Evaluation of Change in Knowledge and Attitude of Emergency Medicine Residents after Introduction of a Rotation in Emergency Medical Services and Disaster Medicine

Nawfal Aljerian, Aamir Omair1, Sami A. Yousif2, Abdulrahman S. Alqahtani3, Faisal A. Alhusain4, Bader Alotaibi5, Mohammad F. Alshehri2, Majed Aljuhani, Saad Albaiz, Yasser Alaska6, Abdullah F. Alanazi7

Department of Emergency Medical Services, College of Applied Medical Sciences, King Saud Bin Abdulaziz University for Health Sciences, 1Department of Medical Education, College of Medicine, King Saud Bin Abdulaziz University for Health Sciences, 2Department of Emergency Medicine, King Abdullah Medical City, Ministry of National Guard Health Affairs, 3Department of Emergency Medicine, King Saud Medical City, 4College of Medicine, King Saud University, 5Department of Emergency Medicine, King Fahd Medical City, 6Department of Medicine, College of Applied Medical Sciences, King Saud University, 7Department of Emergency Medicine, King Abdullah Specialist Children Hospital, Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia

Abstract

Background: Saudi Board of Emergency Medicine (SBEM) graduates are involved in a 1-month rotation in emergency medical services (EMSs) and disaster medicine. The purpose of this study was to evaluate change in knowledge and attitude of EM residents after the introduction of the EMS and disaster medicine rotation. Materials and Methods: The study included 32 3rd-year SBEM residents. A pretest/posttest design and a five-point Likert scale were used. The data included a response to a questionnaire developed by EMS and disaster experts. The questionnaire was distributed on the 1st day of the rotation and 45 days after. Satisfaction questionnaires were distributed after the rotation. The data were analyzed using SPSS 20. Results: Twenty-five residents responded to the satisfaction survey (75%). The overall satisfaction with the course modules was high; the course content showed the highest level of satisfaction (96%), and the lowest satisfaction was for the air ambulance ride outs (56%). The results of the pre-/post-test questionnaire showed an increase of 18.5% in the residents mean score (P < 0.001). In the open-ended section, the residents requested that the schedule is distributed before the course start date, to have more field and hands-on experience, and to present actual disaster incidents as discussion cases. The residents were impressed with the organization and diversity of the lectures, and to a lesser extent for the ambulance ride outs and the mass casualty incident drill I. Seventy-one percent indicated that they would recommend this course to other residents. Conclusion/Recommendation: This study showed that a structured course in EMS and disaster medicine had improved knowledge and had an overall high level of satisfaction among the residents of the SBEM. Although overall satisfaction and improvement in knowledge were significant, there are many areas in need of better organization.

Keywords: Attitude, disaster, emergency medical services, knowledge, residents

Introduction

The Saudi Board of Emergency Medicine (SBEM) was created in October 2001; it is considered the largest EM training program in the region. It is a 4-year program, and the goal is to graduate residents into specialists who can assume leadership roles in the field of EM.[1] Many of the graduates currently are in leadership roles in EM in the country and are directly or indirectly involved in emergency medical services (EMSs), prehospital care, and disaster medicine.[2,3] EMS and disaster medicine are an important aspect of EM training.[4] During their residency, the residents have a 1-month rotation in EMS, in King Abdulaziz Medical City (KAMC). Regarding EMS, the US Accreditation Council for Graduate Medical Education states that EM residents must have experience in
The purpose of this study was to evaluate change in knowledge and attitude of EM program residents after the introduction of professionalism in academic plastic surgery education showed improvement in knowledge and overall behavior. The purpose of this study was to evaluate change in knowledge and attitude of EM program residents after introducing an EMS and disaster medicine course.

**Materials and Methods**

The aim of the study was to assess change in knowledge and attitude of EM residents in KAMC after the introduction of an EMS and disaster medicine course. The objectives of this study were (1) to assess the change in knowledge of EM residents, (2) to assess the change in attitude of EM residents, and (3) to identify any knowledge gaps impacting knowledge to the residents. The 1-month rotation of EMS was done during the 3rd year of the program. All the 3rd-year residents were grouped together and introduced to clinical and nonclinical problems in the prehospital care setting. They were taught different approaches to problem-solving and management and were involved in quality improvement, clinical care, and educational process in prehospital medicine. The rotation also covered various aspects of disaster management and the principles of hospital and community emergency preparedness. It was composed of lectures and seminars delivered by consultants in EMS and disaster medicine. The simulation sessions focused on time-sensitive diseases faced in the field, ground, and air ride outs with the paramedics, quality improvement, and educational projects, and finally every resident worked on a research proposal. A pretest-posttest design was used. The test was developed by experts in the field of EMS and disaster medicine, and the following domains were evaluated basic knowledge, definitions, patient assessment, diagnosis, procedures, and decision-making. The test was distributed on the first and last day of the rotation.

**Study area/setting**

The study area was KAMC, National Guard Health Affairs, in Riyadh. The KAMC is an academic tertiary care institute and is one of the approved centers for training of the SBEM by the Saudi Council for Health Specialties. The Department of EM has 32 emergency physicians; of them, four have specific training in EMS and disaster medicine. The division of EMS has 84 employees, 12 paramedics, and 72 emergency medical technicians and performs 30–35 ambulance transports a day.

**Study subjects**

The study was conducted on a total of 32 (30 male and 2 female) residents of the SBEM. These residents attended the rotation.

**Study design**

All the 3rd-year residents were grouped together in 1 month; the residents were introduced to principals of EMS and disaster medicine. Questionnaires were prepared for demographic data and data on variables (knowledge of the instructor); the pretest/posttest design was distributed on the 1st day of the rotation and 45 days after. Satisfaction questionnaires were distributed after the rotation. Data were obtained on preference to recommend this course to other residents.

**Data management and analysis plan**

The data included responses to a multiple-choice nonvalidated test, demographical data, and satisfaction surveys. The subject’s responses to the 34-question multiple-choice test were scored, and a paired, two-tailed Student’s t-test was used to compare scores of the pretest with those of the posttest. The questions were distributed into six domains: aviation medicine (5 questions), general knowledge in disaster medicine (18 questions), medical oversight (5 questions), EMS medicine (4 questions), EMS systems (3 questions), and helicopter EMS (1). The two-tailed Student’s t-test was used again to compare scores of the pretest with those of the posttest among each domain.

In regard to the satisfaction survey, we used a 5-point Likert scale, with 1 representing “totally disagree,” 3 “neutral,”
and 5 “totally agree.” Respondents rated a series of statements regarding their expectations, use of their time, utility of the course, and if they would recommend the course to others.

The data were compiled on an Excel Spreadsheet and then uploaded into SPSS software. A backup soft copy version as well as a hard copy was dated, saved, and secured after each data entry update. A designated study binder and a dedicated USB flash memory were kept for records. SPSS software Version 22.0 (IBM Corp., Armonk, NY, USA) was used to conduct analysis and develop tables and graphs. A $P < 0.05$ was considered as statistically significant.

**Ethics**

The study was approved by the institutional review board, and written consent was obtained from all participants.

**Results**

A total of 28 residents participated. The age group frequency showed highest frequency (54%) in the age group of 28–30 as compared to frequency of 19% in the age groups of 25–27 and 31–33.

The data on knowledge of the instructor relating the course content are summarized in Table 1.

Regarding the queries on (1) rating the quality of the rotation, 68% of the respondents found it to be of very high quality, while 28% felt it to be of high quality; (2) on query relating rotation meeting the objectives, the response was 64%, 32%, and 4%, respectively for very well, somewhat well, and neutral. On recommendation of this rotation to fellow residents, 71% and 29% responded very likely and somewhat likely, respectively.

Twenty-five residents responded to the satisfaction survey (75%). The findings are summarized in Figure 1.

Statistical comparison was made between the pretest scores [Figure 2] and the posttest scores [Figure 3] by paired $t$-test [Table 2]. The difference was statistically significant ($P < 0.05$).

There were clear gaps between pre-/post-test in all domains. However, the significant gaps were in the general knowledge in disaster medicine and medical oversight ($P < 0.005$, $P = 0.005$, respectively). Pretest mean, posttest mean, and paired $t$-test $P$ values for each domain are shown in Table 3.

**Discussion**

EM residency programs are very complex, with a diversity of rotations in different departments. The delivery of the content of an EMS and disaster medicine rotation over 1 month
requires dedication and time commitment from the educators, adding that to the educators’ busy schedules due to their heavy involvement in patient care and other hospital-related tasks.

The development of an EMS and disaster medicine rotation is an important aspect of any EM training program; it was found worthwhile to analyze the change in the knowledge and attitudes of EM program residents after introducing the rotation on EMS and disaster medicine during the 1-month format.

In a previous study, Franc et al. found a simulation-based model of disaster medicine training was judged by the EM residents to be a valuable component of their medical training and increased their confidence in personal and departmental disaster management capabilities.

This project identified a set of core competencies and performance objectives based on change in knowledge and attitude of EM residents and identified gaps impacting knowledge to the residents to ensure their competence to treat emergencies, including injuries and illnesses experienced by victims of disasters, irrespective of the etiology. The major gaps in knowledge were assessed via the pretest/posttest, and they were mainly in regard to medical oversight, EMS systems, EMS personnel, flight physiology, and general knowledge in disaster medicine. The reduced frequency of females necessitates separate studies exclusively for female population to know their view on the subject. Residents in the age group 28–30 exceeded the other respondents. Nevertheless, the interval between the different groups was minimal. The difference in the levels of satisfaction in different components of rotation constituted the course content and teaching (instructors’ and classroom) as the highest (88%–96%). EMS education is an important aspect of EM training.

The highest level of satisfaction was in the course content and teaching quality of the instructors. On recommendation of this rotation to fellow residents, majority (71%) responded very likely, while some (29%) responded likely. This suggests that the residents were impressed with the organization and diversity of the lectures.

The level of satisfaction achieved on mass causality incident exercises (80%), the ground ambulance ride outs

Table 1: Response to questions on knowledge of the instructor about the course content and about the value of the course material

| How knowledgeable was your instructor about the course content? |
|---------------------------------------------------------------|
| Very knowledgeable                                          | 21 (84) |
| Somewhat knowledgeable                                       | 4 (16)  |
| Not so knowledgeable                                          | 0       |
| Somewhat unknowledgeable                                      | 0       |
| Not at all knowledgeable                                      | 0       |
| Not applicable                                                | 0       |

| How valuable was the course material?                        |
|---------------------------------------------------------------|
| Very valuable                                                | 13 (52) |
| Somewhat valuable                                            | 11 (44) |
| Neither valuable nor not valuable                             | 1 (4)   |
| Somewhat not valuable                                         | 0       |
| Not at all valuable                                           | 0       |
| Not applicable                                                | 0       |

Table 2: Comparison between the mean value of Pair 1 (posttest percentage, pretest percentage)

| Parameter                  | n   | Mean±SD | P       |
|----------------------------|-----|---------|---------|
| Pair 1 (posttest percentage, pretest percentage) | 28  | 18.49±2.44 | <0.001  |

Paired t-test: P<0.05. SD: Standard deviation

Figure 1: Satisfaction level with different components of the rotation

Figure 2: Pretest scores

Table 1

| Parameter                  | n (%) |
|----------------------------|-------|
| Course content             | 96%   |
| Instructor’s teaching      | 92%   |
| Class room teaching        | 88%   |
| PPE and Decontamination    | 88%   |
| Incident exercise          | 80%   |
| Full scale Mass Casualty   | 64%   |
| hands-on exercise          |       |
| Ground ambulance ride outs | 54%   |
| Air ambulance ride outs    | 50%   |

Figure 1: Pretest scores

In a study on American Board of Medical Specialties, highlighting the core content of knowledge that encompasses prehospital emergency patient care, Katzer et al. reported disaster-preparedness as the most common desired addition to existing EMS rotation. The present study was conducted on a 1-month rotation of EM residents in EMS and disaster medicine in view of the significance of the serious involvement of EMS in matter of exigencies related with disaster situations. In a previous study, Franc et al. found a simulation-based model of disaster medicine training was judged by the EM residents to be a valuable component of their medical training and increased their confidence in personal and departmental disaster management capabilities.

This project identified a set of core competencies and performance objectives based on change in knowledge and attitude of EM residents and identified gaps impacting knowledge to the residents to ensure their competence to treat emergencies, including injuries and illnesses experienced by victims of disasters, irrespective of the etiology. The major gaps in knowledge were assessed via the pretest/posttest, and they were mainly in regard to medical oversight, EMS systems, EMS personnel, flight physiology, and general knowledge in disaster medicine. The reduced frequency of females necessitates separate studies exclusively for female population to know their view on the subject. Residents in the age group 28–30 exceeded the other respondents. Nevertheless, the interval between the different groups was minimal. The difference in the levels of satisfaction in different components of rotation constituted the course content and teaching (instructors’ and classroom) as the highest (88%–96%). EMS education is an important aspect of EM training. The highest level of satisfaction was in the course content and teaching quality of the instructors. On recommendation of this rotation to fellow residents, majority (71%) responded very likely, while some (29%) responded likely. This suggests that the residents were impressed with the organization and diversity of the lectures.

The level of satisfaction achieved on mass causality incident exercises (80%), the ground ambulance ride outs
outs (64%), and air and ambulance ride outs (56%) were comparatively less. A possible reason for this was due to the minimal number of ride outs the residents were involved in. There is a paucity of literature, and hence, a comparative interpretation is not possible, however; based on the results obtained, the EMS rotation supervisors and the SBEM program should try to improve the organization of the schedule and the ambulance ride outs both on ground and in the air.

**Conclusion**

This study showed that a structured course in EMS and disaster medicine had improved knowledge and had an overall high level of satisfaction among the residents of the SBEM. Although overall satisfaction and improvement in knowledge were significant, there are many areas in need of better organization.

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Nil.

**Conflicts of interest**

There are no conflicts of interest.

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**Table 3: Comparison between the mean value of each pair domain (posttest percentage, pretest percentage)**

| Domain (number of questions in the questionnaire) | Pretest mean | Posttest mean | Mean±SD | Paired t-test (P) |
|--------------------------------------------------|--------------|---------------|---------|------------------|
| Aviation medicine (5)                            | 42.86        | 61.90         | 19.03±16.58 | 0.37             |
| General knowledge in disaster medicine (18)      | 39.68        | 58.93         | 19.25±3.57 | <0.005           |
| Medical oversight (5)                            | 53.57        | 75.00         | 21.42±3.74 | 0.161            |
| EMS medicine (4)                                 | 66.96        | 74.11         | 7.15±3.87  | 0.73             |
| EMS systems (3)                                  | 22.62        | 47.62         | 24.96±7.13 | <0.005           |
| HEMS (1)                                         | 60.71        | 85.71         | 25.00    |                  |

EMS: Emergency medical services, SD: Standard deviation, HEMS: Helicopter EMS

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