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ORIGINAL ARTICLE

Saudi medical students' knowledge, perception, and exposure to emergency medicine

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ABSTRACT

Background: Information and promoting awareness of emergency medicine (EM) as a vital and independent branch of medicine has been a core component of the national undergraduate medical curriculum for a number of years. This project aims to assess how successful this integration has been by evaluating clinical-level students on their knowledge, exposure, and overall opinion of the subject.

Methods: A survey was conducted by means of a cross-sectional online questionnaire that was made available to clinical year students in all medical colleges in Saudi Arabia. Demographic data, descriptive statistics, and correlation analyses were then carried out to discern if any patterns or commonalities could be found.

Result: A total of 356 medical students participated in the study. Regarding EM perception and interest, a significant variance in responses was highlighted between the 4th, 5th, and 6th-year students. Regarding exposure, 68.8% did not have the EM as an independent course module, and 55.1% did not take an elective in EM as an alternative. The overall level of knowledge of EM and its importance was below the desired standards in 62.4% of the participants. Students who undertook some form of further education in EM had on average a 57.7% higher chance to score at or above desired standards on EM.

Conclusion: Despite the overall majority of participants demonstrating a less than desirable knowledge on EM, exposure, and correct integration of EM in medical course composition has a notable positive effect on student perceptions and opinion of EM.

Keywords: Emergency medicine, student perceptions, curriculum development.

Introduction

Every medical school graduate should possess basic competence in the management of medical and surgical emergencies. An attempt to improve information and perceived importance of emergency medicine (EM) as a vital and independent branch of these basic competences has led to a multitude of different approaches and campaigns aimed at medical undergraduates over a number of years [1]. In an attempt to standardize these disparate approaches, the International Federation for EM has, since 2009, been working on defining national parameters for the minimum primary objectives and skills that need to be met during any medical undergraduate curriculum. It has since outlined an example of the EM course model whose objectives are distributed throughout the different years of study, both clinical and pre-clinical [2]. Despite this, not all Saudi universities are yet to offer independent EM courses. This leads to vast differences in the knowledge and perception graduating students hold regarding EM, which in turn may affect their future career choices and capabilities [3,4].

As it stands, the knowledge of Saudi medical students of EM and its role in daily care is not that promising. Previous research in this area revealed a need to evaluate and improve universities' practical course components [5] and among those best suited to supervise this are EM physicians due to their easy access and constant

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application of necessary life support skills, how to manage undifferentiated patients, and other such vital aspects of emergency care [5].

This project was conducted as a means to assess how successful the integration of EM as a core module has been in Saudi Arabia, and to evaluate clinical students regarding their knowledge, exposure, and overall opinion of the subject as they near the end of their degree.

Subjects and Methods

We opted for a cross-sectional study, with data collected using an online validated survey questionnaire that was made available to all clinical students in Saudi Arabia. The questionnaire was designed to determine and qualify the differences in knowledge and perception among participants. It was divided into three sections:

1. Socio-demographic profiling of the participants:
    - Age, gender, nationality, marital status, name of the university, year of study, emergency courses taken, elective training.
2. Perception of EM:
    - Personal perception and familiarity with EM and confidence in dealing with emergencies.
3. Knowledge of what falls under the EM field of expertise:
    - 12 true or false statements based on different EM scenarios ranging from very acute and seriously ill patients to non-urgent patients.

The study was conducted between November 2018 and April 2019.

In order to restrict the number of participants to manageable levels, a minimum required sample size was calculated using the formula: SS = $Z2\ p(1–p)/d2$, where SS is the sample size, Z is the standard normal variate [at 5% type 1 error ($p < 0.05$), which is 1.96; 3,000 is the expected proportion], and D is the absolute error or precision (0.05). This resulted in an estimated minimum sample size of 341.

Medical degrees in Saudi Arabia have a standard duration in years, being 6 years for a bachelor's degree. Inclusion criteria was being a medical student in any primary medical schools in Saudi Arabia undertaking a bachelor's degree in their 4th, 5th, and 6th year of study.

All pre-clinical and 3rd-year medical students were excluded.

A validation study was conducted on 10 participants to test for content, understandability, and completion time. Kappa statistics were calculated, and a kappa of above 0.8 was considered ideal. Validation indicated the questionnaire to be comprehensible, and the approximate time for completion to be 5 minutes.

Study participants were selected were randomly by means of convenient sampling techniques. Chosen candidates were contacted by email and presented a link to the online questionnaire (hosted and built using Survey Monkey™ patented online software). To assure confidentiality and data security, all information was stored in encrypted and password protected electronic files. The questionnaires three parts were evaluated as follows:

1. Descriptive statistics;
2. Likert-style grading (0–5), where 5 is most likely and 0 is not applicable
3. Score of correct answers in differentiating a high-risk patient from a low-risk patient and what steps should be taken in both cases.

To evaluate participants' knowledge and perception, the students' scores were calculated from the answers provided for both knowledge and perception sections for each participant separately. The median score (50 percentile) for all participants' results was determined. Participants were classified into two categories: the first category was for those who scored below a specific score, 16 (the mean) into "low knowledge or low perception." The other category had scored above the mean, which fit into the "high knowledge or high perception" category.

Statistical analysis was carried out using Statistical Package for the Social Sciences v.23. Chi-squared was used to test for the association, and the difference between categorical variables. A p-value < 0.05 was considered statistically significant.

Result

The demographic characteristics of the 356 participants included in the study presented no notable points of marked variance or biased. A summary of all data is presented in Table 1.

Out of 19 participating medical colleges, 73.7% (14) offer an independent EM course. This mostly comprised of smaller institutions with less student affluence.

Regarding exposure, 68.8% (245) of the students did not come across an independent EM course in their medical college. The vast majority of this percentage (189, 77.2%) was not offered a course in the first place, compared to 22.8% (56) who will receive an emergency course in a later year. Considering elective rotations, 55.1% (196) had not taken elective rotation in EM throughout their medical degree. (Table 2)

On the subject of knowledge and perception, the majority of students (62.4%) were found to have low knowledge levels compared with only 37.6% scoring above the mean. Among those with higher knowledge levels, those who took a structured emergency course scored higher level of knowledge (39.6%) than those above the mean who did not undertake any extracurricular course (60.4%), but no statistical relationship could be proven ($p = 0.60$).

However, students who had a course demonstrated a statistically significant difference in perception levels (57.7%) compared to those with no extracurricular course history (42.3%) ($p = 0.05$) (Table 3).

Table 1. *Demographic characteristics of participants.*

Frequency (%)	
	Gender
141 (39.6%)	Male
215 (60.4%)	Female
	Age groups
12 (3.4%)	18-20 years
234 (65.7%)	21-23 years
94 (26.4%)	24-26 years
16 (4.5%)	More than 26 years
	Nationality
332 (93.3%)	Saudi
24 (6.7 %)	Non-Saudi
	Academic years
114 (32.0%)	4th year
104 (29.2%)	5th year
138 (38.8%)	6th year
	University
119 (33.4%)	King Saud university
45 (12.6%)	King Saud bin Abdulaziz university for health sciences
25 (7.0%)	Imam Muhammad ibn Saud university
6 (1.7%)	Princess Noura bin Abdulrahman university
15 (4.2%)	Alfaisal university
10 (2.8%)	Dar al Uloom university
39 (11.0%)	Almaarfa university
5 (1.4%)	Al-Qassim university
3 (0.8%)	Al-Dammam university
27 (7.6%)	Taiba university
6 (1.7 %)	King Abdulaziz university
56 (15.7%)	Others

Table 2. *Knowledge score difference with courses and training.*

p-value	Knowledge		
	High knowledge (*n* = 134)	Low knowledge (*n* = 222)	
			Emergency course
0.600	44 (39.6%)	67 (60.4%)	Yes
	90 (36.7%)	155 (63.3%)	No
			Elective course
0.713	59 (36.9%)	101 (63.1 %)	Yes
	76 (56.3%)	120 (61.2%)	No
0.304	98 (39.7%)	149 (60.3%)	Bls
0.262	14 (38.8%)	32 (69.5%)	Acls
0.766	9 (41%)	13 (59%)	Atals
0.588	2 (33.4%)	4 (66.6%)	Pals
0.621	0 (0%)	1 (100%)	NRP
0.424	35 (34.6%)	66 (65.4%)	None

From an elective training perspective, students who had an elective training were found to have a significantly higher score in perception (101, 63.2%) compared to those who did not (76, 36.8%) ($p < 0.0001$). Among the available EM courses, Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) comprised the majority of availability (69.4% and 12.9%, respectively). Only 14.9% of the respondents indicated a wish to be an emergency physician as a future carrier, of which 9.3% were of the opinion that their career choice was influenced by the EM course they took.

Most participants (60.7%) believed EM to be a crucial aspect of medicine that requires further attention and promoting. When questioned about the teaching method they prefer, 57.9% stated a preference of clinical rotations and practical sessions, whereas 16.6% preferred theoretical lectures.

Discussion

Despite having a percentage of 73.7 (14) universities in Saudi Arabia that include an independent structured course for EM in their curriculum, 68.8% (245) of the students did not come across an independent EM course in their university. This discrepancy is probably attributable to the fact that the courses are not offered in the larger, more frequented universities as they are not integrated into the curriculum, thus originating a biased offer/student ratio.

The majority of participants were found to have a low level of knowledge, which raises concerns regarding the quality of course content and methods of teaching. Adding to this worrying state of affairs, we found that even those who undertook a structured module on EM had no meaningful difference in overall knowledge of the subject, which raises a multitude of questions and may indicate that independent emergency courses available fail to provide relevant skills and knowledge.

Among the EM courses, BLS (247, 69.4%) and ACLS (44, 12.9%) were the most common medical students. In Saudi Arabia, emergency teaching for medical students needs optimization and standardization to reach an optimum level of core competency. Some of the universities provide an emergency course in the preceding years, while others do not. Likewise when addressing practical training within the curriculum, there is no consensus between the various institutions, with some offering integrated hands-on experience and others failing to offer even shadowing visits to the emergency department.

Only 44% (160) of the students had taken elective summer training in EM. The preparations improved the interests of the students towards the emergency department. Students realize that EM is a tool to experience medical practice in real life due to the variety of cases they may witness in one sitting. A student cannot gain experience unless they observe and handle cases occurring in an emergency department. However, some students, mostly female, do not wish to work in emergency departments due to the social misperceptions of what the job entails; this being daily occurrences

Table 3. *Perception score difference with courses and training.*

	Perception group		P-value
	Low - < 29	**29 - Highest**	
Emergency course Yes No	 58 (43%) 121 (54.7 %)	 77 (57 %) 100 (45.3 %)	 0.031
Elective course Yes No	 59 (33.0 %) 120 (54.7 %)	 101 (57.1 %) 76 (42.9 %)	 < 0.0001
Bls	111 (62.0 %)	136 (76.8 %)	0.002
Acls	14 (7.8 %)	32 (18.1 %)	0.004
Atals	10 (5.6 %)	12 (6.8 %)	0.640
Pals	0 (0 %)	6 (3.4 %)	0.014
NRP	0 (0 %)	1 (0.6 %)	0.497
None	63 (35.2 %)	38 (21.5 %)	0.004

of bloody and mangled patients, raised voices, and perpetual stressful conditions.

As expected, students who took extracurricular courses, such as Basic Life Support (BLS), Pediatrics Advanced Life Support (PALS), Advanced Trauma Life Support (ATLS), Advanced Cardiac Life Support (ACLS), and all others, demonstrated a higher perception and knowledge of EM. These courses allow students to apply their knowledge in an active clinical environment, reinforcing and maximizing the benefits of theoretical learning. BLS is essential for any medical student, as emphasized in the Federation of EM.

However, it is not to be assumed that what is lacking is a source of ready-to-hand sources of information, as modern technologies, social networks, and ample access to online research and study materials provide a more than ample basis to gain advanced understanding of EM and its characteristics. What is missing is the integration of the theoretical part to a practical training under the usual circumstances of an emergency department by a well-qualified academic emergency physician. To this end, some institutions present the option to students to achieve BLS certification during a summer elective in their hospital. It is affordable and available in most government hospitals in Saudi Arabia, among other private institutions.

Student perceptions showed a statistically significant difference between those who took courses such as BLS, summer elective, and who did not, which can be due to the hands-on training these students experienced during training.

A person's desire in pursuing any career is usually a result of gradual familiarization and prolonged exposure to what the position involves. The study found that only 14.9% (53) of the respondents wished to be an emergency physician. Most of them were the ones who had undertaken a course in EM. This helps to support that implementation of EM courses would correct students' misconceptions about EM, ensuring a general growth in the health industry.

Conclusion

The field of medicine is delicate as it deals with human lives. The personnel joining the field should thus be equipped to handle an emergency. According to our findings, medical students in Saudi Arabia do not present a satisfactory level of knowledge and competence to handle emergency care. Furthermore, they emphasize the need to remove what is a significant issue in developing a well-constructed emergency course lead by qualified emergency physicians to all medical students in Saudi Arabia. Students have to be well trained for emergencies, no matter what specialty they choose to be.

In corroboration with institutions offering medical courses, the Saudi Arabian health departments should ensure a practical approach and good knowledge integration in the medical courses offered. The course should target preparing the students for real-life emergencies that occur in healthcare institutions, which are unpredictable and require preparedness and skills.

Recommendations

The following recommendations are proposed:

1-Emergency academic teaching in Saudi Arabia for undergraduate medical students needs further optimization and standardization with better quality to meet the primary core competency in both knowledge and clinical skills required on medical students' level.

2-Implication of the Federation of EM Emergency Medicineguidelines for the undergraduate medical curriculum which each medical student has to master.

3-Clinical training is far more critical than theoretical one and most probably benefits those in the last clinical years.

List of Abbreviations

ACLS	Advanced Cardiac Life Support
ATLS	Advanced Trauma Life Support
BLS	Basic Life Support
PALS	Pediatrics Advanced Life Support

Conflict of interest

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

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Consent to participate

Written consent to participate was obtained from all the participants.

Ethical approval

Ethical approval was granted by Institutional Review Board of King Saud University via reference letter number E18-3396 dated: 01 jan 2019.

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Appendix 1. *Questionnaire.*

Kingdom of Saudi Arabia
KING SAUD UNIVERSITY
College of Medicine

We are 5th-year medical students from College of Medicine, King Saud University.

We are working on a study to compare the knowledge and perception of emergency medicine between medical school students in Saudi Arabia.

-This questionnaire should only be filled by 4th, 5th, and 6th-year medical students.

-Participation is optional and data will be kept confidential.

-Answering this questionnaire is considered your approval to participate in this study.

This questionnaire should only take about 5 minutes of your time. Thank you for your cooperation and support.

By answering this questionnaire you agree to participate on this study.

A- Personal information :

1. Age :

A- 18-20

B- 21-23

C- 24-26

D- More than 26

2. Gender:

A- Male.

B- Female.

3. Nationality :

A-Saudi

B-Non-Saudi

4.Martial status :

A- Married

B- Non-married

5. From which university are you?

1-King Saud University

2. King Saud bin Abdulaziz University for Health Sciences

3. Imam Muhammad ibn Saud University

4. Princess Noura bin Abdulrahman University

5. Alfaisal University

6. Dar al Uloom University

7. Almaarfa University

8-Al-Qassim University

9-Al-Dammam University

10-Taiba University

11-King Abdulaziz University

12-Others

6. Which year ?

A-4th year

B-5th year

C- 6th year

7. Do you have an independent emergency medicine course in your medical school curriculum?

1-Yes

2-No

8. Have you taken any elective training in emergency medicine?

1- yes.

2- No.

9. Did you take any of these courses? "you can choose more than one"

1- BLS

2-ACLS

3-ATLS

4-PALS

5-Nrp

- Others.....

B-Perception :

On a Likert scale from 0 to 5 in which 5 is most likely, 1 is less likely, and 0 is not applicable, answer the following.

1- Do you feel confident in answering friends or family questions about emergency medical situations?

5 4 3 2 1 0

2- Do you feel confident in dealing with emergency medical situations as the only medical person found in the scene?

5 4 3 2 1 0

3- Do you wish to be an emergency physician?

5 4 3 2 1 0

Answer 0 if not applicable to your case.

4-Do you think emergency medicine career choice is influenced by the emergency medicine course you took?

5 4 3 2 1 0

Answer 0 if not applicable to your case.

5-Do you think emergency medicine career choice is influenced by the emergency medicine elective you took?

5 4 3 2 1 0

Answer 0 if not applicable to your case.

6- Do you think emergency medicine is very crucial and needs to be addressed in every medical school curriculum?

5 4 3 2 1 0

7- How do you prefer emergency course modality of teaching?

- Theoretical lectures. 5 4 3 2 1 0
- Videos. 5 4 3 2 1 0
- Clinical rotations. 5 4 3 2 1 0
- Practical skills teaching classes. 5 4 3 2 1 0

8- In which level you think emergency medicine course is most appropriate?

- 1st year
- 2nd year
- 3rd year
- 4th year
- 5th year

C. Knowledge:

From your background knowledge, evaluate the sentence below whether they are correct or not:	True	False
Asystole rhythm is a shockable rhythm for cardiac arrest patient.		
There are five triage categories in emergency.		
CPR is performed on a ratio 30:2 for a child.		
Glasgow Coma Scale is an indication for intubation if it is less than 8.		
Activated charcoal can be given only within 1 hour of ingesting toxins.		
Abdominal aortic aneurysm is diagnosed by chest X-Ray.		
Ruling out a STEMI in left bundle branch block ECG is a must.		
Fast scan is considered part of primary survey in trauma patient.		
No need to check for medical illness in already diagnosed bipolar patient presenting with acute episode of mania.		
A disaster is a mass casualty incident that overwhelms hospital resources and requires external assistants.		
Woman came with facial swelling, shortness of breath, and skin rash, first line of management would be epinephrine.		
In pneumothorax, chest tube should be placed in second intercostal space.		