

Brief Report

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Evaluation of a Disaster Preparedness Curriculum and Medical Students' Views on Preparedness Education Requirements for Health Professionals

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Abstract

Objective: In general, medical students perceive themselves as inadequately prepared to assist in disasters. This study evaluated the impact of a disaster preparedness curriculum and medical students' views toward required preparedness education for health care professionals.

Methods: A comprehensive disaster preparedness curriculum was evaluated on its effect on medical students' views on preparedness education requirements, preparedness, and prior disaster training using self-report survey methodology.

Results: Results provide evidence to support curricular effectiveness in significantly increasing initial participant views of health professionals' education requirements, perceived preparedness for integrating professional roles into the emergency response system, and confidence in exposure risk assessment and triage skills. Most participants possessed limited recent prior disaster training and drill experience. Most interestingly, the majority consistently believed throughout the study that disaster preparedness training should be a medical license mandate.

Conclusions: For those instructing current medical students in disaster preparedness, it is suggested that a curriculum be chosen that can create participant initial anticipation, awareness, and belief in the importance of and need for disaster preparedness training. Further investigation is recommended into the relationship between students' perceived training importance and any future curriculum delivery efforts on behalf of required or mandatory preparedness offerings in continuing professional development.

Disasters, acute or ongoing public health emergencies, can be natural or man-made, including infectious disease outbreaks. Disasters overwhelm a community's resources, and comprehensive preparedness and response initiatives are imperative for health care provision and community recovery. Medical students, the future primary care physician workforce, may be called on to volunteer in pandemics and other disasters.¹ In a review, medical students performed a variety of roles in disasters, from awareness raising to assisting in a medical role. Most were willing to assist in global pandemics and felt it was their duty to help; however, they perceived themselves as low in specific disaster knowledge and training, feeling ill-prepared. Additionally, those with more disaster training were more willing to respond. Several studies in the review, however, noted more willingness in students than their actual preparedness skill and ability level.² In a recent systematic review, although reporting a willingness to be involved in disaster response, medical students also reported a lack of preparedness knowledge due to limited training and curricular content in medical school.³

Because physicians provide care on the front lines in disasters, and medical students possess some crucial skills that may be of assistance in disaster situations, medical students should be offered more training in disaster preparedness and response during their medical education.⁴ Training generally supplemented the core curriculum and demonstrated improvements in student disaster knowledge, attitude, and skill, with a couple noting increases in student perceived willingness to volunteer in some form during an emergency. Training taught through both didactic and clinical methods, including practical exercises, simulations, and crisis awareness activities, was deemed best practice.⁵

Pre-licensure medical education in disaster preparation, therefore, is recommended^{5,6} that covers not only types of disasters and their consequences but also covers triage and incident command topics.⁷ Most training delivery modes include brief 1- to 2-day training,^{8,9} use technology and simulation as part of a course,⁹ or are voluntary certificate courses.¹⁰ One medical school, however, has mandated disaster preparedness training as part of the required first-year curriculum.¹¹ Medical students will most likely continue to be involved in disaster response in the future; however, many are willing to respond but feel inadequately prepared.

The purpose of this study was to evaluate the impact of disaster preparedness curriculum and medical students' views toward required or mandated preparedness education (including direct training) for health care professionals.

Methods

Sample

First and second year medical students at a Midwestern medical school attending an elective disaster preparedness and response course were invited to participate in the study. The intervention, a comprehensive, 2-part disaster preparedness curriculum, was led by certified instructors over several days of 2 school semesters during 2022–2023. All 30 participants enrolled in the first part of the course consented in writing to participate in the study. All 29 who continued into the second part of the course also consented to continue in the study.

Instrument

A 22-item, written survey¹² was used to assess self-reported attitudes, preparedness, and previous disaster training of respondents. After 4 demographics questions, the next 14 items were Likert-style scale questions (1 = Strongly disagree to 5 = Strongly agree) about respondent attitudes and perceived preparedness. The last questions asked for a yes or no response and focused on prior disaster training or disaster drill participation. The original internal consistency of the instrument was acceptable (Cronbach's alpha = 0.78).

Procedure

During 3 evenings in the fall semester, medical student participants took part in the first course of their disaster preparedness curriculum, Basic Disaster Life Support. Lecture, group activities, and active-learning simulation scenarios trained participants in the topics of incident management, surge capacity, and field triage following an all-hazards approach. The 8-hour long, standardized curriculum focused on conceptual knowledge of incident management followed by some skills practice in injury triage.¹³ During the first and last evenings of the course, participants completed their confidential, written pre- and post-surveys, respectively.

During 2 evenings and a full day in the spring semester, medical student participants took part in the second, follow-up course of their disaster preparedness curriculum, Advanced Disaster Life Support. The 15-hour training focused more on the application of basic concepts and skills previously learned. Active-learning activities included mass casualty scenario practice, tabletop drills, lab simulations, protective equipment and decontamination exercises, and a large-scale, half-day culminating drill scenario.¹⁴ During the first evening and last day of the course, participants completed their confidential, written pre- and post-surveys, respectively.

Analysis

For the Basic course, 28 participants completed the pre-survey, and 30 completed the post-survey. One participant was eliminated from the analysis due to significant missing data from the pre-survey. In total, 22 matched pre-post surveys used for analysis.

Others were eliminated due to the inability to match a pre- or post-survey. For the Advanced course, 29 participants completed the pre-survey, and 27 completed the post-survey. In total, 21 matched pre-post surveys were used for analysis. Others were eliminated due to the inability to match a pre- or post-survey.

For both courses, descriptive statistics were used to analyze individual survey items. A series of Wilcoxon Signed Rank Tests were conducted to assess differences in pre-post attitudes toward emergency preparedness for Likert-type items (1 = Strongly disagree to 5 = Strongly agree). This test was chosen over paired-samples *t*-test due to the items being ordinal in nature. Given the large number of inferential assessments conducted, a Bonferroni correction was applied in order to limit error rates, yielding an alpha value of 0.004. Truman Institutional Review Board/SP22 approval was granted.

Results

Basic Course

Among the 22 participants with matched pre-post surveys, the majority (59.1%) were male, from the ages of 25–30 (90.9%) and possessed 1–5 years of previous work experience (54.5%). Only 1 participant had a specialization or residency of unknown type (4.5%).

Curriculum Evaluation

The results of the Wilcoxon Signed Rank Tests revealed positive, statistically significant differences between the pre- and post-surveys among 7 of the areas assessed with scaled items. These areas included a higher perceived need for “situational risk awareness” and “mass casualty drills” for health professionals, “feel[ing] [more] prepared to participate in national [and] local community emergency response system[s]” and “carrying out accepted triage principles.”¹² Participants also felt more confident in “recognizing differences in health assessments indicating potential exposure to specific agent” and “felt [more] prepared to provide psychosocial support to the victims.”¹² All scores, regardless of statistically significant change, increased or remained the same between the pre- and post-surveys (Table 1).

Previous Training

At the time of the pre-survey, most participants had not taken part in “educational activit[ies] dealing with disaster/mass casualty preparedness” (68.2%), partaken in “mass casualty drills” (81.8%), or “participated in the management of disaster/mass casualty cases (90.9%).”¹² Further, most participants felt that “disaster preparedness and management [should] be mandatory for license renewal” (77.3%), and those feelings changed little at the time of the post-survey (72.7%).¹²

Advanced Course

Among the 21 participants with matched pre-post surveys, the majority (52.4%) were female, from the ages of 25–30 (57.1%) and possessed 1–5 years of previous work experience (61.9%).

Curriculum Evaluation

The results of the Wilcoxon Signed Rank Tests revealed positive, statistically significant differences between the pre- and post-surveys

Table 1 Scaled Assessment Responses Among BDLS Participants

Statement*	Test	1 n(%)	2 n(%)	3 n(%)	4 n(%)	5 n(%)	M (SD)	p-value
Q1: Every medical institution should have a disaster/mass casualty incident protocol.	Pre	–	–	–	1 (4.5)	21 (95.5)	4.95 (0.213)	0.317
	Post	–	–	–	–	22 (100.0)	5.00 (0.00)	
Q2: Every medical institution should have strategy with organizational logistics and plans in disaster situations.	Pre	–	–	–	1 (4.5)	21 (95.5)	4.95 (0.213)	0.317
	Post	–	–	–	–	22 (100.0)	5.00 (0.00)	
Q3: Institutional strategies in disaster/mass casualty incident response situation need to be checked and updated periodically.	Pre	–	–	–	–	22 (100.0)	5.00 (0.00)	1.000
	Post	–	–	–	–	22 (100.0)	5.00 (0.00)	
Q4: All health professionals should be familiar with institutional strategy regarding implementation of emergency plans and evacuation procedures.	Pre	–	–	–	3 (13.6)	19 (86.4)	4.86 (0.351)	0.083
	Post	–	–	–	–	22 (100.0)	5.00 (0.00)	
Q5: All health professionals should be acquainted with the identification process of bioterrorism/biological or chemical attacks and should have knowledge how to perform required procedures.	Pre	–	–	3 (13.6)	4 (18.2)	15 (68.2)	4.55 (0.739)	0.053
	Post	–	–	1 (4.5)	1 (4.5)	20 (90.9)	4.86 (0.468)	
Q6: Trainings in emergency response and disaster preparedness should be mandatory for all health professionals.	Pre	–	–	6 (27.3)	7 (31.8)	9 (40.9)	4.14 (0.834)	0.008
	Post	–	–	1 (4.5)	6 (27.3)	15 (68.2)	4.64 (0.581)	
Q7: Overall and situational risk awareness of mass casualty incident/disaster need to be high among health professionals.	Pre	–	–	2 (9.1)	8 (36.4)	12 (54.5)	4.45 (0.671)	0.004**
	Post	–	–	–	2 (9.1)	20 (90.9)	4.91 (0.294)	
Q8: Beside health professionals, the organizational logistics and roles in disaster response situations should include different local and national agencies.	Pre	–	–	–	5 (22.7)	17 (77.3)	4.77 (0.429)	0.025
	Post	–	–	–	–	22 (100.0)	5.00 (0.00)	
Q9: Mass casualty drills should be carried out frequently in order to retain knowledge and skills in the event of a disaster/mass casualty.	Pre	–	1 (4.5)	2 (9.1)	10 (45.5)	9 (40.9)	4.23 (0.813)	0.003**
	Post	–	–	1 (4.5)	3 (13.6)	18 (81.8)	4.77 (0.528)	
Q10: I feel prepared to participate in national emergency response system for disaster.	Pre	3 (13.6)	8 (36.4)	8 (36.4)	1 (4.5)	2 (9.1)	2.59 (1.098)	<0.001**
	Post	–	–	2 (9.1)	7 (31.8)	13 (59.1)	4.50 (0.673)	
Q11: I feel prepared to participate in local community emergency response system for disaster.	Pre	4 (18.2)	7 (31.8)	7 (31.8)	1 (4.5)	3 (13.6)	2.64 (1.255)	<0.001**
	Post	–	–	–	7 (31.8)	15 (68.2)	4.68 (0.477)	
Q12: I feel prepared to carry out accepted triage principles used in disaster incident.	Pre	4 (18.2)	7 (31.8)	6 (27.3)	3 (13.6)	2 (9.1)	2.64 (1.217)	<0.001**
	Post	–	–	1 (4.5)	6 (27.3)	15 (68.2)	4.64 (0.581)	
Q13: In a case of disaster, I feel confident recognizing differences in health assessments indicating potential exposure to specific agents.	Pre	4 (18.2)	8 (36.4)	5 (22.7)	3 (13.6)	2 (9.1)	2.59 (1.221)	<0.001**
	Post	–	–	2 (9.1)	8 (36.4)	12 (54.5)	4.45 (0.671)	
Q14: In a case of disaster, I feel prepared to provide psychosocial support to the victims.	Pre	3 (13.6)	6 (27.3)	7 (31.8)	2 (9.1)	4 (18.2)	2.91 (1.306)	<0.001**
	Post	–	–	2 (9.1)	6 (27.3)	14 (63.6)	4.55 (0.671)	

* Pekez-Pavliško Račić & Jurišić, 2018, 164-166

** p≤.004

among 5 of the areas assessed with scaled items. These areas included “feel[ing] [more] prepared to participate in national [and] local community emergency response system[s]” and “carry[ing] out accepted triage principles.”¹² Participants also “felt [more] confident in recognizing differences in health assessments indicating potential exposure to specific agents” and “felt [more] prepared to provide psychosocial support to the victims.”¹² All scores, regardless of statistically significant change, increased or remained the same between the pre- and post-assessments (Table 2).

Previous Training

At the time of the pre-survey, most participants had taken part in “educational activit[ies] dealing with disaster/mass casualty preparedness” (85.7%).¹² Many of the participants, however, had not been “actively involved in mass casualty drills” (71.4%) or “participated in the management of disaster/mass casualty cases”

(95.2%).¹² Further, most participants felt that “disaster preparedness and management [should] be mandatory for license renewal” (76.2%), and those feelings changed little at the time of the post-test (81.0%).¹²

Limitations

An important limitation should be noted. In an ideal situation, individual participant surveys would have been matched throughout their training, allowing for a more comprehensive assessment of progress. Unfortunately, researchers were only able to match pre-post surveys for both courses (combined) for a very few participants due to missing or unmatched ID codes. Thus, it was necessary to look at the impact of the Basic and Advanced courses separately as the sample size for matched pre-post surveys throughout the curriculum would have been too small to achieve valid results.

Table 2 Scaled Assessment Responses Among ADLS Participants

Statement*	Test	1 n(%)	2 n(%)	3 n(%)	4 n(%)	5 n(%)	M (SD)	p-value
Q1: Every medical institution should have a disaster/mass casualty incident protocol.	Pre	–	–	1 (4.8)	4 (19.0)	16 (76.2)	4.71 (0.561)	0.317
	Post	1 (4.8)	–	–	1 (4.8)	19 (90.5)	4.76 (0.889)	
Q2: Every medical institution should have strategy with organizational logistics and plans in disaster situations.	Pre	–	–	–	1 (4.8)	20 (95.2)	4.95 (0.218)	1.000
	Post	–	–	–	1 (4.8)	20 (95.2)	4.95 (0.218)	
Q3: Institutional strategies in disaster/mass casualty incident response situation need to be checked and updated periodically.	Pre	–	–	–	3 (14.3)	18 (85.7)	4.86 (0.359)	0.317
	Post	–	–	–	1 (4.8)	20 (95.2)	4.95 (0.218)	
Q4: All health professionals should be familiar with institutional strategy regarding implementation of emergency plans and evacuation procedures.	Pre	–	–	1 (4.8)	3 (14.3)	17 (81.0)	4.76 (0.539)	0.083
	Post	–	–	–	2 (9.5)	19 (90.5)	4.90 (0.301)	
Q5: All health professionals should be acquainted with the identification process of bioterrorism/biological or chemical attacks and should have knowledge how to perform required procedures.	Pre	–	1 (4.8)	–	5 (23.8)	15 (71.4)	4.62 (0.740)	0.102
	Post	–	–	1 (4.8)	2 (9.5)	18 (85.7)	4.81 (0.512)	
Q6: Trainings in emergency response and disaster preparedness should be mandatory for all health professionals.	Pre	–	1 (4.8)	1 (4.8)	8 (38.1)	11 (52.4)	4.38 (0.805)	0.014
	Post	–	–	–	4 (19.0)	17 (81.0)	4.81 (0.402)	
Q7: Overall and situational risk awareness of mass casualty incident/disaster need to be high among health professionals.	Pre	–	–	1 (4.8)	4 (19.0)	16 (76.2)	4.71 (0.561)	0.317
	Post	–	–	–	3 (14.3)	18 (85.7)	4.86 (0.359)	
Q8: Beside health professionals, the organizational logistics and roles in disaster response situations should include different local and national agencies.	Pre	–	–	1 (4.8)	6 (28.6)	14 (66.7)	4.62 (0.590)	0.034
	Post	–	–	–	2 (9.5)	19 (90.5)	4.90 (0.301)	
Q9: Mass casualty drills should be carried out frequently in order to retain knowledge and skills in the event of a disaster/mass casualty.	Pre	–	–	3 (14.3)	6 (28.6)	12 (57.1)	4.43 (0.746)	0.007
	Post	–	–	–	3 (14.3)	18 (85.7)	4.86 (0.359)	
Q10: I feel prepared to participate in national emergency response system for disaster.	Pre	2 (9.5)	6 (28.6)	7 (33.3)	2 (9.5)	4 (19.0)	3.00 (1.265)	<0.001**
	Post	–	1 (4.8)	3 (14.3)	4 (19.0)	13 (61.9)	4.38 (0.921)	
Q11: I feel prepared to participate in local community emergency response system for disaster.	Pre	1 (4.8)	4 (19.0)	8 (38.1)	3 (14.3)	5 (23.8)	3.33 (1.197)	0.003**
	Post	–	1 (4.8)	2 (9.5)	4 (19.0)	14 (66.7)	4.48 (0.873)	
Q12: I feel prepared to carry out accepted triage principles used in disaster incident.	Pre	1 (4.8)	4 (19.0)	5 (23.8)	8 (38.1)	3 (14.3)	3.38 (1.117)	0.004**
	Post	–	1 (4.8)	3 (14.3)	3 (14.3)	14 (66.7)	4.43 (0.926)	
Q13: In a case of disaster, I feel confident recognizing differences in health assessments indicating potential exposure to specific agents.	Pre	1 (4.8)	6 (28.6)	8 (38.1)	4 (19.0)	2 (9.5)	3.00 (1.049)	<0.001**
	Post	–	–	3 (14.3)	7 (33.3)	11 (52.4)	4.38 (0.740)	
Q14: In a case of disaster, I feel prepared to provide psychosocial support to the victims.	Pre	2 (9.5)	5 (23.8)	7 (33.3)	3 (14.3)	4 (19.0)	3.10 (1.261)	0.001**
	Post	–	1 (4.8)	5 (23.8)	3 (14.3)	12 (57.1)	4.24 (0.995)	

* Pekez-Pavliško Račić & Jurišić, 2018, 164-166

** p≤.004

Discussion

Regarding preparedness education, during the Basic course, participants significantly increased their perception of the need for awareness and drills for health professionals in the area of disaster preparedness. Participants, similar to other medical students who had experienced the recent global pandemic, may have become more aware of their role as potential volunteers during emergencies.¹ Medical students have reported their disaster preparedness knowledge as limited, possibly due to incomplete topic coverage in medical school.³ As study participants learned more during the Basic course about hazard risk and management of dangerous emergency events, they may have realized a gap, similar to other medical students participating in disaster trainings,² between their personal excitement to volunteer and their current knowledge and skill levels. Generalizing from this realization, participants may have also questioned the disaster preparation skills of not only their medical school colleagues but also of other health professionals.

For preparedness perceptions, results of this study are generally consistent with the literature, as previous types of disaster preparedness and response trainings have improved some participant cognitive, affective, and skill objectives.⁵ Before and after both Basic and Advanced courses, significant improvements in participant perceived preparation for integrating their skills, such as triage, into the local and national response systems were reported. In addition, confidence in hazard assessment and patient psycho-social support skills significantly increased. Building from system-wide response concepts in the Basic course to assessment and treatment skill application in the Advanced course, the curriculum in this study seemed to improve attitudes and skills as participants learned and then practiced their role in the larger system of emergency care. Although this curriculum was a medical school elective, it may have also been successful because it used active-learning instructional strategies that included hands-on exercises and simulations recommended as best practice learning methods.⁵ It also followed recommendations for course length and

coverage of triage skills and incident command management as part of an all-hazards approach.⁷

Implications for Mandatory Future Training

Most interestingly, concerning questions about previous training, over the course of the curriculum, over 70% of participants consistently believed that “disaster preparedness and management [training activities] be mandatory for license renewal.”¹² Although most entered the curriculum with limited previous disaster training and emergency drill experience, the importance of preparedness concepts may have been extremely relevant to them as the global pandemic was a recent event. They saw physicians, frontline providers in a disaster,⁴ manage pandemic treatment and may have perceived a high need for all physicians to learn and continue to practice preparedness and response skills— readying for the next emergency.

Most current disaster preparedness training is voluntary in medical education,^{8–10} if offered at all. Curriculum delivery strategies for disaster preparedness training encompass several promising options for improved knowledge, attitudes, and skills. Study participants may have perceived these current training options as only minimal; therefore, mandatory training was noted as necessary. Although many barriers (time, scheduling, materials, staffing) exist to mandated training, at least 1 medical school described in the literature provided a successful mandatory course.¹¹ That course demonstrated that the ideal could be achieved consistently over time, could be started early in students’ education, could be technology-enhanced, and could be integrated into existing schedules. Possibly, standardizing and replicating such a promising model program¹¹ could meet training needs. Also, mixed delivery modes,⁵ use of technology,⁸ and a brief time frame for implementation⁵ could lessen interference with other required courses.

Disaster preparedness training is well-suited for continuing clinical professional development as it includes content beyond just traditional clinical medicine, and skill improvements can be demonstrated.¹⁵ Disaster preparedness training could reasonably be a legislatively mandated medical professional development topic. Because it can occur in the practice setting, it allows physicians to practice and update their disaster skills throughout their careers, it can be presented in a variety of learning formats, it can be implemented inter-professionally, and the topic can lead to quality improvement in professional practice.¹⁵ As a mandated topic, some physicians may not see its relevance to their specialty; however, when a disaster strikes, emergency knowledge and skills will become highly relevant to all. Mandating disaster preparedness training holds the potential to create a culture shift that emphasizes the role of physicians in emergency preparedness and sends a global message that disaster preparedness training is just as essential as other aspects of medical training, thus, diminishing issues surrounding perceived relevance.

Currently, mandated continuing clinical professional development topics are based on specialty, and practices and policies vary by state. It may also be controversial due to the politics behind the choices and variations in continuing medical education requirements by state medical boards. The process is to be self-directed and topics chosen based on physician performance gaps and needs. Specifically, professional development topics should be personalized to the physician’s expertise needs, stage of practice, and type of practice issues commonly encountered.¹⁵ Some physicians may view mandated topics as less

important or interesting than those they personally chose and place less emphasis on that content.

Conclusion

Overall, results provide evidence to support curricular effectiveness on improving perceptions toward required preparedness education, preparedness, and confidence. For those instructing current medical students in disaster preparedness, although much training seems to improve participant knowledge and skills,⁵ it is suggested that a curriculum (such as the one in this study) be chosen that can create participant initial anticipation and awareness as well as the belief in the importance of and need for disaster preparedness training in continuing medical education. Those trained and who perceive the importance of the training and even believe it critical enough to be a part of the licensing process may advocate for more offerings available to medical students in the required core or elective curriculum to cover the topic. Further investigation into the relationship between students’ perceived training importance and any future advocacy efforts on behalf of increased preparedness and mandatory offerings in medical education and continuing education is recommended.

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