Integration of Academia and Practice in Preparedness Training: The Harvard School of Public Health Experience

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SYNOPSIS

Given the need for public health professionals well trained in emergency preparedness and response, students in public health programs require ample practical training to prepare them for careers in public health practice. The Harvard School of Public Health Center for Public Health Preparedness has been instrumental in the creation and implementation of a course entitled, "Bioterrorism: Public Health Preparedness and Response." This course features lectures on specific applications of public health practice in emergency preparedness and response. In addition, it provides students the opportunity to operationalize and apply their knowledge during an interactive tabletop exercise. In light of their university affiliations and expertise in providing preparedness training, other Academic Centers for Public Health Preparedness have the opportunity to be instrumental in providing similar training to graduate students of public health.

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The global threat of terror thrust the issue of emergency preparedness into the political forefront following the events of September 11, 2001. The continuing risk of biological, chemical, and nuclear terrorism, as well as the emergence of new infectious diseases such as SARS, has underscored the importance of integrating public health expertise in all levels of preparedness and response. In an effort to increase preparedness in the United States, the Centers for Disease Control and Prevention (CDC) established a national network of Academic Centers for Public Health Preparedness (ACPHP) collectively charged with improving the capacity of frontline public health officials and emergency responders.[1] The CDC promotes partnerships between the ACPHP and state and local health agencies on activities to evaluate and enhance preparedness. As one of these centers, the Harvard School of Public Health Center for Public Health Preparedness (HSPH-CPHP) is dedicated to enhancing workforce preparedness in the states of Maine and Massachusetts.

All of the ACPHP are strategically affiliated with accredited graduate schools of public health to ensure that scientific expertise is incorporated in the development of curricula and training programs on public health emergency preparedness. A tension exists, however, between efforts to train public health professionals to respond to an emergency on the scale of a major terrorist event and the content of traditional public health curricula. This tension extends beyond academic circles; public health professionals have not yet been fully integrated into the emergency response community (defined as providers in EMS, fire, police, and emergency management). The events of September 11, 2001, and the anthrax attacks that followed have created a marked interest in closing these gaps and bringing the public health communities into closer working alliance with other emergency responders.

The Harvard School of Public Health (HSPH) trains public health scientists, practitioners, and leaders from around the world, many of whom later serve as influential decision-makers in the arenas of public policy, international health, medicine, and the military. There is no question that HSPH provides students with a comprehensive and rigorous theoretical education. However, as with many schools of public health, there is often less emphasis placed on public health practice at the community or state level. An increased emphasis on public health practice could enhance and strengthen the theoretical aspects of study. The practical requirement for the professional master's degree program at HSPH is limited to a single practicum course on public health practice.[2] Harvard is not alone: the majority of ASPH-accredited schools have a similar focus on public health theory over practice. A website and catalog review of all 42 ASPH-accredited schools of public health (April 2004) showed that the issue of public health preparedness is seldom covered in the curricula of these schools.

In an effort to better integrate theory and practice, the HSPH-CPHP has used its affiliation with HSPH as an opportunity to incorporate practical preparedness training into the graduate academic curriculum by offering a course entitled, "Bioterrorism: Public Health Preparedness and Response." This article discusses this endeavor as a potential model for the integration of a practice-oriented approach to preparedness into academic curriculum.

"BIOTERRORISM: PUBLIC HEALTH PREPAREDNESS AND RESPONSE"

In February 2002, Harvard University received CDC funding to establish the HSPH-CPHP. At the same time, Drs. Jennifer Leaning and Jonathan Burstein, both founding faculty of the HSPH-CPHP, created a graduate-level tutorial entitled, "Public Health Response to Chemical and Biological Terrorism." This course was well received by both students and administration and evolved into a full-credit course called "Bioterrorism: Public Health Preparedness and Response" in 2003. The course was modified further and offered for a second time in winter 2004.

Organization

As of April 2004, HSPH was one of only 13 of the 42 ASPH-accredited and associated schools that offered a course on bioterrorism. "Bioterrorism: Public Health Preparedness and Response" is a seven-week course that totals 30 in-class course-hours. Drs. Jennifer Leaning, Jonathan Burstein, and Paul Biddinger serve as the core faculty. All three are practicing emergency physicians with expertise in disaster medicine. In addition to their clinical duties, all three hold positions within the HSPH-CPHP. The course also relies on several key guest lecturers, many of whom are government officials from a variety of agencies and have practical expertise in emergency preparedness and response.

In winter 2004 there were 21 registered students in the class and three auditors. Of these 24 students, 19 were enrolled in HSPH, two were enrolled in Harvard University Kennedy School of Government, one was enrolled in Harvard University Graduate School of Arts and Sciences, and two were not enrolled in degree programs. Fourteen of the 24 students were physicians.

The course began with a series of lectures on the history of biological warfare and arms control efforts; analyses of the current biological, chemical, and nuclear terrorism threats; assessment of what is known regarding immediate clinical and emergency response to the use of key agents; and underlying biological properties and propagation parameters of relevant organisms. The course next featured lectures on the practical skills of conducting an epidemiologic investigation, emergency public health law and ethics, techniques for risk communication, the Incident Command System, and methods of coordination with various federal, state, and local emergency response agencies.

Tabletop exercise

Perhaps the most notable element of the course was its culminating tabletop drill, a two-day, hands-on exercise during which students had the opportunity to apply the practical preparedness skills they gained during the course. The tabletop scenario was originally created by the U.S. Department of Justice Office for Domestic Preparedness in its course, "Concepts and Implications of WMD Terrorist Incidents Hospital Emergency Management" and was adapted by the HSPH faculty to serve as a training and evaluation tool for graduate students in public health.[3] The scenario involved a deliberate anthrax attack in a small U.S. port city, and unfolded gradually for the participants as an increasing number of patients presented to the city's three local hospitals

with respiratory distress and flu-like symptoms. Students were assigned to roles including mayor and staff, hospital administrators from the three hospitals, local epidemiologists, police, EMS, and media representatives. The specific roles, responsibilities, and interests of each of these parties had been discussed in-depth in previous sessions to prepare students for this exercise. Each student received only information relevant to his or her agency during the exercise, illustrating the importance of inter-agency communication in the event of an emergency.

As the scenario progressed, students were required to use the information they had gathered to critically evaluate the possible etiologies of the epidemic and anticipate potential outcomes. Based on this analysis, students collectively made high-stakes decisions regarding the appropriate actions to be taken: what information should be imparted to the public and how best to communicate it; whether to close the port, schools, and other public offices; whether enforcement of quarantine and isolation was necessary; and how best to protect healthcare providers and emergency responders. This decision-making process occurred in the context of a dialogue stressing the realistic consequences of such actions, such as the economic impact on the community. Specific challenges were anticipated and discussed, such as the intersection of federal law enforcement and local public health, two groups likely to cross paths in the event of a suspected act of terrorism. Actual "press briefings" and "interagency meetings" were held by the students in their roles within the exercise.

The tabletop exercise was facilitated by course faculty who periodically prompted questions to evaluate students' progress. Students were qualitatively evaluated throughout the exercise based on the decisions they made and their level of thoughtfulness, critical thinking, and cooperation during the process. A debriefing session at the end of the exercise provided an opportunity for students to step outside of their tabletop roles and discuss the challenges they faced and the lessons they learned.

Final project

In addition to the tabletop exercise, students had the opportunity to demonstrate their competency based on an independent final project. Early in the semester, students were instructed to select a topic related to emergency preparedness and response to explore in greater depth. Using the course lectures as a foundation, students spent the semester independently researching their topics. At the end of the course, each student submitted either a paper or slide presentation to the instructors on his or her topic. The papers were formal research reports approximately 20 typed, double-spaced pages in length, and the presentations were hour-long, comprehensive slide shows complete with facilitator notes for each slide. Additionally, students were given the opportunity to present their topics to the class. The Figure provides a complete list of the students' final project topics.

Student evaluation

The course was structured to enable faculty to evaluate students' progress using a competency-based approach to assessment, something that is unusual in a graduate-level academic course. The opportunity for hands-on application of skills made this course different from most academic courses in public health, which are typically successful in evaluating understanding of material but not operationalization. The course was structured to allow students to progress through the formative levels of competence: from awareness, a basic knowledge of the topic; to understanding, a working knowledge of the topic and ability to apply that knowledge; to mastery, the ability to transfer knowledge of the topic and train others.[4] The lectures afforded an overview of the preparedness topics, thus providing students with awareness of the important subject matter. In class discussions, it was evident that students were achieving real gains in awareness and knowledge. The tabletop exercise, however, allowed significant tangible opportunities for students to demonstrate their working knowledge of the course material, as well as their ability to apply this knowledge in a practical setting. Their success in this exercise allowed students to recognize that they had achieved definite understanding of the topics covered. This achievement would have been difficult to measure without such a participatory, practical exercise. Finally, the overall high quality of the students' final projects and their ability to teach others during the presentations proved that many of the students achieved mastery of the

Figure. Final project topics

1. Youth Mental Health Interventions following Terrorism & Warfare
2. Is It Bioterrorism?
3. The State of U.S. Preparedness for Cross-Border Bioterrorism
4. Quarantine & Law: The Model State Emergency Health Powers Act
5. Chimeras, Trojan Horses, & Other Novel Pathogens
6. Public Response to Terrorism Strategies: A Historical Perspective
7. An Overview of the Bioterrorism Act of 2002
8. Wartime Secrets & Chemical Warfare
9. Tularemia: History & Pathogenesis
10. The Use of Viral Hemorrhagic Fevers as Bioterrorist Agents
11. Are We Prepared for the "Chemical Killing Sack"?
12. Bioterrorism in Japan: The Aum Religious Cult
13. Lessons for Protecting Human Health from Mustard Gas
14. The Tokyo Sarin Attack
15. Non-Hospital Isolation & Quarantine Facilitation in Response to a Bioterrorist Attack using SARS
16. The Role of the Defense Advanced Research Project Agency
17. Bioterrorism Vaccination Strategies
18. Ebola Hemorrhagic Fever
19. Tularemia as a Bioterrorism Threat
20. Lessons Learned from the Spring 1990 Events in Kosovo
21. Racial, Cultural, & Ethnic Biowarfare

topics. Seven of the 21 student projects were judged by the faculty to be of sufficient quality that they could be used as professional teaching tools with no revision, and another eight could be used as teaching tools with little revision required.

Core competencies

Upon completion of the course, students met six of the nine CDC Emergency Preparedness: Core Competencies for All Public Health Workers:[5]

- Core Competency 1—Describe the public health role in emergency response in a range of emergencies that might arise.
- Core Competency 2—Describe the chain of command in emergency response.
- Core Competency 6—Describe communication roles in emergency response.
- Core Competency 7—Identify limits to own knowledge/skill/authority and identify key system resources for referring matter that exceed these limits.
- Core Competency 8—Recognize unusual events that might indicate an emergency and describe appropriate action.
- Core Competency 9—Apply creative problem solving and flexible thinking to unusual challenges within his/her functional responsibilities and evaluate effectiveness of all actions taken.

Course evaluation

All students completed HSPH-administered anonymous course evaluations on the last day of class. Based on these evaluations, 96% of students reported that they would recommend the course to a classmate with similar interests, and 92% of students considered the course superior to other courses they had taken at HSPH. Additionally, 100% of students considered the course useful to their profession, and 83% thought there was an appropriate emphasis on practical skills.

LESSONS LEARNED

Based on the observations of the course faculty and the feedback received from students and guest lecturers, we plan to offer a revised version of this course again next year. To better evaluate student performance during the tabletop exercise, we plan to include two such exercises. We hope to stage a shorter tabletop at the beginning of the course to introduce students to the issues that arise during an emergency and to provide a context for the remainder of the course. This early exercise will allow faculty to gauge students' initial level of understanding and provide a basis for a pre/post-test comparison when evaluating students' performance during the final tabletop. Further, since all students will have been exposed to the tabletop exercise format and roles, the second tabletop at the end of the course can be more intricate and challenging to the students, requiring an even more advanced application of their public health skills since the "tabletop skills" will already have been mastered.

We conclude from our experience with this course that students feel a need for practical skills in public health. A course like ours, with lectures on specific applications of public health practice and a format for practicing the skills, is an excellent way to teach those skills, based on students' and instructors' evaluations. We believe that the provision of adequate practical training in current threats to our society would be a valuable addition to the curricula of the public health schools of the nation. Given their university affiliations and expertise in providing preparedness training, the ACPHPs have a key role to play in creating and organizing such training opportunities.

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