

ORIGINAL ARTICLE

Confidence of Saudi emergency medical service's students in disaster response capability

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ABSTRACT

Background: A disaster is a severe functional disruption of a community, and occurring over a short or long period of time that causes widespread human, material, economic, or environmental loss which exceeds the ability of the affected community or society to cope using its own resources. In this study, we aimed to assess the awareness and confidence of Saudi emergency medical services (EMS) students regarding disaster response skills, and to identify the preferred method of induction and training for coping with a disaster situation.

Methods: A descriptive cross-sectional survey, modified from the Arabic Disaster Preparedness Evaluation Tool, was distributed in all colleges for EMS in Saudi Arabia, including government and private colleges, targeted at alumni of the EMS class of 2017/18.

Results: A total of 329 surveys were collected. EMS students were shown to be prepared to face a disaster situation ($M = 3.44$; $M = 3.84$). Practical simulations and live drills were the preferred method of emergency procedures induction ($M = 4.52$).

Conclusion: EMS students were confident in their disaster response ability, favoring live drills as a method of re-enforcing emergency practices.

Keywords: Confidence, students, EMS, disaster response, Hajj, Umrah.

Introduction

A disaster is an unpredictable, unfamiliar, urgent, life-threatening, and sudden. All such emergencies, such as floods, earthquakes, and terrorist attacks, to name but a few, incur deaths, severe injuries, disease outbreaks, food shortages, large scale displacement, and economic loss measurable disruption and/or loss of a community's human, material, and economic functions, resulting from an inability to cope with a sudden increase in demand on available resources [1]. Saudi Arabia has faced many disasters throughout its history in different situation and managed by Saudi experience when the science of disaster management was poor in Saudi Universities [2].

Awareness and training are key to effective disaster response, and a multidisciplinary approach is important in creating a seamless collaborative effort between separate response service teams [3]. Disaster education is a part of the emergency medical services (EMS) yearly syllabus, and is a mandatory part of the subject curriculum; it is necessary to amalgamate educational programs into both formal and continuous education curricula, to prepare students to respond to a state of disaster [4].

The National EMS Education Standards, published by the National Registry of Emergency Medical Technician, includes a list of mandatory subjects to be included in EMS curricula in Saudi Arabia. These include emergency management, mass casualty incidents, and terrorism preparedness [5,6].

Recently, the National Association of EMS Physicians called for the formulation of EMS with a stable and robust structure that should play a role in education and training throughout the disaster [7]. However, to ensure students of EMS are well prepared for a disaster, education and regular drills must be applied [8]. Front-line response

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teams to man-made and natural disasters are paramedics who perform initial triage, decontamination, and patient transportation to hospitals [9].

Saudi Arabia, in the past decade, has experienced a variety of disasters, both natural and man-made. The country has identified the need for improvement in its disaster response systems; and as a result of this, a series of proposed changes to the national disaster response are an integral part of the National Transformation 2020 program [10]. EMS is among the specialties that contribute to disaster preparedness and response. EMS technician and paramedic personnel usually receive training in disaster management as part of their educational requirement program, but little is known regarding EMS B.Sc. student's ability and confidence in a disaster or mass causality incident.

Fernandez et al. [11] reported a significant correlation between individual and multiagency disaster preparedness training for EMS professionals and their perception of disaster preparedness when 21,438 EMS professionals were surveyed in the United States of America.

Hospital managers in Boston reported that the Boston blast disaster response was excellent [12]. Pouraghaei et al. [13] said that for better management of disasters, EMS personnel should be effectively trained and educated to make them better in disaster situations.

Leggio et al. [14] reported participants EMS students during Hajj felt that they needed more training for disaster management, MCIs, and triage, and recommended an improvement in disaster management education by including a Hajj specific training program. In a study by Al Razeeni [15], students showed a lack of knowledge and skills in disaster response. Both studies were from the same EMS program, which cannot be generalized across the Kingdom of Saudi Arabia.

Methodology

A descriptive cross-sectional survey was distributed to all colleges for EMS in Saudi Arabia, including government and private colleges, targeted at alumni of the EMS class of 2017/18. We used a modified Arabic version of the Disaster Preparedness Evaluation Tool (ADPET), ceded by the author [16]; and tested by means of a verify study. A convenience sample of 329 students was set as these amounts to the total available in the specified year.

All final-year (internship year) EMS students registered in a bachelor's degree program in either a government or private colleges in Saudi Arabia in the 2017 academic year 2017 were included in the study. Those who had their education outside KSA, or were part of a cooperative internship scheme were excluded.

Pilot study

After modification of the Arabic version of DPET, we distributed the questionnaire online to 29 students from different EMS programs, after which the Pearson correlation coefficient was calculated to determine the internal truthfulness of the questionnaire (p -value ≥ 0.05).

Data management and analysis

Statistical analyses were carried out by using the Statistical Package for the Social Sciences (SPSS v.21), and the mean score and standard deviation was calculated. The length of the 5 points of Likert-scale categories used in the study sub-scales was determined by calculating the range ($5-1 = 4$) and dividing it by the number of scale categories to obtain the correct class length ($4/5 = 0.80$) to the lowest value in the scale (or the beginning of the scale, 1) to determine the upper limit of this category, and thus the length of categories as follows:

$M = 1-1.80$ represents strongly disagree

$M = 1.81-2.60$ represents disagree

$M = 2.61-3.40$ represents neutral

$M = 3.41-4.20$ represents agree

$M = 4.21-5.00$ represents strongly agree

The frequency and percentage to determine the distribution of the study sample according to gender, age, and type of colleges (government/private), and participation in, at least, one season as a volunteer at Hajj or Umrah during their period of study at the college. To find out if there were statistically significant differences in the answers of the participants according to gender and types of college, a two tailed t -test was used to illustrate differences in the answers of the participants in the study, in relation to gender and types of college. Analysis of variance (One-way ANOVA) and differences in the answers of the participants in the study axes according to age variable. To determine the correlation between the disaster preparedness sub-scale and the disaster response sub-scale, a Pearson correlation coefficient was employed. χ^2 -test of independence was applied to categorical variables to assess significance of relationships.

Results

The study included 329 students. Demographic data are summarized below (Table 1).

Disaster preparedness

The second sub-scale reflects the perception of the study, where participants expressed their willingness for disaster preparedness in many ways. Frequencies, percentages, means, and standard deviation for their responses to 15 items concerning the participant's disaster preparedness. Means for each variable were sorted in descending order. M (tot) for all 15 variables was 3.44 ± 0.83 , which tends towards "agree" in the 5-point scale.

Disaster response

Sub-scale three of the questionnaire reflects the students' perception of participants in disaster response, where frequencies and percentages were presented along with the calculation of the mean and standard deviation of 17 items. Third sub-scale $M = 3.84 \pm 0.83$, exhibiting a trend towards "agreed." The higher mean score of items in this sub-scale, questions 1, 7, and 9, was $M = 4.42, 4.23$, and 4.36 , respectively.

This means that students are fully aware of the how personal protection is used as well as the safe method of transferring patients to health facilities and triage.

Disaster education methods and the need for education and training

Sub-scale four of this study consisted of two parts, for which frequency, percentage, mean, and standard deviation was calculated for each part separately to assess, in the first part, which is the preferred methods of learning disaster management and, in the second, a valuation of the need for education and training for disaster management was ascertained. The trend of the first part was strongly agreeing ($M = 4.29 \pm 0.81$). The trend of the second part was also towards strongly agree ($M = 4.39 \pm 0.87$).

Differences in a variable of gender and the type of colleges

The results showed that there was no significant relation (p -value > 0.05) between gender or types of college in the attitude of participants (Table 2).

A strong positive linear correlation between the disaster preparedness sub-scale and the disaster response sub-scale, was found (Table 3).

Volunteering in Hajj and Umrah

Gender distribution and engagement in the Hajj season as volunteers were low for both males and females and the p -value = 0.77. Female students had lower involvement as a volunteer in Hajj than males (3.7%); males were 35% of the total participants. Moreover, volunteering in the Umrah season was also low, and gender distribution was independent. In Umrah, female volunteers comprised 3.3%, and males comprised 25.8%, which indicates there were more volunteers in Hajj season than in Umrah season. There were no differences depending on gender variable for engagement in Hajj and Umrah. EMS student volunteers in Hajj and Umrah were from government and private colleges, and the percentage was close.

Independence between volunteering during Hajj and type of colleges

The distribution percentage was a measure of participants for involvement in the Hajj season as volunteers according to the kind of colleges (Table 4). χ^2 -tests showed a significant relation between college type and volunteering during Hajj (p -value < 0.01) (Table 5).

Table 1. Demographics of the participants.

Items		No. (329)	Percent %
Colleges	Governmental	138	42
	Private colleges	191	58
Gender	Male	45	14
	Female	284	56
Age	22-24	229	69
	25-27	81	25
	>28	19	6

Table 3. Correlation between sub-scales of disaster preparedness and response.

		Disaster preparedness	Response, mitigation, recovery
Disaster preparedness	Correlation	-	0.72
	p -value	-	0.00
	N	-	329
Response, mitigation, recovery	Correlation	0.72	-
	p -value	0.00	-
	N	329	-

Table 2. Differences in variable of gender and the type of colleges.

Section 1							
Variable	Gender	<i>N</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>T</i>	<i>p</i> -value
Disaster preparedness	Male	284	3.42	0.84	372	0.87	0.39
	Female	45	3.54	0.77			
Response, recovery, and mitigations	Male	284	3.85	0.82	327	0.97	0.34
	Female	45	3.72	0.90			
Disaster education and training	Male	284	4.26	0.83	327	1.46	0.15
	Female	45	4.45	0.58			
Section 2							
Variable	Type of colleges	<i>N</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>T</i>	<i>p</i> -value
Disaster preparedness	Governmental	138	3.43	0.66	372	0.87	0.39
	Private	191	3.45	0.94			
Disaster response	Governmental	138	3.93	0.72	327	0.97	0.34
	Private	191	3.77	0.90			
Disaster education and training	Governmental	138	4.37	0.63	327	1.46	0.15
	Private	191	4.23	0.59			

Table 4. Distribution of participants by type of college.

Type of colleges.	Distribution	Hajj season volunteer		Total
	N	Yes	No	
Government	% of colleges	64	74	138
	% of total	46.4%	53.6%	100%
Private	N	19.5%	22.5%	41.9%
	% of colleges	63	128	191
	% of total	33%	67%	100%
Total	N	19.1%	38.9%	58.1%
	% of colleges	127	202	329
	% of total	38.6%	61.4%	100%

Table 5. χ^2 -test.

Degree of freedom	(χ^2)	p-value
1	6.063	0.01

Discussion

In this study, most of the participants were young (22-24 years constituted 69.6%) and from private EMS programs/colleges (58.1%) as compared to government colleges (41.9%), which could be related to the presence of more private EMS programs/colleges, 10, as compared to the 9 government colleges. Male EMS students, standing at 86.3%, are more than female students, holding at 13.7%; this is because there are 19 available male programs and only 6 available female programs. No previous local data looked at the distribution and gender of EMS students among private and government programs.

Öztekin et al. [17] reported that Japanese nurses perceive themselves not prepared for all kind of disasters ($M = 2.6$). Al Khalaileh et al. [18], using a similar method (DEPT), reported 65% of nurses from five hospitals in Jordan were feebly prepared for disasters. Comparing this with our study, EMS students were more prepared for disasters than practicing nurses ($M = 3.4$, trending towards “agree”). Al Razeeni [15] reported from a single EMS program, where 117 students had feeble to moderate preparedness for disaster, with means ranging from $M = 2.50-3.40 \pm 1.57-1.30$.

In our study, students perceived themselves as prepared for disasters ($M = 3.4 \pm 0.8$). There was no significant difference between EMS students in government and private colleges in their perception of disaster preparedness.

Tzeng et al. [19] reported that 311 nurses at a military hospital in northern Taiwan have the low ability and poor readiness for disaster responses, where the mean was 2.77 ± 1.00 . Öztekin et al. [17] reported that Japanese nurses perceive themselves as unable to respond to different types of disasters ($M = 2.2$). However, in our study, Saudi EMS students perceive themselves as able to interface with all kinds of disasters ($M = 3.8 \pm 0.90$).

Al Razeeni [15] reported that 85% of participants in his study were unprepared to respond to disasters, while in our study, EMS students perceive themselves as adequate to the task ($M = 3.8$).

The Pearson correlation coefficient is used when the correlation is significant, (p -value < 0.01) to determine the correlation between disaster preparedness and response. We found that the correlation between preparedness and response to the disaster was strong, meaning the students were prepared for disasters, and the response would be robust, and vice versa.

Many health workers still do not have sufficient information and skills to deal with disasters, and the spectrum of continuing education and training should be enhanced and organized to maintain the healthcare system during emergencies [20].

Ngo et al. [21] reported from the emergency medicine residency training program in the USA that simulations, exercises, and educational methods are more realistic to make them prepared to disasters in the future. Comparing this with our study, EMS students in Saudi Arabia are not any different they prefer simulations and exercises as the method to learn disaster management (the highest mean was 4.52).

Alim et al. [22] reported that training and disaster drills improved the knowledge and ability of disasters preparedness among undergraduate nursing students (the mean score was 4.0 out of 5 points in the Likert scale). In our study, the mean score of disaster exercises and simulations was 4.52, and Saudi EMS students prefer these methods to educate themselves.

Barrimah et al. [23] reported, from Qassim University College of Medicine from a mixed quantitative/qualitative study on 229 participants from fourth- and fifth-year medical students, using yes and no question (The students' preferred method and length of training), that more than 50% chose classroom lectures over online web-based courses, self-study booklets with post-tests, video and audio tapes and CD/DVD, video conferencing and newsletters, and pamphlets to learn disaster management. However, in our study, we used different question styles, where the Likert scale was used (the preferred method to learn disasters), which showed that the lowest mean score in classroom lectures was 4.34 over simulations, exercises, videos and workshops, and courses.

The highest mean was in simulations and exercises, standing at 4.52. Farra et al. [24] reported that the simulation of disasters is a vigorous educational tool. Based on previous studies and our findings, emergency medicine residents, nurses, and EMS students prefer the effective method for learning disasters management.

60% of Saudi EMS students in this study needed to know their role in disasters managements as an EMS professional, and the mean score was 4.26, which is consistent with the previous Al-Razeeni study, where 78.6% needed to know their scope of practice in disaster situations.

Al Khalaileh et al. [18] mentioned in his study on nurses working in hospitals in Jordan that 90% of nurses needed to learn more about their role during a disaster. This indicates that health workers, as well as students, need to realize their roles in case of disasters. Although EMS students perceive themselves to have high levels

of disaster preparedness and response, 60% feels they need to know their role in disaster situations and 78% of EMS students need to participate in multidisciplinary exercises. This is consistent with Al-Razeeni [15] and Al Khalaileh et al. [18] researches. This might be due to the fewer practical training on disaster-like full-scale drills and participation in actual disaster response teams, which, unusually, provides the learner with more confidence in the subject matter.

Al Anazi [25] concluded in his study when he looked at 14 final-year EMS students in Riyadh, who attended the Hajj season as volunteers, that volunteering in Hajj and Umrah is very useful for students to acquire skills and information that will benefit them in the future. Moreover, Leggio et al. [14] found after interviewing 39 EMS students in Riyadh, who attended one Hajj season as volunteers, that the continuous involvement of students in Hajj and Umrah during their years of study in EMS programs is a useful method to cover all concepts of disaster.

In our study, 38.6% of participants attended one Hajj season, and 29.2% attended one Umrah season. Male students were more than female students in attending Hajj and Umrah season (90.5% males as compared to 9.5% females for Hajj; and 88.5% males as compared to 11.5% females in Umrah). This could be due to the smaller number of female students enrolled in the study, and other reasons could be due to the inherited cultural and social issues that might limit the participation of female students in any activities away from their hometown.

Limitations

This study included a small number of female students compared to the number of male students, which might affect the coloration between the study variables and the female gender.

Conclusion

EMS students perceive themselves as prepared for disaster response with a preference toward practical training simulations and drills to acquire disaster preparedness and response.

Although participation in Hajj and Umrah have been shown to improve students' learning experience and opportunities, the participation of EMS students was not high.

Recommendations

EMS programs can build good student perception in disaster preparedness and response, but more work has to be done to demonstrate if this perception affects behavior and reflects on self-confidence.

Hajj and Umrah seasons are excellent learning opportunities for disaster preparedness and response as practicum; therefore, EMS programs have to encourage their students to participate. Furthermore, more research needs to be conducted to evaluate participation in Hajj and Umrah.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for participation

Written informed consent was obtained from all the participants.

Ethical approval

Ethical approval was sought from Institutional Review Board, King Saud University Medical City Ref. No.: 18/0076/IR, dated 11 Jan 2018.

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