

**HOD ACTION: Council on Medical Education Report 15 adopted as amended and the remainder of the report filed.**

REPORT 15 OF THE COUNCIL ON MEDICAL EDUCATION (A-09)  
Education in Disaster Medicine and Public Health Preparedness During Medical School  
and Residency Training  
(Reference Committee C)

EXECUTIVE SUMMARY

This report, which responds to Resolution 319 (A-08), describes the current status of disaster preparedness education and training in undergraduate and graduate medical education.

Between 2003 and 2008, the federal government provided funding for curriculum development through the Bioterrorism and Curriculum Development Program, sponsored first by the Health Resources and Services Administration and later by the Office of the Assistant Secretary for Preparedness and Response. This funding opportunity has been discontinued. Other federal agencies also have supported the development and implementation of training programs. In the past several years, legislation and regulation have moved toward a more coordinated approach. Starting in 2009, the Federal Education and Training Interagency Group will work to create a national strategy for the education and training of health professionals in disaster medicine and public health preparedness. The American Medical Association-sponsored National Disaster Life Support Education Consortium has been invited to participate.

After September 11, 2001, many groups began to develop competencies related to disaster preparedness, most often for specific specialties or levels of learners. In order to create a comprehensive and integrated set of competencies, the AMA Center for Public Health Preparedness and Disaster Response convened an expert working group. The result was a consensus-based set of competencies that cover seven domains: 1) preparation and planning; 2) detection and communication; 3) incident management and support systems; 4) safety and security; 5) clinical/public health assessment and intervention; 6) contingency, continuity, and recovery; and 7) public health law and ethics.

This report next provides examples of educational programs that include content related to disaster medicine and public health preparedness that have been offered for medical students and resident physicians. Surveys indicate that many medical students believe their training in these areas to be inadequate, although topics such as disaster preparedness and biological and chemical terrorism are touched upon in most medical schools. AMA policy supports the development of training programs for medical students and resident physicians, including the National Disaster Life Support (NDLS) sequence of courses.

The report recommends the following:

- 1) That our AMA reaffirm Policy H-130.949, "Organized Medicine's Role in the National Response to Terrorism."
- 2) That formal education and training in disaster medicine and public health preparedness should be incorporated in all medical school and residency programs.
- 3) That our AMA encourage medical schools and residency programs to utilize multiple instructional methods for teaching disaster medicine and public health preparedness.
- 4) That our AMA encourage public and private funders to support education and training opportunities in disaster medicine and public health preparedness for medical students and resident physicians.
- 5) That our AMA support the NDLS Program Office's revision and enhancement of the NDLS courses and supporting course materials, in both didactic and electronic formats, for use in medical schools and residency programs.
- 6) That our AMA support involvement of the National Disaster Life Support Education Consortium in the newly created Federal Education and Training Interagency Group.

REPORT OF THE COUNCIL ON MEDICAL EDUCATION

CME Report 15-A-09

Subject: Education in Disaster Medicine and Public Health Preparedness During  
Medical School and Residency Training

Presented by: Claudette E. Dalton, MD, Chair

Referred to: Reference Committee C  
(Rodney G. Hood, MD, Chair)

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1 Resolution 319 (A-08), which was introduced by the South Carolina Delegation and the  
2 American College of Surgeons and adopted as amended, asked that our American Medical  
3 Association (AMA):

4  
5 study the current status of disaster preparedness education and training in medical schools  
6 and report to the House of Delegates at the 2009 Annual Meeting, and in graduate and  
7 continuing medical education programs with a report back to the House of Delegates at  
8 the 2010 Annual Meeting.

9  
10 This report summarizes attempts by the AMA, federal government, and others to stimulate  
11 training in disaster medicine and public health preparedness during medical school and residency  
12 training and describes the current status of such training as documented in published literature  
13 and other sources. The availability of education for physicians in practice will be addressed in a  
14 report presented during the 2010 Annual Meeting.

15  
16 **FEDERAL EFFORTS TO ENHANCE EDUCATION AND TRAINING IN DISASTER**  
17 **MEDICINE AND PUBLIC HEALTH PREPAREDNESS SINCE SEPTEMBER 11, 2001**

18  
19 Since September 11, 2001, disasters both natural and human-caused have focused attention on the  
20 need for increased leadership and preparedness. Education for trainees and practitioners in the  
21 health fields has been a core part of national preparedness strategies. During the years following  
22 September 11, 2001 and the anthrax attacks later that fall, many federal programs were put into  
23 place to stimulate educational program development.

24  
25 To address the need for education and training in disaster preparedness and response for health  
26 professionals, from 2003 to 2008 the Health Resources and Services Administration (HRSA), and  
27 more recently the Office of the Assistant Secretary for Preparedness and Response (ASPR),  
28 administered the Bioterrorism and Curriculum Development Program (BTCDP). The BTCDP  
29 was created by the Public Health Security and Bioterrorism Preparedness and Response Act of  
30 2002.<sup>1</sup> Funds totaling \$118,300,000 were awarded to 49 institutions nationwide (23 projects for  
31 curriculum development within professional schools and 26 projects for education and training  
32 with practicing health professionals). While multiple programs and funding streams across  
33 several federal agencies were focused on building capacity in the emergency management and  
34 public health sectors, the BTCDP was a unique federal initiative dedicated to training students  
35 and practicing health professionals in all-hazards preparedness and response.

1 Through the BTCDP, HRSA recognized the need to teach the skills, competencies, and  
2 knowledge that are important for all health professionals to acquire. Presently, federal funding of  
3 this program has been discontinued, leaving no dedicated funding stream for training health  
4 professionals to respond to disasters and other public health emergencies.

5  
6 Other agencies, such as the Centers for Disease Control and Prevention (CDC) and the  
7 Department of Homeland Security, continue to support some education and training in disaster  
8 medicine and public health preparedness. The CDC funds various academic Centers for Public  
9 Health Preparedness within schools and colleges of public health, medicine, nursing, veterinary  
10 medicine, pharmacy, biological sciences, community colleges, and several medical and health  
11 science centers. The Centers for Public Health Preparedness collaborate with state and local  
12 health agencies to develop, deliver, and evaluate disaster preparedness education based on  
13 community needs.

14  
15 In December 2006, passage of the Pandemic and All-Hazards Preparedness Act (PAHPA) created  
16 important opportunities for the public and private sectors to build upon and standardize disaster  
17 preparedness education through various programs at the federal, state, and local levels. PAPH  
18 called for the development of integrated, interdisciplinary, and consistent public health and  
19 medical disaster response curricula, which would be available to health professionals and health  
20 professions schools. Section 304 of the Act states that “The HHS Secretary, in collaboration with  
21 the Secretary of Defense, and in consultation with relevant public and private entities, shall  
22 develop core health and medical response curricula and training by adapting applicable existing  
23 curricula and training programs to improve responses to public health emergencies.”

24  
25 As directed by PAPH, public health and medical response training programs may include  
26 course work related to:

- 27
- 28 • Medical management of casualties, taking into account the needs of at-risk individuals;
  - 29 • Public health aspects of public health emergencies;
  - 30 • Mental health aspects of public health emergencies;
  - 31 • National incident management, including coordination among federal, state, local, tribal,  
32 international agencies, and other entities; and
  - 33 • Protecting healthcare workers and healthcare first responders from workplace exposures  
34 during a public health emergency.
- 35

36 Recently, there has been a move toward a more coordinated federal approach. In October 2007,  
37 Homeland Security Presidential Directive-21 (HSPD-21), entitled Public Health and Medical  
38 Preparedness, called for coordinated efforts to develop public health and medical disaster  
39 preparedness and response curricula and training programs:<sup>2</sup>

- 40
- 41 • Paragraph 32 requires the HHS Secretary, in coordination with the Secretaries of  
42 Defense, Veterans Affairs, and Homeland Security to ensure that core public health and  
43 medical curricula and training (developed pursuant to PAHPA) address the need to  
44 improve individual, family, and institutional public health and medical preparedness.
  - 45 • Paragraph 37 requires that the secretaries of the five lead federal agencies build on  
46 Section 304 of PAHPA to develop a mechanism to coordinate public health and medical  
47 disaster preparedness and response core curricula and training across executive

1 departments and agencies to ensure standardization and commonality of knowledge,  
2 procedures, and terms of reference within the federal government, which can be  
3 communicated to state and local government entities, as well as academia and the private  
4 sector.

- 5 • Paragraph 38 calls upon the Secretaries of Health and Human Services and Defense, in  
6 coordination with the Secretaries of Veterans Affairs and Homeland Security, to establish  
7 an academic Joint Program for Disaster Medicine and Public Health housed at a new  
8 National Center for Disaster Medicine and Public Health at the Uniformed Services  
9 University of the Health Sciences (located in Bethesda, MD).

10  
11 In 2009, these federal directives will be addressed by a newly authorized Federal Education and  
12 Training Interagency Group (FETIG). The primary charge of this group is to identify and  
13 implement a national strategy for the education and training of health professionals in disaster  
14 medicine and public health preparedness. This includes the identification of core competencies  
15 and standards across federal departments and agencies, as well as state and local government  
16 entities, the academic community, and the private sector in relation to public health emergency  
17 and disaster response. The AMA-sponsored National Disaster Life Support Education  
18 Consortium™ (NDLSEC™) has been invited to participate in this effort. Such involvement  
19 provides an important opportunity to assist federal efforts to:

- 20  
21 • Coordinate the implementation of laws and directives related to education and training in  
22 medical and public health preparedness and response to disaster;
- 23 • Delineate core competencies and education and training standards for all potential health  
24 system responders;
- 25 • Create a National Center for Disaster Medicine and Public Health at the Uniformed  
26 Services University of the Health Sciences;
- 27 • Facilitate the translation of research findings to disaster-related medical and public health  
28 practice; and
- 29 • Enhance communication with federal, state, local, and tribal entities; academia; and the  
30 private sector on issues affecting education and training in disaster medicine and public  
31 health preparedness.

### 32 33 OTHER NATIONAL EDUCATION AND TRAINING EFFORTS

34  
35 Stimulated by national events, many groups began creating informational resources for disaster  
36 preparedness. In 2003, the Association of American Medical Colleges released a report titled  
37 *Training Future Physicians About Weapons of Mass Destruction* that included a set of learning  
38 objectives for medical students that should be addressed during the basic science and clinical  
39 years.<sup>3</sup> The report recommended that objectives related to weapons of mass destruction should be  
40 included throughout the medical school curriculum, using a variety of instructional formats such  
41 as OSCEs, case studies, tabletop exercises and disaster drills, and distance learning.<sup>3</sup> The AMA,  
42 through its Council on Science and Public Health, created informational materials on  
43 bioterrorism-related topics even before 2001. Other associations, including specialty societies,  
44 created their own informational materials<sup>3</sup> and the Centers for Disease Control and Prevention  
45 developed a detailed web site ([www.emergency.cdc.gov](http://www.emergency.cdc.gov)) that provided information on a number  
46 of hazards.

47  
48 In December 2003, the AMA House of Delegates adopted policy calling for the AMA to work  
49 collaboratively with the Federation in the development, dissemination, and evaluation of a  
50 national education and training initiative called the National Disaster Life Support Program™

1 (NDLS™) to provide physicians, medical students, other health professionals, and other  
2 emergency responders with a fundamental understanding and working knowledge of their  
3 integrated roles and responsibilities in disaster management and response efforts (AMA  
4 Policy H-130.946, AMA Policy Database). In June 2004, the HOD further called upon the AMA  
5 to actively pursue the creation of a national training network for the NDLS Program coordinated  
6 through a newly-developed AMA-based NDLS Program Office (AMA Policy D-130.979, AMA  
7 Policy Database).

8  
9 The NDLS Program Office has been instrumental in the creation of a sequence of courses with an  
10 all-hazards approach to disaster preparedness. The courses, developed under the umbrella of the  
11 NDLS Program, are designed for various levels of learners. For example, the Core Disaster Life  
12 Support® (CDLS®) course is for first responders without an in-depth medical background while  
13 the Advanced Disaster Life Support™ (ADLS) course is for physicians actively involved in  
14 emergency response and victim treatment.

15  
16 It is interesting to note that AMA support for disaster training has historic precedence. From  
17 1954 to 1968, the Department of Defense sponsored a voluntary program in U.S. medical schools,  
18 entitled Medical Education for National Defense (MEND). The program began at the request of a  
19 joint committee of the AMA and the Association of American Medical Colleges to improve the  
20 training and motivation of medical students with regard to military and disaster medicine. The  
21 curriculum included disaster medicine, management of mass casualties, public health (including  
22 impact of chemical, biological, and nuclear events), tropical medicine, and environmental  
23 medicine. Although the MEND Program was voluntary, all 92 medical schools that existed at the  
24 time participated. In 1968, the General Accounting Office issued a negative report on the  
25 program, citing the lack of performance criteria and its significant fiscal impact. This was  
26 countered in 1969 by a report from the National Research Council's Division of Medical Science,  
27 which strongly recommended that the program be reinstated. The primary finding of the report  
28 was the great need for all physicians to have disaster medical training for the good of the general  
29 public as well as for its relevance to potential future military service. While the AMA also  
30 expressed support for reinstatement of the MEND Program, the program was discontinued for lack  
31 of federal funding.

### 32 33 COMPETENCIES IN DISASTER MEDICINE AND PUBLIC HEALTH PREPAREDNESS

34  
35 The abundance of information emanating from multiple sources has the potential to create  
36 confusion for curriculum planners and for learners. A need was recognized to determine what,  
37 among all the possible content, learners at various levels should know. This requires assessment  
38 and delineation of the knowledge, skills, attitudes, and proficiencies needed by healthcare and  
39 public health professionals and others (e.g., citizen responders) for the management of all  
40 populations in day-to-day emergencies and during catastrophic mass casualty events. As  
41 recommended in the Institute of Medicine *Future of Emergency Care* report series, all health  
42 professions schools, institutions, and entities responsible for the training, continuing education,  
43 credentialing and certification of health professionals need to define and incorporate adult and  
44 pediatric disaster preparedness and emergency care competencies into discipline-specific  
45 educational curricula at the undergraduate, graduate and postgraduate (continuing education)  
46 levels.

47  
48 To prepare health professionals to respond appropriately, and to assist professional schools and  
49 continuing education providers to meet this challenge, various organizations and universities have  
50 developed competencies for health professionals and other emergency responders. To date, these  
51 efforts have been limited primarily to individual specialties or targeted professionals (e.g.,

1 physicians, nurses, emergency medical technicians, public health workers). For example,  
 2 guidelines for preclinical bioterrorism curriculum were developed using experts from  
 3 microbiology, immunology, and infectious disease.<sup>4</sup> Another effort defined competencies  
 4 applicable to medical, dental, nursing, and public health students.<sup>5</sup>

5  
 6 As yet, little effort has been devoted to the integration of these competencies across health  
 7 specialties and professions that have a significant role in disaster medicine and public health  
 8 preparedness. This has resulted in a lack of definitional uniformity across professions with  
 9 respect to education, training, and best practices. To address these gaps, the AMA Center for  
 10 Public Health Preparedness and Disaster Response convened an expert working group to develop  
 11 a consensus-based educational framework and set of competencies from which educators could  
 12 devise learning objectives and curricula tailored to the needs of all health professionals. The  
 13 group conducted a broad-based literature and document review, which formed the basis of a  
 14 comprehensive set of competencies. These were subject to extensive review and finalized  
 15 through expert consensus.<sup>6</sup> The competencies can be adapted for all health professions and all  
 16 levels of learners from student to leader; and cover seven domains: 1) preparation and planning;  
 17 2) detection and communication; 3) incident management and support systems; 4) safety and  
 18 security; 5) clinical/public health assessment and intervention; 6) contingency, continuity, and  
 19 recovery; and 7) public health law and ethics.<sup>6</sup> The competency set was approved by the  
 20 NDLSEC in May 2008. The availability of this national competency-based framework supports  
 21 the intent of HSPD-21.<sup>2</sup>

## 22 DISASTER EDUCATION FOR MEDICAL STUDENTS

23  
 24 Data from Liaison Committee on Medical Education Annual Medical School Questionnaires  
 25 since 2001 shown that the number of medical schools including content related to disaster  
 26 medicine and public health preparedness in the curriculum is increasing (see Table 1).  
 27

28  
 29 There is no information from the questionnaire on how much time is devoted to teaching these  
 30 subjects or what formats are used for instruction. Curriculum placement is variable. In 2007-  
 31 2008, teaching related to biological/chemical terrorism more commonly occurred during the  
 32 preclinical years (83 schools) than the clinical years (26 schools). For disaster  
 33 management/response, 54 schools included the topic in the preclinical years and 32 included it in  
 34 the clinical years. For both topics, some schools touched on the topic in both the preclinical and  
 35 clinical years.  
 36

37 -----  
 38 TABLE 1: NUMBER OF MEDICAL SCHOOLS TEACHING SELECTED  
 39 CONTENT RELATED TO DISASTER PREPAREDNESS<sup>7</sup>

40 Academic Year	41 Number of Schools Where the Subject is 42 Included in one or more Required Courses	
	43 <u>Biological/Chemical Terrorism</u>	44 <u>Disaster Management/Response</u>
45 2002-2003	46 88	47 No data
48 2003-2004	49 90	50 38
51 2004-2005	104	40
2007-2008	100	77

Data from the Liaison Committee on Medical Education, Annual Medical School Questionnaire, Part II

1 Many recent medical school graduates perceive their training in these areas to be lacking. In the  
2 2008 Association of American Medical Colleges Annual Medical School Graduation  
3 Questionnaire, which was completed by over 13,000 fourth year medical students, 47% of  
4 respondents reported that the amount of instruction they received in biological, chemical, and  
5 natural disaster management to be inadequate. In addition, in a recent survey of medical students,  
6 respondents expressed willingness to participate in a disaster situation but most believed  
7 themselves to be unprepared. For example, 96% were willing to respond to a natural disaster but  
8 only 17% believed that they had adequate education and training (report in press in *Disaster*  
9 *Medicine and Public Health Preparedness*).

#### 10 *Examples of Training Programs for Medical Students*

11 Training for medical students occurs in a variety of formats.

- 12
- 13
- 14
- 15 • Short courses in block format allow medical students to concentrate on the subject matter.  
16 For example, a one-week course on responding to bioterrorism and other disasters was  
17 offered as an ungraded experience for second-year medical students at the Texas A&M  
18 Health Science Center College of Medicine.<sup>8</sup>
- 19 • Role play (tabletop) small-group exercises allow students to assume the roles of  
20 responders to a disaster. An exercise developed by Texas A&M created a scenario based  
21 on avian influenza, where students assumed the roles of community physicians, public  
22 health officials, school nurses, and others who might participate in the identification and  
23 management of a developing disaster situation.<sup>9</sup>
- 24 • Interdisciplinary training allows medical and other health professions students to learn  
25 relevant content and skills together. Funded by HRSA, the AMA developed a course that  
26 created virtual teams of medical, pharmacy, and public health students who worked  
27 online in virtual interprofessional teams to respond to disaster scenarios. Participants  
28 completed the online AMA Core Disaster Life Support (CDLS) course as background  
29 before working on the scenarios.
- 30

31 Currently, NDLS training is being incorporated into required and elective courses in various  
32 health professional schools, including some medical schools.

#### 33 DISASTER EDUCATION FOR RESIDENT PHYSICIANS

34

35

36 There are no comprehensive data on the inclusion of content related to emergency preparedness  
37 in residency programs. However, the data that does exist indicate that coverage is incomplete  
38 across all subject areas. In a 2005 survey of residency programs in emergency medicine, 98%  
39 reported including formal training in bioterrorism. However, the training often was of low  
40 intensity and focused on lectures instead of experiential methods.<sup>10</sup> A survey in late 2003 to  
41 emergency medicine, pediatrics, and family medicine residency programs showed that the  
42 majority of responding emergency medicine residencies addressed the clinical recognition and  
43 management of general victims of thermochemical, chemical, biological, and radiation events,  
44 but that the majority of family medicine and pediatrics programs did not.<sup>11</sup>

1 *Examples of Training Programs for Resident Physicians*

2  
3 The following examples may include both didactic and experiential learning opportunities:

- 4
- 5 • The general preventive medicine residency at Johns Hopkins included didactic lectures,  
6 practical exercises to allow learners to apply the knowledge, and a real-world exercise to  
7 support integration of the information into the resident's didactic year.<sup>12</sup>
  - 8 • The internal medicine residency program at the Memorial Hospital of Rhode Island  
9 coupled four didactic sessions with supplemental reading with training at a simulation  
10 center that included the use of personal protective equipment and participation in  
11 simulated disaster scenarios.<sup>13</sup>
  - 12 • Emory University introduced a curriculum that focused on the public health implications  
13 of bioterrorism and emerging infections. The curriculum was used with internal  
14 medicine residents, as well as medical students in the clinical years.<sup>14</sup>
- 15

16 **EXISTING AMA POLICY**

17  
18 The AMA supports the development of training programs by medical schools and residency  
19 programs that address medical and public health aspects of biological and chemical terrorism, as  
20 well as community disaster planning and emergency response procedures in the event of such  
21 terrorism (AMA Policy Database, Policy H-130.949). The AMA also will work to revise the  
22 National Disaster Life Support sequence of courses (D-130.979). One of the courses in this  
23 sequence, the online Core Disaster Life Support course, was successfully used in the HRSA-  
24 funded course for medical, pharmacy, and public health students.

25  
26 **COMMENT**

27  
28 Education and training in disaster medicine and public health preparedness should be integrated  
29 as a basic element of life-long learning for all clinical and public health professionals. Core  
30 curricula and training programs are needed to provide a consistent learning experience for  
31 physicians-in-training, as well as other health professionals. This requires consensus on  
32 competencies and learning objectives to ensure that course content is based on a well-defined and  
33 testable body of knowledge, skill set, and methodology.

34  
35 In general, though there are examples of programs in disaster preparedness in the published  
36 literature, there has been no comprehensive "curriculum" covering all relevant aspects of the  
37 subject. More guidance is needed in developing such curricula for medical students and resident  
38 physicians.<sup>15</sup> At a minimum, curricula should: (1) use an all-hazards approach; (2) cover the full  
39 spectrum of disaster prevention, mitigation, response, and recovery; (3) provide specific  
40 information to address clinical and public health aspects; mental health; ethical, and legal issues;  
41 and the needs of particular at-risk populations (e.g., children, pregnant women, the disabled, frail  
42 elderly); (4) use a common vocabulary (e.g., glossary of terms and definitions) to provide  
43 standard information across professions; (5) include active learning methods, such as tabletop  
44 exercises, mock drills; (6) stress the development of mutual understanding and working  
45 knowledge of the integrated roles and responsibilities of health professionals and other responders  
46 at a disaster scene; and (7) provide mechanisms to verify that learners have attained a defined  
47 level of knowledge and skill.

48  
49 Developing comprehensive curricula to train physicians and other health professionals for  
50 disasters and other public health emergencies presents a daunting challenge. That is because  
51 terrorism and other disasters can occur in multiple types of situations, with diverse clinical and



1 public health outcomes, many of which are not addressed in current health professions education.  
2 Despite the challenges of integrating new content into existing health professional curricula, the  
3 risk of not doing so can no longer be ignored.

4  
5 RECOMMENDATIONS

6  
7 The Council on Medical Education recommends that the following recommendations be adopted  
8 and that the remainder of this report be filed.

- 9  
10 1. That Policy H-130.949, “Organized Medicine’s Role in the National Response to  
11 Terrorism, be reaffirmed.” (Reaffirm HOD Policy)  
12  
13 2. That our American Medical Association recommend that formal education and training in  
14 disaster medicine and public health preparedness ~~should~~ be incorporated into the  
15 curriculum at all medical schools and residency programs. (New HOD Policy)  
16  
17 3. That our AMA encourage medical schools and residency programs to utilize multiple  
18 methods, including simulation, disaster drills, interprofessional team-based learning, and  
19 other interactive formats for teaching disaster medicine and public health preparedness.  
20 (Directive to Take Action)  
21  
22 4. That our AMA encourage public and private funders to support the development and  
23 implementation of education and training opportunities in disaster medicine and public  
24 health preparedness for medical students and resident physicians. (Directive to Take  
25 Action)  
26  
27 5. That our AMA support the National Disaster Life Support (NDLS) Program Office’s  
28 work to revise and enhance the NDLS courses and supporting course materials, in both  
29 didactic and electronic formats, for use in medical schools and residency programs. (New  
30 HOD Policy)  
31  
32 6. That our AMA encourage support involvement of the National Disaster Life Support  
33 Education Consortium’s adoption of training and education standards and guidelines  
34 established by the ~~in the~~ newly created Federal Education and Training Interagency  
35 Group (FETIG). (Directive to Take Action)

Fiscal Note: \$25,000 for ongoing revision of the NDLS courses for medical  
students and resident physicians.

## REFERENCES

1. Department of Health and Human Services. Assistant Secretary for Preparedness and Response. Bioterrorism Training and Curriculum Development Program. Accessed at <http://www.hhs.gov/aspr/>
2. Homeland Security. Homeland Security Presidential Directive 21: Public Health and Medical Preparedness.
3. AAMC. Training Future Physicians About Weapons of Mass Destruction: Report of the Expert Panel on Bioterrorism Education for Medical Students, 2003.
4. Coico R, Kachur E, Lipper S. Guidelines for preclerkship bioterrorism curricula. *Academic Medicine* 2004;79(4):366-375.
5. Markenson D, DiMaggio C, Redlener I. Preparing health professions students for terrorism, disaster, and public health emergencies: Core competencies. *Academic Medicine* 2005;80(6):517-526.
6. Subbarao I, Lyznicki J, Hsu E et al. A consensus-based educational framework and competency set for the discipline of disaster medicine and public health preparedness. *Disaster Medicine and Public Health Preparedness* 2008;2:57-68.
7. Liaison Committee on Medical Education. Annual Medical School Questionnaire, Part 2. The questionnaire was sent to the dean of each LCME-accredited medical school and had a 100% response for each year.
8. Parrish A, Oliver S, Jenkins D et al. A short medical course on responding to bioterrorism and other disasters. *Academic Medicine* 2005;80(9):820-823.
9. Silenas R, Akins R, Parrish A et al. Developing disaster preparedness competence: An experiential learning exercise for multiprofessional education. *Teach Learn Med* 2008;20(1):62-68.
10. Moye P, Pesik N, Terndrup T et al. Bioterrorism training in U.S. emergency medicine residencies: Has it changed since 9/11? *Acad Emerg Med* 2007;14(3):221-2276.
11. Martin S, Bush A, Lynch J. A national survey of terrorism preparedness training among pediatric, family practice, and emergency medicine programs. *Pediatrics* 2006;118:e620-e626.
12. Uddin S, Barnett D, Parker C et al. Emergency preparedness: Addressing a residency training gap. *Academic Medicine* 2008;83(3):298-304.
13. Summerhill E, Mathew M, Stipho S et al. A simulation-based biodefence and disaster preparedness curriculum for internal medicine residents. *Medical Teacher* 30(6):e145-e151.
14. Cassoobhoy M, Wetterhall S, Collins D et al. Development of an interactive bioterrorism and emerging infections curriculum for medical students and internal medicine residents. *Public Health Rep* 2005;120 Suppl 1:59-63.

15. The American Academy of Pediatrics Committee on Pediatric Emergency Medicine; Task Force on Terrorism. The pediatrician and disaster preparedness. *Pediatrics* 2006;117(2):560-565.