly stressed the importance of providing accurate and credible information to the public. Effective communication requires a strong knowledge of community needs (gleaned, for example, through the health risk assessment and long-term community engagement) so that targeted and culturally appropriate communications can be developed. The tools of risk communication should be used to build communication skills among pre-trained medical care providers, public spokespersons, and others prior to an emergency. As with the other elements, communication capabilities must be developed, practiced, and improved as needed.

Panelists also noted that communication with the public is an important part of pre-event planning. The public needs a clear understanding of what public officials are doing to prepare for an emergency and, further, what citizens roles and responsibilities are. As noted above, however, the panel believed that the public should be engaged in preparedness, in addition to receiving and responding to information (see “Public engagement”).

Robust supply chain. Effective PHEP requires critical resources for public health response to be identified in advance so that these supplies can be procured and stockpiled for use in an emergency. Communities must also develop effective means to deliver these resources throughout the supply chain. The panel was also clear that supply chain functions can often be delivered by a combination of public- and private-sector partners, and that efforts should be used to draw upon the expertise of the military, private business, and other partners who have far more experience in supply chain management than most public health professionals.

Expert and Fully Staffed Workforce

Two elements are related to an expert and fully staffed workforce.

Operations-ready workers and volunteers. State and local experience in planning for mass prophylaxis and other large-scale response operations suggests that staffing shortages and lack of current skills might limit timely responses (see, e.g., Blank, Moskin, & Zucker, 2003). Thus, the element on having operations-ready workers and volunteers is meant to convey that health systems must not only muster adequate *numbers* of staff and volunteers but also ensure that they are adequately prepared (either through pre-event or just-in-time training or other guidance) to *perform optimally* under stressful circumstances. This represents a new role for much of the public health workforce. As is the case with any capability, operations readiness must be demonstrated well in advance of an emergency.

In discussing this element, panelists emphasized that while it is critical to have a prepared public health workforce capable of caring for the people, citizens themselves also need to be prepared, and that such preparation helps build resiliency. In the words of one panelist, “We need both – citizenry as part of the solution and the public health workforce. Both need to be addressed and both have individual outcomes and will be measured differently.”

Leadership. Before and during an event, public health leaders play a critical role in mobilizing resources, engaging the community, developing interagency relationships, and communicating with the public. This element requires jurisdictions to take steps not only to recruit strong public health leaders but also to develop leadership potential within their ranks. The element is meant to highlight the role of leadership in *developing* and *sustaining* PHEP capabilities rather than just managing the response to emergent events. Thus, jurisdictions need to place emphasis on the training, recruitment, and development of public health leaders.

Accountability and Quality Improvement

The final three elements relate to accountability and quality improvement. The quality improvement ethos is evident in most of the elements already discussed, which enjoin communities to “develop, test, and improve” various capabilities. Panelists felt strongly that preparedness should not be viewed as a steady state, since a system of preparedness should be continually evolving and improving, based on measurement of its performance (during either real events or exercises).

Testing operational capabilities. This element includes testing, practicing, and improving PHEP based on exercises, drills, and real events. Panelists stressed that every exercise or real event presents opportunities to assess performance and determine whether improvements are needed. They particularly emphasized the need to have a system in place to assess real-time learning during real events, such as an influenza pandemic.

Performance management. Performance measurement and management systems are needed to inform the public about system performance and provide incentives and tools for improvement. Panelists stressed the need for a system characterized by clear performance measures and a system of accountability, in which stakeholders including public health agencies were held accountable for improvement, as well as a given level of preparedness. These measures should also provide data that can be used for quality improvement efforts designed to close performance gaps. Such a system would include measures, reporting, incentives, and resources for improvement.

Financial tracking. Finally, panelists noted the need to have systems in place to ensure fiscal accountability. Jurisdictions need to develop, test, and when necessary, improve financial systems so that they can adequately track resources and ensure adequate and timely reimbursement of third parties during an emergency.

CONCLUSION

The absence of a clear definition of PHEP makes it difficult to determine whether the nation is better prepared to respond to a bioterrorist attack or major disease outbreak than it was before the nation made considerable investments after the 9-11 attacks. Moreover, without an agreed-upon definition, policymakers and other stakeholders will continue to struggle to determine what it will take to get ready for such attacks and outbreaks, as well as how to prioritize future investments.

The definition presented here provides a concise, broadly applicable vision of what a prepared community looks like, along with a short list of actionable and measurable steps for attaining that vision. At the most general level, the definition and action-oriented elements can help provide a set of shared terms for discussion among various governmental and non-governmental actors about what exactly is involved in enhanced community preparedness. More specifically, the definition can provide a sound footing upon which to develop the kind of clear and coherent standards and metrics required by the recently signed Pandemic and All Hazards Preparedness Act of 2006, which, in turn, are required for public health systems to be accountable to the public. Simply put, the definition can help ensure that in the future we can answer the question on everyone's mind: "Are we prepared and, if so, for what?"

Acknowledgements: Expert panelists involved in the development of this definition include: James S. Gilmore, III, Chair; Georges C. Benjamin, MD, FACP; Mark Ghilarducci; Lewis R. Goldfrank, MD; Lawrence Gostin, JD; Shelley A. Hearne, DrPH; Nathaniel Hupert, MD, MPH; James J. James, MD, DrPH, MHA; Ana-Marie Jones; Kenneth W. Kizer, MD, MPH; Howard Koh, MD, MPH; John Lumpkin, MD, MPH; and Courtney Magnus. We appreciate the support of Lara Lamprecht, MPH, William Raub, PhD, Rich Besser, MD, Craig Thomas, PhD, Joe Posid, PhD, and RADM Craig Vanderwagen, in addition to other officials from HHS, CDC, and DHS with whom we spoke in preparing for the panel. We also thank Kristin Leuschner for her expert editorial assistance.

Human Participant Protection: This project was approved by the RAND Corporation Human Subjects Protection Committee.

APPENDIX A - PHEP DEFINITIONS FROM PROGRAM GUIDANCE AND THE LITERATURE

CDC FY06 Cooperative Agreement Guidance: “CDC’s Preparedness Goals are intended to frame urgent public health system response concepts for terrorism and non-terrorism events, including infectious disease, environmental and occupation-related emergencies.”

Disaster risk management (UN-ISDR): “The systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards.”

FEMA’s SLG 101: “Preparedness is part of a larger set of constructs, including mitigation (cf. prevent in DHS doctrine), preparedness, response, recovery. The overall goal is to minimize the impact caused by an emergency in the jurisdiction.” (1-2)

Florida DOH: The process of preparedness is an ongoing cycle: plan, equip, train, exercise, and then the cycle is repeated.

Homeland Security Council – National Strategy for Pandemic Influenza: Preparedness is the underpinning of the entire spectrum of activities, including surveillance, detection, containment and response efforts.

HRSA – National Bioterrorism Hospital Preparedness Program (NBHPP): “The vision of the NBHPP is for U.S. hospitals and the supporting healthcare systems to provide immediate and effective healthcare through a well-trained and equipped workforce to minimize morbidity and mortality in the event of a terrorist attack or other public health emergency.”

HSPD-8: “The term ‘preparedness’ refers to the existence of plans, procedures, policies, training, and equipment necessary at the Federal, State, and local level to maximize the ability to prevent, respond to, and recover from major events.

National Preparedness Goal and National Response Plan (DHS): “Preparedness” is defined (from the NRP, December 2004) as: “The range of deliberate, critical tasks and activities necessary to build, sustain, and improve the operational capability to prevent, protect against, respond to, and recover from domestic incidents. Preparedness is a continuous process involving efforts at all levels of government and between government and private-sector and non-governmental organizations to identify threats, determine vulnerabilities, and identify required resources.”

NFPA (National Fire Protection Association) 1600: “Activities, programs, and systems developed and implemented prior to a disaster/emergency that are used to support and enhance mitigation of, response to, and recovery from disasters/emergencies.” (4)

UN-ISDR on Preparedness: Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective

early warnings and the temporary evacuation of people and property from threatened locations.

APPENDIX B – MEMBERS OF THE EXPERT PANEL

James S. Gilmore III, Chair

Georges C. Benjamin, MD, FACP

Mark Ghilarducci

Lewis R. Goldfrank, MD

Lawrence Gostin, JD

Shelley A. Hearne, DrPH

Nathaniel Hupert, MD, MPH

James J. James, MD, DrPH, MHA

Ana-Marie Jones

Kenneth W. Kizer, MD, MPH

Howard Koh, MD, MPH

John Lumpkin, MD, MPH

Courtney Magnus

References:

- Asch, S. M., M. Stoto, M. Mendes, R. B. Valdez, M. E. Gallagher, P. Halverson, et al. "A Review Of Instruments Assessing Public Health Preparedness," *Public Health Reports*, Vol. 120, No. 5, September-October 2005, pp. 532-42.
- Auf der Heide, E., *Disaster Response: Principles of Preparedness and Coordination*, St. Louis, MO: Mosby, 1989.
- Auf der Heide, E., "The Importance of Evidence-Based Disaster Planning," *Annals of Emergency Medicine*, Vol. 47, No. 1, January 2006, pp. 34-49.
- Blank, S., L. C. Moskin, and J. R. Zucker, "An Ounce of Prevention Is a Ton of Work: Mass Antibiotic Prophylaxis for Anthrax, New York City, 2001," *Emerging Infectious Diseases* [serial online] 2003 Jun [date cited]. Online at <http://www.cdc.gov/ncidod/EID/vol9no6/03-0118.htm>
- Centers for Disease Control and Prevention (CDC), *Continuation Guidance for Cooperative Agreement on Public Health Preparedness and Response for Bioterrorism---Budget Year Six*, 2006. Online at <http://www.bt.cdc.gov/planning/coopagreement/#fy06>
- Fraser, M., "After 5 Years of Public Health Preparedness, Are We Ready Yet?" *Journal of Public Health Management Practice*, Vol. 13, No. 1, January-February 2007, pp. 3-6.
- Institute of Medicine (IOM), *The Future of Public Health*, Washington, DC: National Academy Press, 1988.
- Institute of Medicine (IOM), *The Future of the Public's Health in the 21st Century*, Washington, DC: National Academy Press, 2003.
- Keim, M., and P. Giannone, "Disaster Preparedness," in G. Ciottone, ed., *Disaster Medicine*, Philadelphia, PA: Mosby, 2006, pp. 164-173.
- Lenihan P., C. Welter, C. Chang, and G. Gorenflo, "The Operational Definition of a Functional Local Public Health Agency: The Next Strategic Step in the Quest for Identity and Relevance," *Journal of Public Health Management and Practice*, Vol. 13, No. 4, 2007, pp. 357-363.
- Lindell, M. K., and R. W. Perry, *Behavioral Foundations of Community Emergency Planning*, Washington, DC: Hemisphere Pub., 1992.
- Lurie, N., J. Wasserman, and C. Nelson, "Public Health Emergency Preparedness: Evolution Or Revolution?" *Health Affairs*, Vol. 25, No. 4, July-August 2006, pp. 935-45.
- Martin, W., "Citizen Rights and State Responses: Legal and Public Policy Responses of States to Bioterrorism," *American Journal of Public Health*, Vol. 94, No. 7, 2004, pp. 1093-6.
- National Association of County and City Health Departments (NACCHO), *Operational Definition of a Functional Health Department*, Washington, DC: NACCHO, 2005.

Online at

<http://www.naccho.org/topics/infrastructure/documents/OperationalDefinitionBrochure.pdf>

Nelson, C. D., N. Lurie, and J. Wasserman, "Assessing Public Health Emergency Preparedness: Concepts, Tools, and Challenges," *Annual Review of Public Health*, Vol. 28, 2007, pp. 1-18.

Pandemic and All-Hazards Preparedness Act (S.3678), July 18, 2006.

Quarantelli, E. L. and R. R. Dynes, "Response to Social Crisis and Disaster," *Annual Review of Sociology*, Vol. 3, 1977, pp. 23-49.

U.S. Department of Homeland Security, *National Preparedness Goal*, Washington DC: Government Printing Office, 2005. Online at http://www.ojp.usdoj.gov/odp/docs/InterimNationalPreparednessGoal_03-31-05_1.pdf