

# EDITORIAL

## Disaster Medicine and Public Health Preparedness: A Discipline for All Health Professionals

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Individuals and populations exposed to natural and human-caused disasters confront myriad social, physical, psychological, environmental, and economic conditions that affect health. Lessons learned from Hurricane Katrina (2005), the Haitian earthquake (2010), and other large-scale disasters consistently demonstrate that such events disproportionately affect the most vulnerable members of society, including children, elderly people, and minority populations. Minimizing adverse health outcomes requires cooperative efforts that cross traditional boundaries of health specialties, professions, and nationalities. Health professionals are on the front lines when dealing with injury and disease every day, whether natural or man made.

There are a wide variety of disasters ranging from localized events to large-scale public health emergencies. To respond effectively, health professionals, regardless of specialty or area of expertise, require a fundamental understanding of the disaster management system and the ways in which various health-related roles are integrated to protect health and respond to disease or injury. In a disaster or public health emergency (PHE), health professionals have an obligation to protect and preserve the health, safety, and security of their patients, families, and communities, as well as themselves. All health disciplines should be knowledgeable about the range of illnesses and injuries that may arise and how their particular expertise facilitates effective response. In addition, all must be able to recognize the general features of disasters and PHEs and be knowledgeable about their impact on the population, how to report a potential public health event, and where to access pertinent information as required. Most disaster events are on a scale that communities, whether in the developed or developing world, can manage well. Consequences are usually limited to direct injuries and deaths. In particular, large-scale PHEs place unprecedented demands on the existing public health infrastructure and system that may increase overall morbidity and mortality. PHEs require an added degree of coordination, cooperation, and collaboration between the clinical workforce and public health authorities.

### DEFINING THE KNOWLEDGE BASE FOR DISASTER MEDICINE AND PUBLIC HEALTH PREPAREDNESS

It is recognized within the discipline of disaster medicine and public health preparedness (DMPHP) that there are distinct principles and practices across the health and social sciences that pro-

vide a foundation for doctrine, education, training, and research within the public health and health care sectors. (DMPHP includes all health professions and specialties, including but not limited to allied health, dentistry, emergency medical services, environmental health, epidemiology, hazardous materials response, medicine, mental health, nursing, pharmacology, public health, toxicology, and veterinary medicine.) Previous definitions have been proposed, but despite their relevance, they have not achieved widespread consensus. To distinguish DMPHP from other health disciplines and professions, a modified definition is proposed that recognizes the essential integration of clinical and public health science and practice into the emergency response system:

DMPHP is defined as the study and collaborative application of sound scientific principles, practices, and standards by multiple health professions for the prevention, mitigation, management, and rehabilitation of injuries, illnesses, and other problems that affect the health, safety, and well-being of individuals and communities in disasters and public health emergencies.

Strong impetus for more focused attention to education, training, and research in DMPHP was provided by Homeland Security Presidential Directive 21 (HSPD-21)<sup>3</sup> and 3 recent consensus reports.<sup>4-6</sup> HSPD-21 specifically calls for the establishment of a discipline that recognizes the unique principles in disaster-related medicine and public health; provides a foundation for the development and dissemination of doctrine, education, training, and research in this field; and better integrates private and public entities into the disaster health system. As precedent for this new discipline, HSPD-21 cites the evolution of the specialty of emergency medicine due to recognition of the special considerations of emergency patient care. HSPD-21 endorses similar action directed to disaster-related public health and medicine, which merits the establishment of a separate formal discipline.

Although DMPHP draws from multiple other fields, to be recognized and embraced as a distinct academic discipline, it must be differentiated by its own unique and distinctive essentials. This can be accomplished through description of an identifiable philosophy for the discipline, a sound conceptual framework, a unique core body of knowledge, and acceptable methodological approaches for the pursuit and development of knowledge in the field.<sup>7</sup> Just as the discipline of biochemistry and its accompanying journals once evolved from the interests of individual ex-

perts in organic chemistry, zoology, botany, and other fields, and the discipline of genomics evolved from the interests of individual biochemists, geneticists, pharmacologists, and others, it is envisioned that the discipline of DMPHP will evolve similarly, in response to proper input and nurturing from experts with diverse clinical and public health backgrounds.<sup>8</sup> DMPHP can be seen as a “composite” discipline requiring integrated multidisciplinary study and research to meet its goals.

Proficiency in DMPHP requires knowledge and skills beyond those typically acquired in clinical and public health training and practice, and must encompass unique competencies. The delivery of optimal care in a disaster relies on both clinical and public health expertise, and depends on a common understanding of each health professional’s role in the broader emergency management system. To be considered proficient in DMPHP, individuals must demonstrate common mastery of defined essentials in this field. Certain backgrounds (such as may be found in subspecialties within medicine, public health, and nursing, among others) may have further differentiated skills that can be applied effectively in specific disaster events.

### **EMERGENCY MANAGEMENT ASPECTS OF DMPHP**

To prepare for a disaster or PHE, health professionals should learn the essential elements of community and institutional disaster plans, as well as federal and local incident command. Plans should include assessment and characterization of surge capacity assets in the public and private health response sectors, and the extent of their potential assistance in an emergency. Health responders must be knowledgeable about institutional, community, and regional response systems and their respective roles within those structures, including policies and procedures for mobilizing and integrating civilian, military, and other response resources and assets. Health responders also require knowledge of administrative regulations, safety and security issues, systems engineering, decontamination protocols, forensics, use of personal protective equipment, evacuation procedures, continuity planning, and utilization of public information and communication networks.

### **CLINICAL ASPECTS OF DMPHP**

In a disaster, clinicians should be prepared to apply and adapt their usual practices and behaviors, as appropriate, to the recognition, diagnosis, triage, and treatment of seriously injured or ill people, with limited situational awareness and resources. They may be required to apply their accustomed clinical skill set to the assessment and management of people of all ages under a variety of scenarios. At times, they may be called upon to fill nonclinical response functions such as moving patients during a hospital evacuation. Although clinicians specializing in DMPHP should have a universal core knowledge and skill set, understanding the limitations of one’s individual clinical capabilities is equally important.

Clinicians and other health responders need to be familiar with medical and mental health implications of the spectrum of di-

sasters and PHEs and recognize that people may have been exposed to nonconventional agents as the source of unusual presentations. This requires competence in identifying the health consequences and treatment of exposure to biological, chemical, radiological, nuclear, and incendiary agents. In a mass casualty situation, health system responders may need to take personal histories, conduct physical examinations, and manage injured or ill people in potentially hazardous environments with limited medical supplies and equipment while maintaining situational awareness. They should be prepared to follow appropriate diagnostic procedures to confirm or refute possible etiologies, and in some cases begin treatment based solely on symptoms and signs. Implementation of safety and protection principles to prevent harm to themselves and others is critical, as is sensitivity to the diagnostic and treatment plans for psychological and behavioral as well as physical trauma.

All health responders should know the ethical and legal structures that govern response to disasters and PHEs, while maintaining the highest possible standards of care under extreme conditions. This encompasses their rights and responsibilities to protect themselves and treat others (including those with potentially contagious diseases), with consideration of issues such as professional liability, worker protection and compensation, licensure, and privacy.

### **PUBLIC HEALTH ASPECTS OF DMPHP**

There are many health system responders who are not clinicians that need to demonstrate proficiency in public health preparedness and response. Although they may not be involved directly in casualty assessment and treatment, the work of these responders is critical to meeting the health needs of affected populations. Actions and interventions that must be considered following the onset of a disaster or PHE include health monitoring and surveillance; outbreak investigation; isolation and quarantine; population-based triage; mass sheltering and feeding; vector control; environmental monitoring; ensuring the safety of food and water supplies; responder and health care worker protection; basic sanitation and hygiene; countermeasure stockpiling, distribution, and dispensing; and management of mass fatalities. This requires basic knowledge of descriptive and analytical epidemiology, laboratory science, environmental and occupational health, infection control, nutrition, effective communication practices and the social sciences.

Health professionals who have direct roles in disaster response should be able to support surveillance efforts and explain the rationale and procedures for case reporting. The basics of risk communication and health messaging will be essential for communicating with affected individuals, their families, and the media regarding exposure risks and potential preventive measures. Finally, just like clinicians, public health responders should know the moral, ethical, and legal issues that are relevant to the management of affected populations and communities and the basic legal framework for public health. They should be fa-

miliar with ethical principles that underlie decision making in disasters, such as those impacting allocation of scarce resources.

### **DEVELOPING CORE CURRICULA AND TRAINING PROGRAMS IN DMPHP**

Recent disasters and terrorist events have increased federal interest and attention for the integration of DMPHP into clinical and public health education. In 2006, passage of the Pandemic and All-Hazards Preparedness Act (PAHPA; PL 109-417) created important opportunities to build upon and standardize disaster preparedness education through various programs at the federal, state, and local levels.<sup>9</sup> PAHPA called for the development of integrated, interdisciplinary, and consistent public health and medical disaster response curricula, which would be available to health professionals and health professional schools. Section 304 of the Act states that “the Secretary of Health and Human Services (HHS), in collaboration with the Secretary of Defense, and in consultation with relevant public and private entities, shall develop core health and medical response curricula and training by adapting applicable existing curricula and training programs to improve responses to public health emergencies.”

In 2007, HSPD-21 called for federal interagency action and cooperation to ensure that core public health and medical curricula and training developed pursuant to PAHPA address the needs to improve individual, family, and institutional public health and medical preparedness and to develop a mechanism to coordinate public health and medical disaster preparedness and response core curricula and training across executive departments and agencies, to ensure standardization and commonality of knowledge, procedures, and terms of reference within the federal government that also can be communicated to state and local government entities, academia, and the private sector.

To lead federal efforts for the development and delivery of core curricula and training related to medicine and public health in disasters, HSPD-21 specifically calls for the establishment of an academic joint program for disaster medicine and public health, housed at a National Center for Disaster Medicine and Public Health, at the Uniformed Services University of the Health Sciences. The HHS and Department of Defense are required to carry out respective civilian and military missions within this program. In 2009, federal directives aimed at education and training in disaster medicine and public health began to be addressed by the Federal Education and Training Interagency Group. The Group, as authorized under PAHPA, serves as a coordinating body for the delineation of core competencies and education and training standards across federal departments and agencies, as well as state and local government entities, academia, and the private sector in relation to public health emergency and disaster response. The primary charge of this group is to identify and implement a national strategy for the education and training of health professionals in disaster-related medicine and public health. The recently re-

leased National Health Security Strategy further emphasizes the importance of professional training, competencies, and standards to help ensure the attainment and maintenance of proficiency by the disaster response workforce.<sup>10</sup>

In 2009, the American Medical Association (AMA) House of Delegates adopted policy calling for formal education and training in DMPHP to be incorporated in all medical school and residency programs.<sup>11</sup> This initiative includes integration of core curricula and training programs to provide a consistent learning experience for physicians-in-training and other students in the health professions. Such training requires consensus on competencies and learning objectives to ensure that course content is based on a well-defined and testable body of knowledge, skill set, and methodology.

To prepare health professionals to respond appropriately and to assist professional schools and continuing education programs to meet this challenge, various organizations and universities have developed competencies for health professionals and other emergency responders.<sup>12-20</sup> To date, many of these efforts have been limited primarily to individual specialties or targeted professionals. This has resulted in a lack of definitional uniformity across professions with respect to education, training, and best practices, thus limiting the establishment of DMPHP at an operational level. To better integrate competencies across all health specialties and professions, a consensus-based educational framework and competency set was published from which educators could devise learning objectives and curricula in DMPHP that are tailored to the needs of all health professionals.<sup>21</sup> The framework includes the delineation of 7 core learning domains and 19 core competencies (Table), as well as 73 specific subcompetencies targeted at 3 broad health personnel categories. A learning matrix also was developed to allow disaster health educators and accreditation entities to incorporate the competencies at any desired proficiency level.

The DMPHP educational framework identifies 3 broad, yet distinct, personnel categories to encompass all health professionals: informed workers/students, practitioners, and leaders. Personnel are expected to perform at different levels of proficiency depending on their experience, professional role, level of education, or job function across the core competencies and subcompetencies. The framework allows for all health professions to be represented in each category, and recognizes the diversity of expected job functions and educational requirements for each health profession involved in disaster prevention, mitigation, response, and recovery. The health personnel categories establish increasing standards for each core competency. The proposed competency set and educational framework were endorsed by the National Disaster Life Support Education Consortium in May 2008. (The Consortium is an unincorporated association jointly sponsored by the AMA and National Disaster Life Support Foundation, Inc, convened by the AMA. It consists of 75 professional organizations and distinguished individuals with interest and expertise in di-

saster medicine and public health preparedness, as well as experts in professional education and curriculum development, all of whom participate on a voluntary basis.)

Although this vision has been endorsed by many, the implementation is not clear. Decisions about exactly which competencies form the common core for all members of all professions considered to be health professions have not been made. Work that is under way to meet the PAHPA mandate for public health education, for example, does not presume that all public health workers will possess the skills to diagnose individual patient conditions or initiate individual therapies. Similarly, it is unlikely that all licensed physicians and nurses will be expected to have the skills to diagnose and mitigate contamination of a municipal water supply. All of these need a common base that is respectful of all contributions to health and maximizes the efficiency of the health contribution to community readiness, response, and recovery. The DMPHP educational

framework provides the best effort to date to facilitate decisions about how best to proceed.

If DMPHP is to be a recognized discipline, then a core standard curriculum must be defined and mastery demonstrated by all who wish to be acknowledged as proficient or “specialist” in this field. Anything less perpetuates the insular “silo” approach that continues today. Specific subcompetencies appropriate for public health practitioners, or certain medical and nursing practitioners, must be considered in addition to the core competencies, however they are defined.

**BUILDING THE DMPHP RESEARCH BASE**

The effects of conventional disasters and PHEs can be studied through well-established clinical and epidemiological research methods. Such information is critical for adaptation of preparedness, response, and recovery plans. To ensure a sound evidence base for DMPHP, continued research is needed to elu-

**TABLE**

**Core Competencies for All Health Professionals in DMPHP<sup>21</sup>**

| Competency Domain                                      | Core Competencies  |
|--|--|
| 1.0 Preparation and Planning                           | 1.1 Demonstrate proficiency in the use of an all-hazards framework for disaster planning and mitigation.<br>1.2 Demonstrate proficiency in addressing the health-related needs, values, and perspectives of all ages and populations in regional, community, and institutional disaster plans.   |
| 2.0 Detection and Communication                        | 2.1 Demonstrate proficiency in the detection of and immediate response to a disaster or public health emergency.<br>2.2 Demonstrate proficiency in the use of information and communication systems in a disaster or public health emergency.<br>2.3 Demonstrate proficiency in addressing cultural, ethnic, religious, linguistic, socioeconomic, and special health-related needs of all ages and populations in regional, community, and institutional emergency communication systems.   |
| 3.0 Incident Management and Support Systems            | 3.1 Demonstrate proficiency in the initiation, deployment, and coordination of national, regional, state, local, and institutional incident command and emergency operations systems.<br>3.2 Demonstrate proficiency in the mobilization and coordination of disaster support services.<br>3.3 Demonstrate proficiency in the provision of health system surge capacity for the management of mass casualties in a disaster or public health emergency.  |
| 4.0 Safety and Security                                | 4.1 Demonstrate proficiency in the prevention and mitigation of health, safety, and security risks to yourself and others in a disaster or public health emergency.<br>4.2 Demonstrate proficiency in the selection and use of personal protective equipment at a disaster scene or receiving facility.<br>4.3 Demonstrate proficiency in victim decontamination at a disaster scene or receiving facility.  |
| 5.0 Clinical/Public Health Assessment and Intervention | 5.1 Demonstrate proficiency in the use of triage systems in a disaster or public health emergency.<br>5.2 Demonstrate proficiency in the clinical assessment and management of injuries, illnesses, and mental health conditions manifested by all ages and populations in a disaster or public health emergency.<br>5.3 Demonstrate proficiency in the management of mass fatalities in a disaster or public health emergency.<br>5.4 Demonstrate proficiency in public health interventions to protect the health of all ages, populations, and communities affected by a disaster or public health emergency. |
| 6.0 Contingency, Continuity, and Recovery              | 6.1 Demonstrate proficiency in the application of contingency interventions for all ages, populations, institutions, and communities affected by a disaster or public health emergency.<br>6.2 Demonstrate proficiency in the application of recovery solutions for all ages, populations, institutions, and communities affected by a disaster or public health emergency.  |
| 7.0 Public Health Law and Ethics                       | 7.1 Demonstrate proficiency in the application of moral and ethical principles and policies for ensuring access to and availability of health services for all ages, populations, and communities affected by a disaster or public health emergency.<br>7.2 Demonstrate proficiency in the application of laws and regulations to protect the health and safety of all ages, populations, and communities affected by a disaster or public health emergency.   |

cidate the clinical and public health effects of specific disasters; analyze risk factors for adverse social and health effects; and provide for investigation of the effectiveness of clinical and public health interventions and various types of disaster assistance, and the long-term influence of relief operations on the restoration of predisaster conditions. New or modified research tools may be needed to facilitate discoveries in DMPHP.

Dedicated textbooks and peer-reviewed journals, such as *Disaster Medicine and Public Health Preparedness*, are being published to provide the scientific basis and framework for research, education, and training in this field. Additional venues for scholarly discourse in DMPHP include numerous conferences and symposia that have been convened in the United States and abroad. In December 2009, the AMA, in conjunction with the HHS Office of the Assistant Secretary for Preparedness and Response, sponsored the Third National Congress on Health System Readiness. The conference was attended by more than 500 public and private sector health professionals. In February 2010, the National Association of County and City Health Officials held the Fourth Annual Public Health Preparedness Summit, which was attended by approximately 2000 health professionals. In May 2010, the annual Integrated Medical, Public Health, Preparedness and Response Training Summit, sponsored by HHS, was convened as a forum for conducting training, sharing information, and networking among various national organizations involved in preparing for and responding to disasters and public health emergencies. International conferences include the Asia-Pacific Conference on Disaster Medicine as well as meetings sponsored by the World Association for Disaster and Emergency Medicine, the International Society for Disaster Medicine, and the World Health Organization.

Continued validation of principles and practices in DMPHP through sound scientific methods and evidence is fundamental, urgently needed, and essential. Research is needed for the design and evaluation of process and performance measures, educational modalities (eg, lectures, simulations, drills, exercises), and clinical and public health interventions, as well as for the translation of research into improvements in disaster medicine and public health practice. To be meaningful, best practices and performance benchmarks must be evaluated in the context of where these will really be required, in realistic scenarios that involve a community's entire emergency management system, operating as required under the National Response Framework and compliant with the National Incident Management System.

### **ESTABLISHING THE DISCIPLINE OF DMPHP— THE TIME IS NOW**

DMPHP seeks to engage all health professions in efforts to prepare for, respond to, and recover from disasters and PHEs. Because DMPHP relies on the amalgamation of knowledge about health issues affecting individuals and populations in a disaster or public health emergency, it does not belong to any single specialty, profession, or discipline—it belongs to all. It is not simply

an extension of dentistry, medicine, nursing, mental health, pharmacy, or a branch of public health. Rather, the discipline extends to all health care and public health professionals whose expertise supports the health-related capacity of emergency response systems. DMPHP is unique in that it can be considered a secondary discipline of all health professionals, as they seek to fulfill professional and societal obligations to patients, populations, and communities in a disaster or public health emergency.

Education and training in DMPHP should be integrated as a basic element of lifelong learning for all clinical and public health professionals. Considering the relevance of this field for all health professionals, schools and entities responsible for the training, continuing education, credentialing, and certification of health professionals should incorporate cross-cutting competencies in DMPHP into curricula at the undergraduate, graduate, and postgraduate levels. Mechanisms must be developed to coordinate public health and clinical disaster preparedness and response education in the public and private sectors to ensure standardization and commonality of knowledge, procedures, and terms of reference.

Core curricula and training programs are needed to provide a consistent learning experience for all health professionals. Developing such curricula presents a daunting challenge—disasters, terrorism, and public health emergencies can occur in multiple scenarios, with diverse clinical and public health outcomes, many of which are not addressed in current health professional education. Certainly, DMPHP topic areas must be relevant to the roles they will play and be reasonably attainable, considering time and financial resources. Despite the challenges of integrating new content into existing health professional curricula, the risk of not doing so can no longer be ignored.

DMPHP is more than just clinical care and public health. There are also major elements of politics, economics, social sciences, and logistics that must exist to plan and respond effectively. DMPHP professionals provide care, leadership, and community guidance throughout all phases of a disaster. They serve to interface with public safety and emergency management personnel, government agency officials, legislators, and the media, and facilitate coordination of private and public sector disaster response assets. As colleagues of a formally recognized discipline, DMPHP professionals can provide the essential expertise and leadership to facilitate the integration of the clinical and public health sectors as well as civilian-military coordination that forms a resilient national disaster health system.

A new organizational entity that has the committed resources to provide comprehensive, dedicated leadership and support for the promotion and advancement of this field is needed to provide the structure and means for sustaining multiprofessional interaction and discourse in DMPHP, with a broad membership. As the umbrella organization for DMPHP, this entity could develop and foster mechanisms to coordinate public health and clinical disaster preparedness and response core curricula and training across professions. As envisioned, the mission of this

organization would be to achieve and promote excellence in education, training, and research related to DMPHP for all health professionals based on sound educational principles, scientific evidence, and best clinical and public health practices. To fulfill this mission and realize its desired impact, this new organization would support a membership dedicated to formalized, life-long learning in DMPHP with a shared vision to create a network of personnel who are ready, willing, and able to meet the health and safety needs of all ages and populations affected by disasters and public health emergencies.

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1. Brown RKB. Disaster medicine. What is it? Can it be taught? *JAMA*. 1966; 197:133-136.
2. Gunn SWA, Masellis M. The scientific basis of disaster medicine. *Ann MBC*. 1992;5:51-55 [http://www.medbc.com/annals/review/vol\\_5/num\\_1/text/vol5n1p51.htm](http://www.medbc.com/annals/review/vol_5/num_1/text/vol5n1p51.htm). Accessed March 12, 2010.
3. Homeland Security Presidential Directive 21 (HSPD-21). Public Health and Medical Preparedness. Washington, DC: The White House. October 18, 2007. <http://fas.org/irp/offdocs/nspd/hspd-21.htm>. Accessed March 12, 2010.
4. Institute of Medicine Report Series on the Future of Emergency Care in the U.S. Health System: (a) *Emergency Care for Children: Growing Pains*. (b) *Emergency Medical Services at the Crossroads*. (c) *Hospital-Based Emergency Care: At the Breaking Point*. Washington, DC: National Academies Press; 2006.
5. American Medical Association, American Public Health Association. *Improving Health System Preparedness for Terrorism and Mass Casualty Events: Recommendations for Action. A Consensus Report of the AMA/APHA Linkages Leadership Summit*. Chicago: American Medical Association; 2007. [http://www.ama-assn.org/ama1/pub/upload/mm/415/final\\_summit\\_report.pdf](http://www.ama-assn.org/ama1/pub/upload/mm/415/final_summit_report.pdf). Accessed March 12, 2010.
6. Institute of Medicine. *Research Priorities in Emergency Preparedness and Response for Public Health Systems: A Letter Report*. Washington, DC: National Academies Press; 2008. [http://www.nap.edu/catalog.php?record\\_id=12136](http://www.nap.edu/catalog.php?record_id=12136). Accessed March 12, 2010.
7. Cameron-Traub E. An evolving discipline. In Gray C, Pratt R, eds. *Towards a Discipline of Nursing*. Melbourne, Australia: Churchill Livingstone; 1991.
8. James JJ, Subbarao I, Lanier WL. Improving the art and science of disaster medicine and public health preparedness. *Mayo Clin Proc*. 2008;83: 559-562.
9. Pandemic and All-Hazards Preparedness Act (PAHPA); 2006. <http://www.hhs.gov/aspr/ops/pahpa/index.html>. Accessed March 12, 2010.
10. US Department of Health and Human Services (HHS). *National Health Security Strategy of the United States of America*. Washington, DC: HHS; 2009. <http://www.hhs.gov/aspr/ops/nhss/nhss0912.pdf>. Accessed March 12, 2010.
11. Policy H-295.868; AMA Policy Database. As cited in Report 15 of the Council on Medical Education. *Education in Disaster Medicine and Public Health Preparedness During Medical School and Residency Training*. CME Report 15 (A-09). Chicago: American Medical Association; 2009.
12. Association of Schools of Public Health. *Public Health Preparedness and Response Core Competency Development Project*. <http://www.asph.org/document.cfm?page=1081>. Accessed March 12, 2010.
13. Medical Reserve Corps. *MRC Core Competencies Matrix*. Washington, DC: Office of the Surgeon General; 2007. [http://www.medicalreservecorps.gov/File/MRC%20TRAIN/Core%20Competency%20Resources/Core\\_Competencies\\_Matrix\\_April\\_2007.pdf](http://www.medicalreservecorps.gov/File/MRC%20TRAIN/Core%20Competency%20Resources/Core_Competencies_Matrix_April_2007.pdf). Accessed March 12, 2010.
14. Hsu EB, Thomas TL, Bass EB, et al. Healthcare worker competencies for disaster training. *BMC Med Educ*. 2006;6:1-9 <http://www.biomedcentral.com/1472-6920/6/19>. Accessed March 12, 2010.
15. Barbara JA, Macintyre AG, Shaw G, et al. *VHA-EMA Emergency Response and Recovery Competencies: Competency Survey, Analysis, and Report*. Washington, DC: Institute for Crisis, Disaster, and Risk Management, The George Washington University; 2005.
16. Hospital Core Competency Sub Committee and Health, Medical, Hospital, and EMS Committee Florida State Working Group. *State of Florida Recommended Core Competencies & Planning/Mitigation Strategies for Hospital Personnel*; 2004. <http://www.emlrc.org/pdfs/disaster2005presentations/HospitalDisasterMgmtCoreCompetencies.pdf>. Accessed March 12, 2010.
17. *Educational Competencies for Registered Nurses Responding to Mass Casualty Incidents*. Nashville: International Nursing Coalition for Mass Casualty Education; 2003. <http://www.aacn.nche.edu/Education/pdf/INCMCECompetencies.pdf>. Accessed March 12, 2010.
18. Center for Public Health Preparedness, Columbia University Mailman School of Public Health and the Center for Health Policy, Columbia University School of Nursing, Greater New York Hospital Association, The Commonwealth Fund. *Emergency Preparedness and Response Competencies for Hospital Workers*. New York: Center for Health Policy, Columbia University School of Nursing; 2003. <http://www.ncdp.mailman.columbia.edu/files/hospcomps.pdf>. Accessed March 12, 2010.
19. Center for Health Policy, Columbia University School of Nursing. *Bioterrorism and Emergency Readiness: Competencies for All Public Health Workers*. New York: Center for Health Policy, Columbia University School of Nursing; 2002. <https://www.train.org/Competencies/btcomps.pdf>. Accessed March 12, 2010.
20. American College of Emergency Physicians NBC Task Force. *Developing Objectives, Content, and Competencies for the Training of Emergency Medical Technicians, Emergency Physicians, and Emergency Nurses to Care for Casualties from Nuclear, Biological, or Chemical (NBC) Incidents: Final Report*. Washington, DC: Department of Health and Human Services, Office of Emergency Preparedness; 2001.
21. Subbarao I, Lyznicki JM, Hsu EB, et al. A consensus-based educational framework and competency set for the discipline of disaster medicine and public health preparedness. *Disaster Med Public Health Preparedness*. 2008; 2:57-68.