Issue Brief
No. 7

Bioterrorism
and Health System Preparedness

The Agency for Healthcare Research and Quality (AHRQ) is the lead agency charged with supporting research designed to improve the quality of health care, reduce its cost, address patient safety and medical errors, and broaden access to essential services. AHRQ sponsors and conducts research that provides evidence-based information on health care outcomes; quality; and cost, use, and access. The information helps health care decisionmakers—patients and clinicians, health system leaders, and policymakers—make more informed decisions and improve the quality of health care services.

Surge Capacity—Education and Training for a Qualified Workforce

Introduction

Surge capacity is a health care system's ability to expand quickly beyond normal services to meet an increased demand for medical care in the event of bioterrorism or other large-scale public health emergencies.

A health system's ability to expand its services rapidly depends on the availability of qualified personnel and their ability to perform tasks assigned to them. Building a qualified workforce requires that disaster planners recruit previously untapped resources, such as non-active nurses, and provide training to ensure that these personnel are prepared to respond to significantly increased surge capacity requirements.

On March 2, 2004, the Agency for Healthcare Research and Quality (AHRQ) sponsored a Web-assisted audio conference that examined how education and training efforts are being used to create and maintain the readiness of an appropriately trained workforce that can respond to a sudden increase in surge capacity needs. Presentations were made by the following researchers and practitioners:

- Joan P. Cioffi, Ph.D., Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, Atlanta;
- Terri Spear, Ed.M., Health Resources and Services Administration, U.S. Department of Health and Human Services, Rockville, Md.;
- Michael Allswede, D.O., University of Pittsburgh Medical Center Health System, Pittsburgh; and
- Betsy Weiner, Ph.D., R.N., B.C., FAAN, Vanderbilt University, Nashville, Tenn.

This issue brief summarizes those presentations and the question and answer period that followed. Dr. Cioffi and Ms. Spear described education and training initiatives sponsored by the Centers for

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Disease Control and Prevention (CDC) and the Health Resources and Services Administration (HRSA), respectively. Dr. Allswede described his AHRQ-funded project to develop non-contiguous training that teaches hospital personnel the skills they need to respond to bioterrorism or other large-scale public health emergencies. Dr. Weiner discussed her project, also funded by AHRQ, to develop and evaluate Web-based and face-to-face training modules to prepare volunteer nurses to respond to public health emergencies. A recurring theme of the audio conference was the importance of competency-based training.

CDC Funding for Education and Training

One of CDC's top strategic imperatives is to build a competent and sustainable public health workforce that can respond to a bioterrorist event or other public health emergency. "CDC has developed a national public health strategy for terrorism preparedness and response that will guide our agency's efforts over the next five years," said the CDC's Joan Cioffi. Dr. Cioffi described education and training activities in three broad categories.

The first category is State and local education and training, which is mandated by CDC's Cooperative Agreement on Public Health Preparedness and Response for Bioterrorism. The Cooperative Agreement provides grants to 50 States, the District of Columbia, eight territories, and three cities. Grantees are expected to conduct needs assessments, develop training plans, and have some capacity to maintain data on who has been trained. CDC plans to disseminate best practices on a regional and national basis and is currently developing system performance indicators and exercises and drills to help grantees refine their training activities.

The second category is partnerships. The Centers for Public Health Preparedness program includes 23 schools of public health and 13 specialty centers, including schools of medicine, nursing, veterinary medicine, and law. The Centers work with state and local partners to meet identified community needs. For example, the University of Illinois at Chicago is working with the Illinois Department of Health and the City of Chicago to provide needs assessments for training of all public health staff and to develop customized training.

CDC has also formed partnerships through outreach to clinicians. In response to clinicians' desire for guidance from their professional peers and the organizations they typically work with, CDC has established relationships with the Association of American Medical Colleges and eight specialty societies. They are working collaboratively to develop customized information for more than 300,000 clinicians and health care professionals who have links to these organizations.

The third broad category is as a direct provider of education and training, both internally and externally. Internally, CDC must train its emergency operations staff and field staff for terrorism preparedness. External training is provided through nine different CDC offices, centers, and agencies. The Office of Terrorism Preparedness and Emergency Response coordinates the various education and training programs to identify gaps and avoid duplications.

Dr. Cioffi summarized CDC's role in providing critical health information as being part of a continuum from communication to professional education. CDC has learned from its experience with the anthrax attacks, the spread of SARS, and other emerging health threats that two strategies are needed. CDC's "just in case"strategy involves making educational information available to frontline public health professionals and clinicians, helping to prepare them to recognize illnesses that might be caused by a terrorist agent. A good example of that strategy is the wealth of information on smallpox that is available on CDC's Web site.

The second strategy, "just in time," involves being able to provide information that can be immediately accessed by public health professionals and clinicians when they are presented with a case that may have been affected by a bioterrorist event. Clinical guidance and medical management protocols can be made available through hotlines, health alerts and advisories, emergency satellite videoconferences, and other means. The starting point for both strategies is CDC's Web site (www.cdc.gov).

HRSA's National Bioterrorism Hospital Preparedness Program

The purpose of HRSA's National Bioterrorism Hospital Preparedness Program is to "ready hospitals and supporting health care systems to deliver coordinated and effective care to victims of terrorism and other public health emergencies." Guidance in the first year of the program, FY 2002, made education and training a

secondary priority, and program guidance for FY 2003 made it optional. Nevertheless, HRSA's detailed review of applications for continuation funding found that 100 percent of its grantee hospitals are addressing education and training for bioterrorism and other public health emergencies.

HRSA's analysis of the education and training being provided by grantee hospitals included who was being trained, what topics were being addressed, and what educational methodologies were being used. Because it is a hospital-based program, the training of laboratory personnel and medicine, mental health, nursing, and allied health professionals was expected. Hospital training has also targeted fire, police, and emergency medical personnel.

The topic most frequently addressed during training is worker safety, which focuses on how to use personal protective equipment and how to perform basic activities while wearing it. The second most frequently addressed topic is psychosocial issues for both patients and providers. Other topics include responding to biological, chemical, and radiological events; incident command; risk communication; and treating special populations.

Grantees reported using several different educational methodologies. Sixty-nine percent reported using face to face training, either "one on one" or "one to many." Sixty-one percent are using distance learning approaches such as Web-based training and video and other tape, 55 percent are using field exercises or drills, and 52 percent have distributed written learning materials.

While it is clear that hospitals are engaged in education and training for bioterrorism preparedness, neither the hospitals nor HRSA can answer one overriding question today. That question is, "What percentage of the Nation's health care workforce is prepared to respond competently to a public health emergency?" To help answer that question, HRSA is assisting awardees in shifting from content-focused training toward competency-based training. Instead of acquiring content knowledge about smallpox, anthrax, or radiation illness, for example, hospital employees would be expected to be able to describe and demonstrate their emergency response role.

"Competency-based education increases the relationship between training and workplace applicability," said HRSA's Terri Spear. "Health care providers will have a measure to assess for themselves that they are as prepared as they can be in response to an event and to be able to provide the best care possible for the population that they are serving." By offering a clearer definition of provider preparedness, competency-based training also improves the transferability and comparability of training across health care facilities.

Further information about HRSA's National Hospital Bioterrorism Program is available at www.hrsa.gov/bioterrorism.htm.

Non-Contiguous Training

Dr. Michael Allswede is the principal investigator on an AHRQ-sponsored project to develop a competency-based training approach called "non-contiguous training" as a method of teaching hospital personnel the skills needed to respond to bioterrorism or other large-scale public health emergencies. Biological or chemical or radiation events are different from other emergencies because they place the medical caregiver at risk. They may place patients already in the hospital at risk and may place the facility itself at risk. Keeping caregivers, patients, and the facility safe requires new skill development and adaptation of other technical skills.

Those new skills are better taught on an individual level rather than in a general drill. Non-contiguous training divides the hospital disaster plan into key capacities and key skills that are then assigned to individual staff members. The skill level of each staff member is assessed and needed skills are tracked as they are acquired to give each person an individualized training program. Training is divided into segments so that the staff member can learn the skills during downtime or on regular CME training days. In effect, each person has his or her own individual disaster plan. When a general drill is then held, or if an emergency event occurs, each individual knows what he or she is supposed to do.

The concept of non-contiguous training has been borrowed from the U.S. Navy's Afloat Training Exercise and Management System (ATEAMS). A Navy ship is similar to a hospital in disaster emergency training, said Allswede, in that "you cannot just stop a ship and have it go through a training day and then start it going again." Similarly, hospitals cannot stop their normal functions to take part in a drill. Moreover, drills are often scheduled at the convenience of individuals from other sectors of the

community, such as the police. (For example, drills may be scheduled in the morning, which is optimal for the police force but almost always very busy for hospitals.) In addition, drills are costly and consume significant staff time. At the University of Pittsburgh Medical Center, for example, a disaster drill in the emergency department costs $3,000 per hour in staff salary alone. Non-contiguous training is intended to disseminate knowledge and skills prior to a disaster drill, thereby making the drill more effective and efficient.

The program being developed by Dr. Allswede and his colleagues has also borrowed a concept from the U.S. Army called the "FAPV" sequence, which stands for Familiarize, Acquire, Practice, and Validate. The first two components lend themselves to non-contiguous training. The Familiarize component includes classic classroom teaching, distance learning, video interface, and memory enhancement tools like mnemonics. The Acquire component employs two methodologies. One is virtual interface using an interactive computer program. The second is a training room containing approximately 40 physiologic mannequins that have pulses, can talk, and can exhibit a wide range of symptoms. Medical staff can practice treating symptoms in a controlled environment.

The Practice component is best done in a standard drill format. The focus of the drill is not on whether the individual knows what to do, but whether individuals and groups together can apply the skills they have acquired to accomplish their objective. The Validate component may be "the real thing" or an unannounced drill, but can also be done in a non-contiguous way. The University of Pittsburgh Medical Center, for example, validates the training of their microbiology technicians by occasionally submitting a slide containing a biological pathogen among normal slide sets. The objective is to validate the ability of the technician to identify the pathogen and respond in an appropriate manner.

The non-contiguous training program will be published by AHRQ. Until that time, additional information is available from Project Director Lucy Savitz, Ph.D., at the Research Triangle Institute: savitz@rti.org.

Preparing Volunteer Nurses for Public Health Emergencies

With support from an AHRQ grant, the Vanderbilt University School of Nursing is developing and will evaluate modules that are intended to prepare volunteer and non-active nurses to respond to events of bioterrorism or other public health emergencies. The evaluation will compare online with face-to-face training to determine the effectiveness and efficiency of each approach. The project will also attempt to define user characteristics that predict selection and completion of training by each method, and to determine the adequacy of technology integration in learning emergency response skills.

The project is targeted at inactive nurses who have volunteered for the Medical Reserve Corps (MRC) in their local communities. MRC volunteers must be trained to know what their role is in an organized response to a mass casualty event. The Vanderbilt project will provide that training. Furthermore, the Vanderbilt team believes that nurses who have volunteered will be more motivated to learn.

The training modules that are being developed under the project are based on competencies created by the International Nursing Coalition for Mass Casualty Education (INCMCE), which is hosted by the Vanderbilt University School of Nursing. Those competencies are now available on the INCMCE Web site, www.incmce.org.

The first module is called "The Tipping Point," because a large public health emergency may require value shifts. For example, the nurse's traditional approach to triage may need to change. A mass casualty event requires that the triage nurse's decisions must be based on what will do the most good for the greatest number of people. Thus, the critically ill person may not be the one who should be treated first—a value shift.

Each of what will ultimately be seven modules will be posted on the INCMCE Web site as they become available.

Discussion

Following the presentations the audience was invited to submit questions to the panelists. Five major subjects emerged from the ensuing discussion.

Sources of Information About Competencies

In addition to the nursing competency for mass casualty education, other competencies have been developed by several professional organizations. Also, CDC has sponsored the development of competency sets for public health. A listing of Web sites where competencies can be found is provided as part of this issue brief.

Public Health Emergencies Other than Bioterrorism

One question raised was whether surge capacity education and training was being approached from a total health perspective, with the range of microorganisms and infectious diseases that health care workers may face.

Michael Allswede responded by describing the "trifurcated response" disaster plan at the University of Pittsburgh Medical Center (UPMC). The trauma response maximizes personnel, equipment, beds, and medications, all concentrated on victims, or the emergency department. The hazmat response starts with the fundamental understanding that something bad has happened outside the hospital and must be kept outside the hospital; this applies to a chemical event or a radiation event. The quarantine response involves configuring the hospital to take in potentially infectious or hazardous patients by segregating staff and contaminated patients from non-contaminated patients.

Joan Cioffi noted that CDC's dual strategy of "just in case" and "just in time" applies not just to a potential bioterrorism event, but has been proved to be effective in response to recent outbreaks of SARS and monkey pox and the potential of avian flu. Betsy Weiner pointed out that the broader term to describe the response to a mass casualty incident is an "all-hazards" approach.

Competency-based Training

In response to a question about decontamination training, Michael Allswede described how UPMC has moved from time-based to objective-based, or competency-based, training. UPMC started with the Occupational Safety and Health Administration's certified four-hour, eight-hour sequence for decontamination training. That approach was useful for familiarization with the decontamination system, but did not necessarily demonstrate the acquisition of actual skills. The questions to be answered are: "Can you or can you not get into your decontamination suit in two minutes or less? Can you or can you not operate the decontamination system? Can you or can you not, in a four-person team, decontaminate one patient every six minutes?" The answers to those questions can be measured by observation. When the desired skill level is reached the hospital can be confident that staff will be able to respond to an actual emergency.

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Medical Reserve Corps

Vanderbilt's use of nurses who had volunteered for the Medical Reserve Corps elicited additional information about the MRC. Betsy Weiner explained that each MRC unit is configured according to the needs of the community it serves. Thus units may include expected professionals like physicians, nurses, pharmacists, and Emergency Medical Technicians, but also veterinarians, for example, because some infectious diseases may appear first in animals. In addition, April Kidd called from the National Office of the Medical Reserve Corps to provide the program's Web site, where more information can be found. That Web site is www.medicalreservecorps.gov.

Incident Command System

Another caller raised the issue of the importance of incorporating the Incident Command System and incident management system principles into the training modules that are being developed. This includes creation of integrated training opportunities among health care, public safety, emergency medical services, and other public health entities as part of the team training process. Betsy Weiner responded that, indeed, one of the lessons learned in development of the mass casualty education modules for nurses was that incident management system principles had to be included at the outset. Mass casualty response, she said, is a process that must be well integrated.

Michael Allswede, on the other hand, pointed to the experience of the UPMC Health System, which includes 20 hospitals and approximately 7,000 doctors. They have learned that the hospital component of the Incident Command System involves too many people without enough decisionmaking power. The UPMC Health System has thus reduced the number of physicians in the command center to three higher-level people with better decisionmaking power.

Conclusion

Stakeholders, including decision makers at the Federal, State, and local levels; health system emergency planners; and providers, all have an essential role in ensuring sufficient surge capacity within their communities and regions. To guarantee a rapid response in the event of a public health emergency, they must have sufficient staff available to respond, and those staff must understand their roles and perform them effectively. Workforce education and training—including the competency-based training approach described in this issue brief—will be critical to ensuring health systems' successful response to significantly increased surge capacity requirements.

For More Information

The complete audioconference on "Surge Capacity—Education and Training for a Qualified Workforce"is available as a streaming presentation and as a text transcript on the AHRQ Web site (www.ahrq.gov/browse/bioterbr.htm).

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Additional Resources Related to Bioterrorism, Surge Capacity, and Health System Preparedness

www.hsrnet.net/ahrq/surgecapacity/event1 /materials/competency_training.htm	This site provides a helpful compilation of resources on competency-based training for bioterrorism and other public health emergencies.
www.mailman.hs.columbia.edu/CPHP/cdc/ COMPETENCIES.pdf	This address leads to a Columbia University School of Nursing publication on using core competencies: Core Public Health Worker Competencies for Emergency Preparedness and Response, Center for Health Policy, Columbia University School of Nursing, April 2001.
www.nursing.hs.columbia.edu/institute-centers/ chphsr/btcomps.pdf	This link offers a CDC brochure for all public health workers on core competencies related to bioterrorism and emergency. This link offers a CDC brochure for all public health workers readiness.
http://cpmcnet.columbia.edu/dept/sph/CPHP/ hospcomps.pdf	This link leads to a brochure describing emergency preparedness and response competencies for hospital workers.
www.incmce.org/competenciespage.html	The INCMCE Web site offers a description of educational needed by registered nurses responding to mass casualty incidents.
www.hrsa.gov/bioterrorism.htm	HRSA's Web site provides information on the National Bioterrorism Hospital Preparedness Program including detailed guidance on HRSA's regional surge capacity benchmarks.
www.medicalreservecorps.gov	The Medical Reserve Corps' Web site offers information on its mission and activities, including access to a listserv for MRC communities.

Source: These resources were referenced during the March 2, 2004 Web-assisted audio conference conducted by AHRQ: "Surge Capacity: Education and Training for a Qualified Workforce." Some Web sites may require Adobe®Acrobat® 6.0.

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