ORIGINAL RESEARCH

Veterans Health Administration's Disaster Emergency Medical Personnel System (DEMPS) Training Evaluation: Potential Implications for Disaster Health Care Volunteers

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ABSTRACT

Objective: The US Veterans Health Administration's Disaster Emergency Medical Personnel System (DEMPS) is a team of employee disaster response volunteers who provide clinical and non-clinical staffing assistance when local systems are overwhelmed. This study evaluated attitudes and recommendations of the DEMPS program to understand the impact of multi-modal training on volunteer perceptions.

Methods: DEMPS volunteers completed an electronic survey in 2012 (n = 2120). Three training modes were evaluated: online, field exercise, and face-to-face. Measures included: "Training Satisfaction," "Attitudes about Training," "Continued Engagement in DEMPS." Data were analyzed using χ^2 and logistic regression. Open-ended questions were evaluated in a manner consistent with grounded theory methodology.

Results: Most respondents participated in DEMPS training (80%). Volunteers with multi-modal training who completed all 3 modes (14%) were significantly more likely to have positive attitudes about training, plan to continue as volunteers, and would recommend DEMPS to others (*P*-value < 0.001). Some respondents requested additional interactive activities and suggested increased availability of training may improve volunteer engagement.

Conclusions: A blended learning environment using multi-modal training methods, could enhance satisfaction and attitudes and possibly encourage continued engagement in DEMPS or similar programs. DEMPS training program modifications in 2015 expanded this blended learning approach through new interactive online learning opportunities. (*Disaster Med Public Health Preparedness*. 2018;12:744-751)

Key Words: emergency preparedness, voluntary workers, Veterans health, health education, disaster medicine

When disasters impact a community, health care facilities may receive a surge of casualties and people searching for potentially injured loved ones and information. To adequately manage these emergency demands, professionals with expertise in a range of areas are needed to respond.[1-3] However, facility staffing is sometimes a challenge because of the unavailability of usual staff due to the emergency (eg, directly impacted by the event, difficulty commuting, conflicting responsibilities) or a need for additional staff to handle the surge demand.[4] To prepare for a potential staff shortage, hospitals offer disaster response training to employees and national teams of disaster health care volunteers (eg, Medical Reserve Corps) are coordinated to provide the needed support to maintain patient access to care.

The US Department of Veterans Affairs Veterans Health Administration (VHA) is the largest integrated health care system in the United States. Serving ~9.3 million Veterans each year at over 1700 sites of care, it is vital that individual facilities and VHA, as a whole, are prepared to continue delivering services despite a potential mass casualty surge or staffing shortage following an event.[5] The Disaster Emergency Medical Personnel System (DEMPS) is a team of employee volunteers available to deploy to disaster sites and provide clinical and non-clinical staffing assistance when local systems are overwhelmed. VHA supports DEMPS volunteers with training for deployment readiness. In 2012, a quality improvement project surveyed DEMPS volunteers on their experience with the program up to that point. Initial analyses of the resulting data evaluated factors influencing

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volunteers' readiness to deploy,[6] while this study focused on perceptions of and feedback on training experiences.

While the current literature emphasizes that training of health care staff and volunteers in disaster medicine and public health emergency response is integral for preparedness,[7-9] there is no universally accepted course curriculum or method of training.[7,8,10,11] At the time of the survey, in 2012, the program consisted of a comprehensive curriculum with 3 modes of training delivery: (1) online independent study, (2) hands-on field exercise, and (3) face-to-face classroom lecture. The goals of this analysis were to (1) better understand DEMPS volunteers' training mode utilization and attitudes about training, and (2) identify areas of improvement for DEMPS' training program. The primary focus of this study was to better understand the impact of a multi-modal training program on perceptions of training.

METHODS

In 2012, all DEMPS volunteers (N = 8250) were invited by e-mail to participate in an online survey to provide feedback on their DEMPS training experiences up to that point. The survey included questions about training, self-perceived preparation and readiness, levels of stress, and ideas or areas for program improvement, but did not request input on specific training content. Three reminder e-mails were sent following the initial invitation to those who had not replied. A total of 2120 (26%) DEMPS volunteers responded to the survey. Data submitted online were converted into analytic files for analysis and items were reviewed for completeness, coding, and usefulness in addressing the study aims. The study was approved by the US Department of Veterans Affairs Greater Los Angeles Health Care System Institutional Review Board as a quality improvement study.

Measures

Key variables

Key items for analysis included training mode participation and satisfaction (online, field exercises, and face-to-face), attitudes about DEMPS training, and continued engagement in DEMPS (see Figure 1 for these survey items). All satisfaction, attitude, and continued engagement questions utilized 7-point Likert scale responses ranging from most negative (eg, extremely dissatisfied) to most positive (eg, extremely satisfied), but were recoded to indicate either a positive or a neutral/negative binary response for further descriptive and regression analysis as the dependent variables. Training mode participation included the options of having completed any combination of online, field exercise, or face-to-face modes. Number of training modes completed (0, 1, 2, 3) was the key independent variable used in the analysis. For regression models, dichotomous indicators for each count value of training modes was created with 1 training mode as the reference category.

Bivariate and regression analyses considered demographic characteristics (gender, race/ethnicity, age, and education) along with DEMPS experience (roles, deployments) as independent variables. Demographic characteristics were collected in the survey using multiple choice and short answer questions. Gender was a binary descriptor (male/female), whereas ethnicity included white, black/African American, Hispanic/Latino, Asian, American Indian/Alaska Native, and Native Hawaiian/Other Pacific Islander. Due to the small number of people within the non-white categories, categories were collapsed for multivariate analysis as white and Non-white. Age was initially measured as 1 of 6 categories, but subsequently collapsed into 3 groups: 18-40, 41-50, and 51 years or older. Level of education was derived from 6 multiple choice and 1 open-ended "other" option. These were grouped into 4 categories: less than a college degree (high school diploma, some college), 2-4-year degree (associates, nursing, bachelor's degree), master's degree, doctoral or medical degree. The authors then reviewed and coded "other" responses into 1 of these groups.

The respondents' DEMPS role and participation were also analyzed as independent variables. Respondents were asked if they had deployed with DEMPS (yes/no). The length of time as a DEMPS volunteer was measured on a 4-point scale. Primary DEMPS volunteer roles collected through the survey included 43 options. Volunteer role categories were grouped as "Clinical" (eg, Doctor, Nurse, Other Clinician) and "Non-Clinical" (eg, Medical Technicians, Police Officers, Chaplains Administrative/Technical/Clerical Employees) for analysis. "Other Clinician" included roles such as Physician Assistant, Pharmacist, and Social Worker.

Survey respondents were also asked for their open-ended feedback. Short answer questions included items to assess additional training suggestions, ideas for maintaining volunteer engagement, and challenges to DEMPS participation. Most survey respondents (48%-64% depending on the question) answered these questions. The qualitative data from these questions referring to training were extracted and evaluated for frequency and content in a manner consistent with grounded theory methodology.

Data Analysis

Survey data were analyzed using Microsoft Excel, Statistical Analysis System software version 9.3 (SAS Institute, Cary, NC), and Stata 13.1 (StataCorp, College Station, TX). Initial analysis determined response rates, data quality, and sample adequacy. Descriptive and univariate analysis of the entire sample (n = 2120) for categories of training modalities, frequencies of modalities used, and other basic sample characteristics helped guide subsequent analysis. χ^2 tests were used to identify associations between categorical variables. Bivariate analyses assessed the relationship between number of training modalities and respondent characteristics, satisfaction, attitudes, and engagement. Multiple variable logistic regression was used to confirm the descriptive associations between the

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FIGURE 1

Measures

Satisfaction with Training Modes	Extremely Dissatisfied	Very Dissatisfied	Somewhat Dissatisfied	Neither Dissatisfied nor Satisfied	Somewhat Satisfied	Very Satisfied	Extremely Satisfied
Overall, how satisfied were you with the online training?	○	○	○	○	○	○	○
Overall, how satisfied were you with the field exercises?	○	○	○	○	○	○	○
Overall, how satisfied were you with the face-to-face training?	○	○	○	○	○	○	○
Attitudes About Training	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
The training I received was appropriate given DEMPS mission & goals	○	○	○	○	○	○	○
DEMPS training prepared me about what to expect during deployment	○	○	○	○	○	○	○
DEMPS training provided useful information about my role responsibilities during deployment	○	○	○	○	○	○	○
I have been provided with sufficient training in preparation for deployment	○	○	○	○	○	○	○
All in all, I am satisfied with my training experience(s) with DEMPS	○	○	○	○	○	○	○
Continued Engagement in DEMPS	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
I plan to continue to volunteer with DEMPS for at least another year	○	○	○	○	○	○	○
I would recommend volunteering with DEMPS to others	○	○	○	○	○	○	○

This image is a visual summarization of the training-related questions evaluated by this paper, but is not a direct replication of the Disaster Emergency Medical Personnel System (DEMPS) on-line survey format. The category titles were generated by the manuscript authors.

number of training modalities completed and attitudes about training and continued engagement in DEMPS. The 7 measures (see Figure 1) were collapsed to reflect whether the respondent slightly agreed, agreed, or strongly agreed with the statement and then analyzed using the same set of covariates for each logistic regression model. Multiple logistic regression models were used to determine whether associations persisted once other factors were measured. Each of the regression models included the same set of covariates, including number of training modalities, DEMPS role, prior deployment, education, age, race/ethnicity, and gender. The analytic sample excluded responses that reported no training (n = 405), as well as responses with missing data on training questions (n = 70) or independent variables (n = 34-61 depending on the item). The resulting analytic sample size ranged 1438-1457 survey responses, depending on the variable being assessed.

RESULTS

Participant Characteristics

Most the study sample was white and non-Hispanic (78%) and the modal age range reported was 51-60 years old. The modal level of education was less than a college degree (34%); however, when categories of higher education were combined, a large majority (66%) reported a higher education degree. Most participants had been in DEMPS for 5 years or less (79%) and had not deployed with DEMPS (83%). Respondents almost equally represented clinical (54%) and non-clinical (45%) volunteer roles. See Table 1 for detailed participant characteristics. A notable bivariate relationship within participant characteristics was that deployment experience was highly related to longer length of time as a DEMPS volunteer. For logistic regression models, length of time in DEMPS was omitted because of its high correlation with deployment experience.

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TABLE 1

Participant Characteristics

	N	%
Gender		
Male	923	44
Female	1163	56
Age		
18-25	16	1
26-30	79	4
31-40	304	14
41-50	652	31
51-60	834	40
>60	198	10
Ethnicity		
American Indian/Alaskan Native	42	2
Asian	46	2
Black/African American	228	11
Hispanic/Latino	126	6
Native Hawaiian/Other Pacific Islander	10	1
White	1614	78
Education		
Less than a college degree (HS, some college)	690	34
2-4-year degree	643	31
Master's degree	542	27
Doctoral or medical degree	169	8
Time *w*/DEMPS		
<1 year	281	14
1-2 years	657	32
3-5 years	695	34
>5 years	438	21
DEMPS role		
Doctor	50	2
Nurse	707	34
Other clinician	379	18
Not clinical	923	45
Deployed *w*/DEMPS		
Yes	351	17
No	1713	83

Abbreviations: HS, high school; DEMPS, Disaster Emergency Medical Personnel System.

These numbers are based on the entire sample but categories do not total to (n=2120) due to missing values.

Training Mode Participation

Most respondents (80%) indicated they had completed at least some DEMPS training at the time of the survey. Around half (51%) finished only 1 training mode, whereas 14% participated in all 3 modes. Among the entire sample, the majority (76%) completed online modules with substantially lower percentages reporting either field exercises (24%) or face-to-face training (23%). Table 2 provides more details regarding the combination of modes completed by survey participants. Bivariate analyses showed female respondents were more likely to have 1 or 3 training modes completed, and volunteers with deployment experience more frequently indicated completing 2 or 3 modes. None of the remaining sociodemographic, DEMPS role, or participation groups showed statistically significant differences in the number of training modes completed (data not shown).

TABLE 2

Mode Participation by Type and Count

	N	%
Training mode		
None	405	20
Online only	994	48
Field only	15	1
Face-to-face only	34	2
Online and field	167	8
Online and face-to-face	115	6
Field and face-to-face	29	1
All 3	291	14
Number of modes		
0	405	20
1	1043	51
2	311	15
3	291	14

These numbers are based on the entire sample but categories do not total to (n=2120) due to missing values.

Training Satisfaction, Attitudes, and Continued Engagement

Satisfaction was universally high for those who indicated completing the specific training modalities in question, with field exercise (86%) receiving the highest overall rating. Multivariate models (Table 3) showed that white, non-Hispanic respondents were significantly more likely to be satisfied with online training and those with non-clinical roles were significantly less likely to be satisfied with face-to-face training (P-value < 0.05 for both models). More than half of all participants that completed at least 1 training type responded positively on all questions regarding attitudes about DEMPS training. In addition, the majority of volunteers, regardless of whether they completed training, indicated they plan to continue to volunteer with DEMPS for at least another year (81%) and they would recommend volunteering with DEMPS to others (77%).

After controlling for demographic and participant characteristics, participation in all 3 training modes (vs those with only 1 training mode indicated) was directly related to a more positive attitude about training, plans to continue as a DEMPS volunteer, and recommending DEMPS to others (P-value < 0.001 for all 7 logistic regression models). Prior DEMPS deployment was associated with reporting overall training satisfaction and with higher likelihood to recommend DEMPS to others in these regression models (P-value ≤ 0.001 for both models). For questions on training as it related to deployment expectations and preparation, respondents aged 51 years and older were significantly more likely to respond that training provided useful information about responsibilities during deployment (P-value $= 0.020$), whereas those with deployment experience were more likely to feel they were provided sufficient training in preparation for deployment (P-value $= 0.001$). The regression models for these questions were also analyzed for only the

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TABLE 3

Training Satisfaction, Attitudes, and Continued Engagement

Dependent Variables	Overall Satisfaction (%)	Independent Variables With Statistically Significant OR	OR (95% CI)	*P*-Value
Satisfaction with training modes				
Overall, how satisfied were you with the online training?	83	White, non-Hispanic ethnicity	1.40 (1.02-1.92)	0.038
Overall, how satisfied were you with the field exercises?	86	No significant findings	—	—
Overall, how satisfied were you with the face-to-face training?	80	Non-clinical DEMPS role	0.50 (0.29-0.87)	0.013
Attitudes about training				
Training I received was appropriate given DEMPS mission and goals	71	Participated in 2 modes of training	6.17 (4.07-9.35)	<0.001
		Participated in 3 modes of training	9.37 (5.68-15.45)	<0.001
		White, non-Hispanic ethnicity	0.72 (0.52-1.00)	0.045
DEMPS training prepared me about what to expect during deployment	65	Participated in 2 modes of training	3.73 (2.68-5.20)	<0.001
		Participated in 3 modes of training	7.20 (4.74-10.93)	<0.001
DEMPS training provided useful information about my role responsibilities during deployment	68	Participated in 2 modes of training	4.52 (3.09-6.32)	<0.001
		Participated in 3 modes of training	7.06 (4.61-10.81)	<0.001
		51 years old and older	1.38 (1.05-1.83)	0.020
I have been provided with sufficient training in preparation for deployment	60	Participated in 2 modes of training	4.28 (3.11-5.90)	0.003
		Participated in 3 modes of training	7.65 (5.18-11.31)	<0.001
		Deployed with DEMPS	1.74 (1.26-2.41)	0.001
All in all, I am satisfied with my training experience (s) with DEMPS	66	Participated in 2 modes of training	5.00 (3.48-7.17)	<0.001
		Participated in 3 modes of training	13.09 (7.74-22.12)	<0.001
		White, non-Hispanic ethnicity	0.70 (0.52-0.96)	0.027
		Deployed with DEMPS	1.88 (1.32-2.68)	0.001
Continued engagement				
I plan to continue to volunteer with DEMPS for at least another year	81	Participated in 2 modes of training	3.47 (2.06-5.85)	<0.001
		Participated in 3 modes of training	7.23 (3.49-14.97)	<0.001
I would recommend volunteering with DEMPS to others	77	Participated in 2 modes of training	3.73 (2.29-6.06)	<0.001
		Participated in 3 modes of training	8.25 (4.15-16.38)	<0.001
		Deployed with DEMPS	3.02 (1.76-5.18)	<0.001

Dependent variables were coded as a "1" if the respondent slightly to strongly agreed with the statement and "0" otherwise. Multiple logistic regression models included dichotomous indicators for the number of Disaster Emergency Medical Personnel System (DEMPS) training modalities completed (1 training mode as reference category), clinical versus non-clinical role (clinical role as reference category), education category (less than a college degree as reference category), female gender (male as reference category), age 18-40 and 51 years or older (age 41-50 as the reference category), white, non-Hispanic (all other race/ethnicity categories as reference), and prior DEMPS deployment (not previously deployed reference category). Variables with odds ratios (OR) that were significantly different than 1.0 are reported in this table.

subsample that had deployed; results were that age was no longer significant, but more training modes continued to be significantly related to positive agreement on these 3 questions. White, non-Hispanic ethnicity was found to be negatively associated with reporting that training was appropriate and with overall satisfaction with training (P-value <0.05 in both models). No significant findings arose for education level or gender in any of the regression models.

Open-Ended Response Findings

Respondents most often requested field exercises or live sessions when providing suggestions for additional training, with emphasis on "hands on" and "group" experiences. Some respondents noted they wanted more of this mode of education while others stated they had never had it but wanted and enjoyed it in other contexts. Suggestions for maintaining engagement ranged from general suggestions for improving DEMPS communication with volunteers to very specific ideas such as starting a monthly newsletter. Two frequent training-related suggestions were to make training more available and to hold field exercises. Although some comments were unclear regarding types of training that should be provided more frequently, many responses indicated the desire for more field exercises. Scheduling "interactive" exercises, "mock drills," and "reenactments" with teams were all suggestions about how DEMPS could keep volunteers engaged. Some respondents noted that practice could "get volunteers involved" while "building social contact."

When asked about DEMPS participation challenges some respondents indicated the training program in some way posed a challenge to their continued participation. Some stated the lack of availability of face-to-face training or field exercises was a problem, while others were unhappy with the online courses or did not believe online training was adequately supplemented by other training modes. These comments included references to a "lack of skill training" and "no teamwork building" with online training.

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DISCUSSION

This analysis suggests that respondents were overall very satisfied with DEMPS training, had positive attitudes about the program, and that participation in multiple modes of training strengthened these associations. Determining volunteer preferences and effective teaching methods for the required skills during deployment is important to maintain the needed roster of qualified DEMPS volunteers. Past studies have found that training programs relying primarily on web-based independent courses have mixed results in improving knowledge.[10,12] In contrast, interactive training formats such as drills, tabletop exercises, and simulations[8,10,11,13-16] and multi-modal training programs[7,8,16,17] can effectively increase knowledge retention and have been described as more helpful and preferred over self-study by health care professionals. To accommodate various learning styles and preferences, DEMPS' multi-modal education program incorporated both interactive and self-study components.

Approximately 76% of respondents to the DEMPS survey participated in online independent study courses, whereas fewer attended field exercises (24%) or face-to-face training (23%). It was highly recommended that volunteers complete some of the online courses before engaging in face-to-face training or exercises, and many introductory sessions were offered in this manner. This may be 1 potential reason for higher engagement in this modality over the others. Regardless of the type of training mode completed, the majority of respondents who participated in each of the 3 were satisfied with what was provided. White, non-Hispanic respondents were more likely to be satisfied with online training. This may be because this ethnic group was more likely than non-white respondents to have completed online training, which could be related to differential access to or interest in this mode and correspondingly less satisfaction with it. In contrast, non-clinical DEMPS volunteers were less likely to be satisfied with face-to-face trainings. One potential reason for lower satisfaction with this mode could that non-clinical respondents were more likely to have less than a college degree, which may mean this group had less experience with or desire to be in a classroom lecture setting. Field exercises, however, were universally well received by this sample, with no group differences in satisfaction ratings and with extremely high overall satisfaction.

Most volunteers also had positive attitudes about the training content. Older DEMPS volunteers (older than 50 years of age) were significantly more likely to feel training provided useful information about responsibilities during deployment. In addition, respondents who deployed were more likely to feel training sufficiently prepared them for deployment. After checking the sensitivity of these models by running them as conditional upon deployment experience, age, and deployment experience were found to be no longer significant. This may be because those respondents 51 years old and above were the most likely age group to have deployment experience, showing collinearity in these models. To test this, we conducted a sensitivity analysis of our regression model specification and examined bivariate relationships between the covariates. We found that deployment experience was consistently related to overall satisfaction with DEMPS training and that multiple training mode participation was related to positive attitudes.

A potential supplement for volunteers without deployment experience is participation in a field exercise or hands on training. This was commonly requested in the open-ended sections of the survey as a way to improve training and enhance the DEMPS program in general. Some DEMPS volunteers noted in their comments that there were not enough opportunities to participate or they did not believe there were enough interactive training modes available. While this shows interest in multiple modalities of training, it may also highlight a limitation of the DEMPS training program. Field exercise and face-to-face trainings were generally offered less frequently than online courses, and aimed to accommodate individuals who were interested and available to attend them as much as possible. Administrative barriers to expanding these opportunities include cost and time, which are both more substantial for interactive training, particularly training that requires travel or time away from core duties of employment. However, for the relatively small percentage of volunteers who did complete more than 1 type of training (29%), their multi-modal training experience appeared to be very strongly related to their perceptions of not only the training but also of the DEMPS program itself.

Results indicate that volunteers who were willing and able to attend multiple types of trainings tended to be happier with the overall DEMPS training program. As positive attitudes about training in DEMPS could positively impact their readiness to deploy,[6] it is important to understand factors that can influence these attitudes. In general, other studies have suggested that an ancillary benefit to any education or training program may be improved volunteer satisfaction, commitment, confidence, and willingness to continue to participate.[6,9,18] The current study has also demonstrated that more participation in training (based on number of modes) and deployment can improve volunteers' willingness to continue in DEMPS or recommend it to others. Participants specifically noted in their written responses that training and field exercises could keep volunteers involved in the program.

Based on this study's findings, it is plausible that offering additional opportunities for volunteers to engage in multiple training methods and hands on experience could improve attitudes about training and foster continued involvement in the volunteer program. In response to this possibility, in 2015, DEMPS program leaders redesigned the training program to incorporate aspects of all training modes (online, field exercises, face-to-face) into an interactive web-based

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platform that builds on the efficiency and standardization advantages of online training.[1,15,19] Noting the concern that some computer-based training systems may lack interactive, team-based, or experiential components,[1] the redesigned DEMPS education program that was launched in 2015 includes features that support interaction and team learning. Online independent study continues to be included, while the addition of asynchronous webcasts and synchronous virtual reality provides a collaborative and interactive learning environment for volunteers. This appears to align with the trend of some other clinician-focused, disaster medicine programs to be multi-modal and incorporate information and communication technologies into their courses.[7,8,16,17] Ultimately, these new training components are intended to facilitate a multi-modal education program that reaches more DEMPS volunteers and provides more opportunities to engage in different training methods due to its accessibility through online delivery.

The results of the 2012 DEMPS volunteer survey were used to make important changes to the way VHA trains its volunteers for emergency deployment duties. As this was a pragmatic and operational survey, there are some design limitations including a limited response rate and the possibility that respondents had systematically different attitudes compared with non-respondents. An additional limitation is that the survey was only available online and completion was voluntary, which meant data were cross-sectional and respondent demographics may not be representative of all DEMPS volunteers. In addition, questions about reasons for participation or potential training barriers were not included in the survey, which may have provided a more nuanced explanation of volunteers' experiences. Lastly, because data were de-identified, the research team was unable to link the analytic files to other data sources to address the generalizability of our findings to all DEMPS volunteers or VHA employees.

CONCLUSION

Fostering a blended learning environment with multi-modal training methods and opportunities to apply training could improve disaster volunteer training satisfaction and positive attitudes. Successful training programs may, in turn, encourage continued engagement in DEMPS, similar programs such as the Medical Reserve Corps, or disaster response volunteer programs (eg, Team Rubicon, American Red Cross). Future research on volunteer satisfaction and attitudes of the DEMPS web-based curriculum could provide insight into the viability of this type of training program for disaster health care and response volunteers.

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