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ORIGINAL RESEARCH

Evaluation of the Availability and Implementation of Emergency Medical Services (EMS) Training in Saudi Emergency Medicine Programs

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Background: Emergency Medical Services (EMS) is pivotal in the healthcare system, particularly in Emergency Medicine (EM) education. This study focuses on the current state and structure of the EMS rotation within Saudi Emergency Medicine Programs.

Objective: The aim is to evaluate the availability and implementation of the EMS rotation curriculum in Saudi Emergency Medicine Programs concerning the Saudi Commission for Health Specialties (SCHS) requirements, identify gaps in its delivery, and propose areas for improvement to enhance standardization and effectiveness.

Methods: A cross-sectional survey was conducted among emergency medicine program directors and residents in Saudi Arabia. Inclusion criteria were physicians who had completed EMS rotations after 2018. The survey collected data on participant backgrounds, available activities, evaluation-related services, and field experience. SPSS version 24 was used for data analysis, employing Chi-square tests to determine statistical significance.

Results: The study included 68 participants, 51.5% current EM residents and 42.6% graduated EM residents. The majority were from the Central EM residency program (51.5%). Education of prehospital healthcare providers was the most reported activity (78%), followed by ride-along (Ground) (75%) and dispatch observation (66.1%). Significant differences in activity availability and evaluation services were observed based on respondents' positions and locations. For instance, ride-along (Air) was available in 7.1% of Eastern Region programs compared to 0% in Western programs. The most meaningful component of EMS rotation, as reported by 41.5% of participants, was ride-along.

Conclusion: This study highlights the variability in EMS rotation activities and evaluation services across Saudi emergency medicine programs and underscores the need for more structured and comprehensive training approaches aligned with SCHS requirements.

Keywords: emergency medical services, EMS rotation, emergency medicine education, Saudi Arabia, curriculum evaluation

Introduction

The Kingdom of Saudi Arabia (KSA), the fifth largest country in Asia and one of the largest in the Arab world,[1] was unified in 1932 and is divided into 13 regions.[2] Healthcare, established in 1926 with modest capabilities, has since developed into a well-structured system.[3] Sixty percent of healthcare services are provided by the Ministry of Health (MOH), while the remaining are shared among sectors such as the Ministry of Defense, National Guard, Interior, Education, the Royal Commission of Jubail and Yanbu, and the private sector.[1] The early healthcare system, notably in Makkah, addressed the medical needs of Hajj and Umrah pilgrims, with the first ambulance service launched in 1934 by the Ambulance of Charity Association.[1]

Emergency medical services (EMS) evolved with the establishment of the Saudi Red Crescent Authority (SRCA) in 1963, fully funded by the government, including a $568 million budget in 2016.[2] The SRCA, initially responsible for pre-hospital care, is now complemented by individual healthcare sectors managing the EMS service model.[1] Moreover, emergency medicine is becoming one of the growing specialties in KSA, including EMS, consisting of emergency medicine physicians, paramedics, ambulance drivers, technicians, and firefighters. They provide the necessary

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management for patients outside the hospital and transfer them to the nearest healthcare facility for further management and care.[3] Saudi Arabia's Emergency Medical Services (EMS) system predominantly follows the Anglo-American model, characterized by rapid patient transport to hospitals with pre-hospital care provided by trained paramedics and emergency medical technicians.[4]

The Saudi Board of Emergency Medicine (SBEM) residency program was established in October 2001 by enrolling four physicians. It was mainly located at King Fahad National Guard Hospital in Riyadh after being approved in 2000 as a specialty under surgery. In 2005, the Saudi Council for Health Specialties (SCFHS) approved EM as an independent specialty, and the SBEM was formed. To this date, the SBEM is mandated to oversee and accredit following the SCFHS regulations. The program extends to the kingdom's central, eastern, southern, and western regions.[5] EM residency programs have over 20 different training centers across the kingdom.[1] By 2013, the number of Saudi Emergency Medicine physicians grew to almost 70 physicians who completed their training in Europe, North America, and Saudi Arabia collectively.[3]

In the United States, the Accreditation Council for Graduate Medical Education (ACGME) requires EM-training physicians to be exposed to pre-hospital care, and that includes participation in paramedic base stations, emergency transportation, and care in the field (including ground units and air ambulance units), disaster planning and drills.[6] The SCFHS mission was to graduate EM physicians trained in supportive environments with the highest clinical and academic training levels.[5] Since EMS plays a vital role in the initial pre-hospital resuscitation and management of patients. It has been included as part of the SBEM curriculum.[2] According to Prof. Majid Alsalamah (the former Head of the Emergency Medicine Scientific Council), the integration of the EMS rotation into the curriculum commenced in 2001, consisting of a month-long placement within the four-year residency program, scheduled for completion during the third year of residency. Initially, this rotation operated on an individual basis, with 1–2 residents being assigned to the EMS medical director at King Abdulaziz Medical City, Ministry of National Guard- Health Affairs (KAMC, MNG-HA), each month throughout the year. Subsequently, by 2013, it transitioned into a consolidated single-month rotation at KAMC, MNG-HA, mandatory for all third-year residents across all the programs within the four-year curriculum. Furthermore, in 2019, each center assumed responsibility for the training of its trainees for the EMS rotation.

The EMS rotation in the SBEM has clear objectives for their EM physicians. They should be able to do the following: (1) Function as the base hospital physician, (2) Develop patient management protocols, (3) Develop quality assurance methods, (4) Demonstrate immobilization techniques, (5) Demonstrate victim extraction, (6) Evaluate pre-hospital literature, (7) Use communication equipment, (8) Organize patient transfer, (9) Act as an on-site physician in disaster exercises, (10) Act as the ED triage physician in disaster exercises, (11) Develop a disaster plan and (12) Organize patient decontamination.[5]

This study aimed to evaluate the availability and implementation of the EMS rotation within the SBEM residency program to assess its alignment with the SCFHS requirements. While the SBEM curriculum was centrally developed by the SCFHS for uniform implementation across Saudi Arabia, regional variations in EMS resources and activities may affect the consistency of training experiences. Identifying gaps in the delivery of EMS rotations will help highlight areas for improvement and enhance the standardization of training quality. This evaluation focuses on ensuring that physicians are adequately prepared to deliver high-quality pre-hospital care, ultimately contributing to improved patient outcomes in emergency medical settings.

Materials and Methods

Study Design

An electronic cross-sectional survey was conducted among emergency medicine program directors and emergency medicine residents (graduated and current) in Saudi Arabia.

Study Area/Setting

All Saudi emergency medicine programs in Saudi Arabia (Riyadh, Jeddah, Eastern Province, and Aseer).

Study Subjects and Eligibility Criteria

Inclusion criteria encompass all emergency medicine physicians in Saudi Arabia who completed EMS rotations after 2018, including directors, graduates, and current residents. Exclusion criteria include program directors for non-emergency medicine programs, Saudi emergency medicine residents who completed the EMS rotation in 2018 or earlier, and Saudi emergency medicine residents who did not complete the EMS rotation.

Target Population and Sample Size

The SBEM program admits approximately >200 new residents annually across all training centers, and the number is getting bigger through the years. The program completion rate averages > 80% of the residents per year, with the SCFHS serving as the certifying body for all training outcomes. The SCFHS maintains oversight of the curriculum standards and certification process. The study included all the program directors and residents who completed the EMS rotation after 2018.

Data Collection Methods and Instruments Used

Two different electronic questionnaires were distributed separately to the eligible program directors and emergency medicine residents. The questionnaires were distributed electronically to eligible participants, including program directors and emergency medicine residents (current and graduated), via the SBEM central database. The questionnaire included data about background information (participants` position, location of the residency program in Saudi Arabia, and number of graduated residents per year), available activities (mandatory or optional) for the emergency medicine residents, mandatory activities for the emergency medicine residents, and evaluation-related services given to emergency medicine residents. In addition, participants were inquired about the existence of a process used for residents to evaluate the EMS rotation and asked to mention the most and least meaningful components of the EMS rotation to residents` education. Three consultants in Emergency Medicine (Face Validation) ascertained the questionnaire's validation.

Data Management and Analysis Plan

Data were collected in an Excel sheet and analyzed using the SPSS program, version 24. Participants were categorized into three groups: program directors, graduated residents, and current residents. We performed statistical analyses to compare responses across these groups and across different regions (Central, Eastern, and Western). Categorical variables were summarized as frequencies and percentages, and comparisons between groups were made using the Chi-square test or Fisher's exact test, as appropriate. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

A key aspect was the anonymity of participants; no identities or personally identifiable information were collected during data collection. This approach ensured the confidentiality and privacy of all participants, allowing them to provide honest and unbiased responses without concern for personal or professional repercussions. Informed consent was obtained from all participants before completing the electronic survey. The invitation explicitly stated that participation was voluntary, and participants had the right to decline or withdraw from the survey at any point without any consequences. The confidentiality of their responses was ensured, with no personally identifiable information being collected. The study was designed to adhere to the principles of beneficence and non-maleficence, aiming to contribute positively to the field of medical education without causing harm to the respondents. Ethical approval was secured from King Abdullah International Medical Research Center (KAIMRC) institutional review boards to ensure adherence to the highest ethical standards in research (Protocol number: NRC22R/425/09).

Results

Demographics of Included Participants

A total of 68 participants were included in the study, comprising program directors, graduated residents, and current residents. More than half (51.5%) were current EM residents, while 42.6% were graduated EM residents. Over half

(51.5%) of the participants were recruited from the Central EM residency program. The number of graduated residents per year ranged between 6 and 15 in 32.4% of cases, while it was less than five in another 32.4% of cases (Table 1).

EMS Activities

Participants reported the availability of various EMS activities during their residency (Figure 1). The most frequently reported activities included education of prehospital healthcare providers (78%), ride-along (Ground) (75%), dispatch observation (66.1%), and disaster preparedness (61.8%). However, less commonly reported activities included mass gathering events, wilderness medicine, and ride-along (Air). Mandatory activities followed a similar pattern, with education of prehospital healthcare providers (60.3%) and ride-along (Ground) (58.9%) being the most frequently mandatory activities (Figure 2). Regarding EMS training components, most participants reported receiving a formal introduction to EMS provider training (76.5%) and EMS system organization (72.1%), while only 19.1% reported the availability of a formal telemetry instruction course (Figure 3). Half of the participants (50%) reported that such a process exists, while 29.4% indicated they were unaware of it, and 20.6% stated that no process was available.

Regarding the most meaningful components of the EMS rotation, Figure 4 shows that ride-along activities were identified as the most valuable by 41.5% of participants, followed by dispatch observation (28.7%) and disaster preparedness (10.3%). A small proportion of participants highlighted other activities (12.9%), while 7.4% stated that none of the activities were meaningful. Conversely, Figure 5 presents the least meaningful components of the EMS rotation. Nearly half of the respondents (48.5%) reported that no activity was considered least meaningful. However, dispatch observation was perceived as the least meaningful by 27.8%, followed by ride-alongs (22.3%) and lectures (16.8%). Other activities accounted for 36.1% of the responses. Figure 6 highlights the amount of time participants spent in the field with EMS providers. Most participants (43.6%) reported spending 1–3 hours, followed by 36.4% who spent 4–6 hours, and 20% who spent more than 6 hours during the rotation.

Comparison Based on Position

Significant differences were observed in the availability of EMS activities, mandatory activities, and evaluation services among program directors, graduated residents, and current residents.

Availability of Activities

Graduated residents and current residents reported similar access to most EMS activities; however, program directors consistently reported higher availability rates for all activities. For example, disaster preparedness was reported as available by 79.3% of graduated residents and 42.9% of current residents, compared to 100% of program directors

Table 1 Background of the Participants (n=68)

	Frequency	Percentage
Position		
Program director	4	5.9
Graduated resident	29	42.6
Current resident	35	51.5
Location of the residency program		
Eastern Region	14	20.6
Western Region	19	27.9
Central Region	35	51.5
Number of graduated residents/years		
<5	22	32.4
6–15	22	32.4
16–30	21	30.9
>30	2	2.9
Don`t know	1	1.4

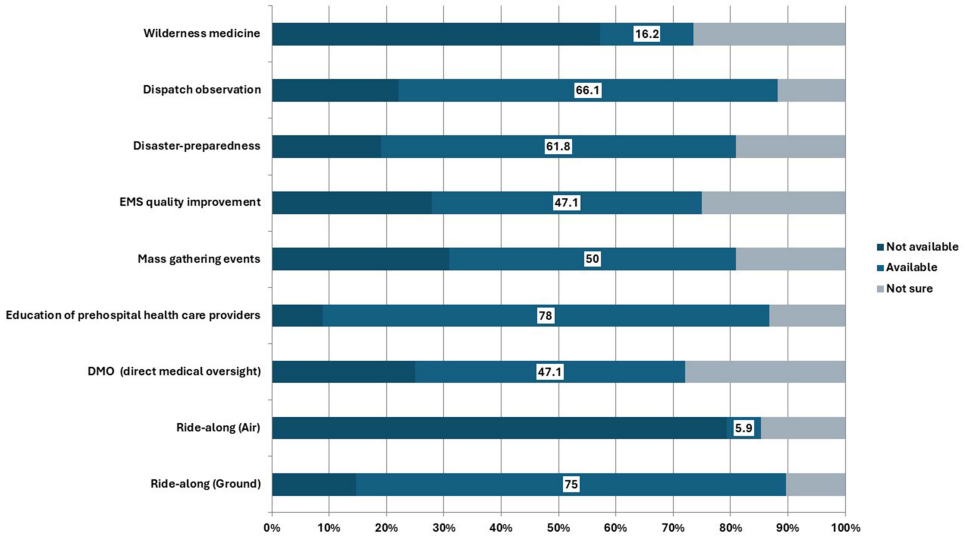

Figure 1 Available activities (mandatory or optional) for emergency medicine residents in Saudi Arabia during EMS rotation.

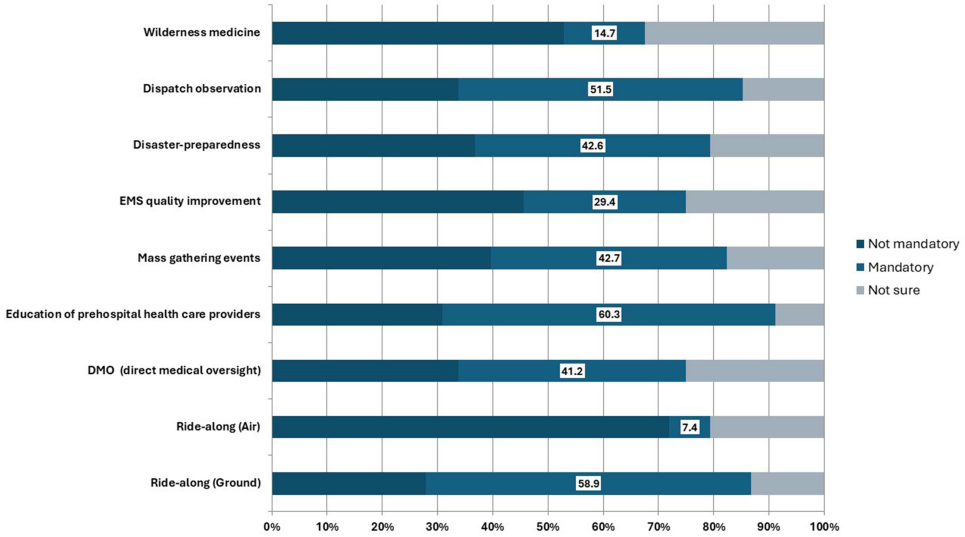

Figure 2 Mandatory activities for emergency medicine residents in Saudi Arabia during EMS rotation.

(p=0.004). Similarly, wilderness medicine was reported as available by 13.8% of graduated residents and 11.4% of current residents, in contrast to 75% of program directors (p=0.026). Mass gathering events were more frequently reported as available by current residents (51.4%) than by graduated residents (41.4%, p=0.187) (Table 2).

Mandatory Activities

Disaster preparedness was again highlighted as a significant difference, with 58.6% of graduated residents and 25.7% of current residents identifying it as a mandatory activity, compared to 75% of program directors (p=0.010). Similarly, ride-along (Air) was identified as mandatory by 3.4% of graduated residents and 5.7% of current residents, compared to 50% of program directors (p=0.034). Wilderness medicine was also identified as a mandatory activity by 10.3% of graduated residents and 11.4% of current residents, versus 75% of program directors (p=0.016) (Table 3).

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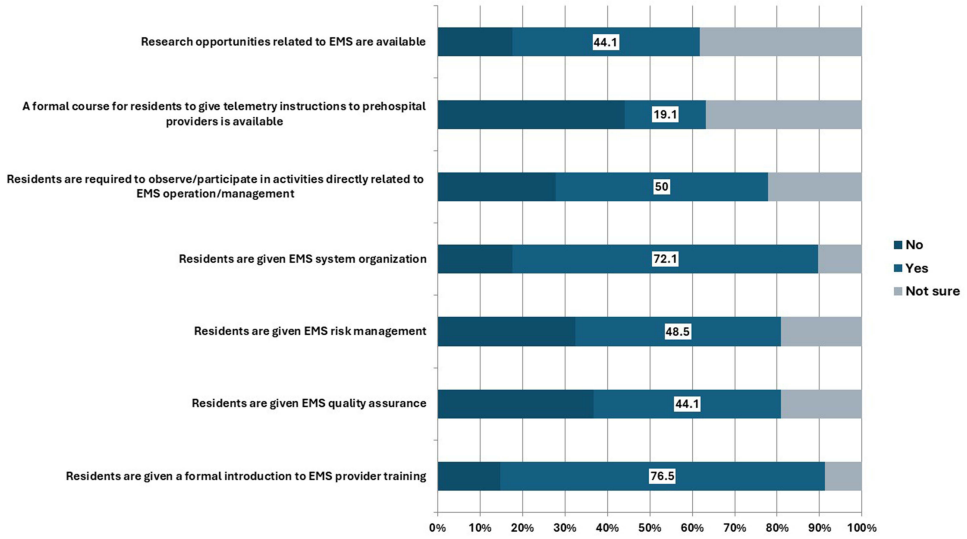

Figure 3 Evaluation-related Services given to emergency medicine residents in Saudi Arabia.

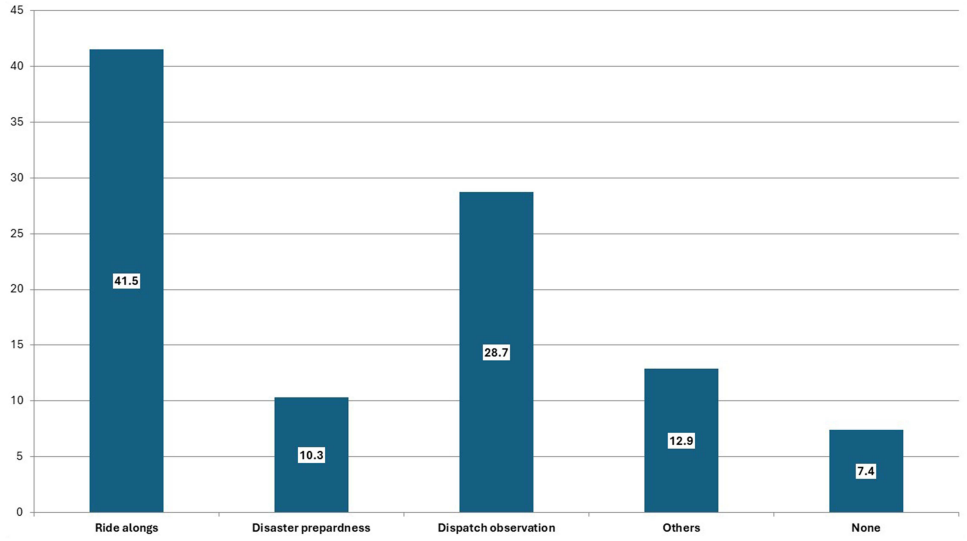

Figure 4 The most meaningful components of the EMS rotation to residents` education according to their perspectives.

Evaluation Services

Evaluation services showed notable differences between groups. A formal introduction to EMS provider training was reported as being given to 80% of current residents and 72.4% of graduated residents, compared to 75% of program directors (p=0.809). EMS quality assurance was reported as being provided to 51.4% of current residents and 31% of graduated residents, while 75% of program directors reported its availability (p=0.129). No significant differences were observed for other evaluation services, such as EMS system organization or risk management (Table 4).

Comparison Based on Region

Availability of Activities

Significant regional differences were observed in the availability of EMS activities. Ride-along (Air) was available in 7.1% of programs in the Eastern Region and 8.6% of programs in the Central Region, while it was unavailable in the Western Region (p=0.528). Education of prehospital healthcare providers was most commonly available in the Central Region (85.7%), compared to 71.4% in the Eastern Region and 68.4% in the Western Region, though this difference was not statistically

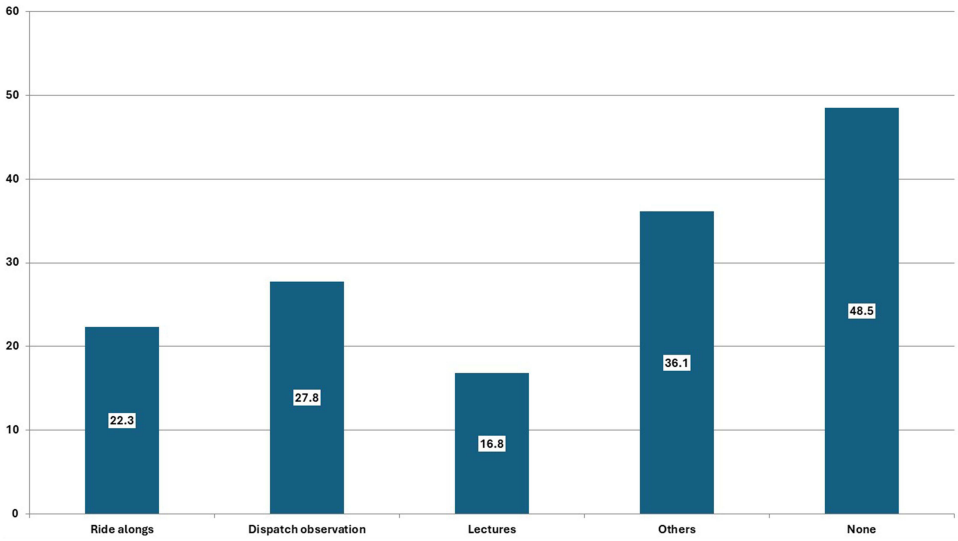

Figure 5 The least meaningful components of the EMS rotation to residents` education according to their perspectives.

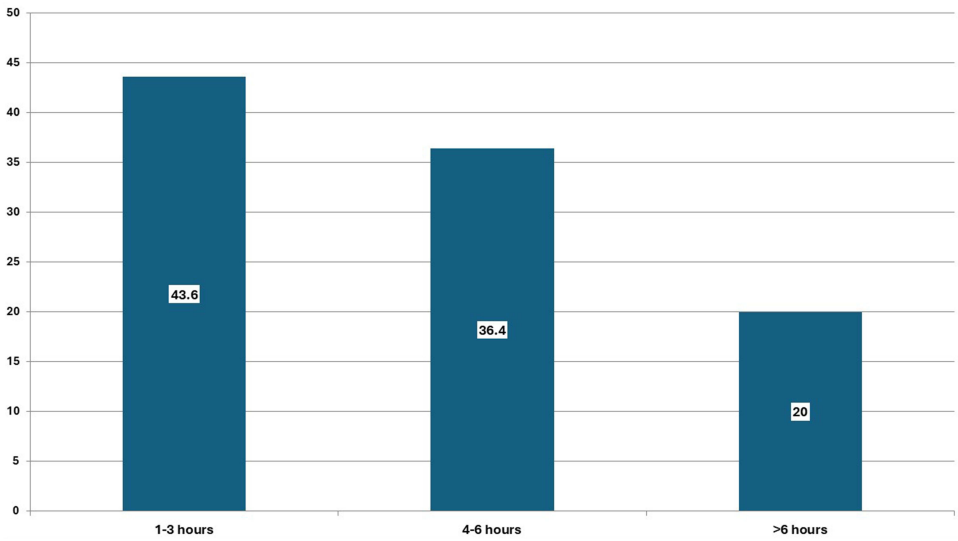

Figure 6 Amount of time the residents spend in the field with EMS providers.

significant (p=0.188). Disaster preparedness was more frequently reported in the Central Region (74.3%) compared to the Eastern (50%) and Western (47.4%) Regions, but this difference did not reach statistical significance (p=0.229) (Table 5).

Mandatory Activities

The availability of mandatory activities varied slightly across regions but did not show significant differences in most cases. For example, ride-along (Ground) was identified as mandatory by 68.4% of participants in the Western Region, 60% in the Central Region, and 42.9% in the Eastern Region (p=0.634). Disaster preparedness was reported as mandatory by 57.9% of participants in the Western Region, 42.9% in the Central Region, and only 21.4% in the Eastern Region (p=0.117). Education of prehospital healthcare providers was mandatory for 63.2% of participants in the Western Region, 62.9% in the Central Region, and 50% in the Eastern Region (p=0.873) (Table 6).

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Table 2 Comparison of the Availability of Activities (Mandatory or Optional) for the Emergency Medicine Residents, According to Their Position

	Participant's Position			p-value
	Program Director N=4 N (%)	Graduated Resident N=29 N (%)	Current Resident N=35 N (%)	
Ride-along (Ground)	4 (100)	22 (75.9)	23 (71.4)	0.342
Ride-along (Air)	1 (25.0)	2 (6.9)	1 (2.9)	0.228
DMO (direct medical oversight)	3 (75.0)	13 (44.8)	16 (45.7)	0.583
Education of prehospital health care providers	4 (100)	23 (79.3)	26 (74.3)	0.721
Mass gathering events	4 (100)	12 (41.4)	18 (51.4)	0.187
EMS quality improvement	3 (75.0)	12 (41.4)	17 (48.6)	0.462
Disaster-preparedness	4 (100)	23 (79.3)	15 (42.9)	0.004
Dispatch observation	4 (100)	19 (65.5)	22 (62.9)	0.453
Wilderness medicine	3 (75.0)	4 (13.8)	4 (11.4)	0.018

Note: *Fisher-Exact Test.

Table 3 Comparison of the Mandatory Activities for the Emergency Medicine Residents, According to Their Position

	Participant's Position			p-value*
	Director N=4 N (%)	Graduated Resident N=29 N (%)	Current Resident N=35 N (%)	
Ride-along (Ground)	4 (100)	16 (55.2)	20 (57.1)	0.277
Ride-along (Air)	2 (50.0)	1 (3.4)	2 (5.7)	0.034
DMO (direct medical oversight)	3 (75.0)	9 (31.0)	16 (45.7)	0.178
Education of prehospital health care providers	3 (75.0)	18 (62.1)	20 (57.1)	0.791
Mass gathering events	4 (100)	11 (37.9)	14 (40.0)	0.066
EMS quality improvement	3 (75.0)	8 (27.9)	9 (25.7)	0.151
Disaster-preparedness	3 (75.0)	17 (58.6)	9 (25.7)	0.010
Dispatch observation	3 (75.0)	14 (48.3)	18 (51.4)	0.788
Wilderness medicine	3 (75.0)	3 (10.3)	4 (11.4)	0.016

Note: *Fisher-Exact Test.

Evaluation Services

The provision of evaluation services showed some significant regional differences. A formal introduction to EMS provider training was most commonly reported in the Western Region (94.7%), compared to the Central Region (77.1%) and the Eastern Region (50%, p=0.006). Other evaluation services, such as EMS quality assurance and risk management, did not show significant regional differences. For instance, EMS quality assurance was reported as being available by 42.9% of participants in both the Eastern and Central Regions and by 47.4% in the Western Region

Table 4 Comparison of the Existence of Evaluation Services for the Emergency Medicine Residents, According to Their Position

	Participant's Position			p-value*
	Director N=4 N (%)	Graduated Resident N=29 N (%)	Current Resident N=35 N (%)	
Residents are given a formal introduction to EMS provider training	3 (75.0)	21 (72.4)	28 (80.0)	0.809
Residents are given EMS quality assurance	3 (75.0)	9 (31.0)	18 (51.4)	0.129
Residents are given EMS risk management	3 (75.0)	12 (41.4)	18 (51.4)	0.387
Residents are given EMS system organization	4 (100)	20 (69.0)	25 (71.4)	0.687
Residents are required to observe/participate in activities directly related to EMS operation/management	4 (100)	14 (48.3)	16 (45.7)	0.159
A formal course for residents to give telemetry instructions to prehospital providers is available	2 (50.0)	4 (13.8)	7 (20.0)	0.225
Research opportunities related to EMS are available	4 (100)	13 (44.8)	13 (37.1)	0.057

Note: *Fisher-Exact Test.

Table 5 Comparison of the Availability of Activities (Mandatory or Optional) for the Emergency Medicine Residents, According to Their Residency Program`s Location

	Residency Program's Location			p-value*
	Eastern Region N=14 N (%)	Western Region N=19 N (%)	Central Region N=35 N (%)	
Ride-along (Ground)	8 (57.1)	15 (78.9)	28 (80.0)	0.179
Ride-along (Air)	1 (7.1)	0 (0.0)	3 (8.6)	0.5283**
DMO (direct medical oversight)	6 (42.9)	7 (36.8)	19 (54.3)	0.604
Education of prehospital health care providers	10 (71.4)	13 (68.4)	30 (85.7)	0.188
Mass gathering events	8 (57.1)	12 (63.2)	14 (40.0)	0.394
EMS quality improvement	8 (57.1)	6 (31.6)	18 (51.4)	0.094
Disaster-preparedness	7 (50.0)	9 (47.4)	26 (74.3)	0.229
Dispatch observation	8 (57.1)	11 (57.9)	26 (74.3)	0.374
Wilderness medicine	2 (14.3)	3 (15.8)	6 (17.1)	1.00**

Notes: *Chi-square test. **Fisher-Exact Test.

(p=0.276). Research opportunities related to EMS were reported as available by 51.4% of participants in the Central Region, 36.8% in the Western Region, and 35.7% in the Eastern Region (p=0.366) (Table 7).

Discussion

This study evaluated the EMS rotation curriculum within the Saudi Emergency Medicine Programs, highlighting variability in the availability of activities, mandatory requirements, and evaluation services across participants' roles and regions. Key EMS activities, such as ride-along and disaster preparedness, were frequently reported as essential but

Table 6 Comparison of the Mandatory Activities for the Emergency Medicine Residents, According to Their Residency Program`s Location

	Residency Program's locatIon			p-value*
	Eastern Region N=14 N (%)	Western Region N=19 N (%)	Central Region N=35 N (%)	
Ride-along (Ground)	6 (42.9)	13 (68.4)	21 (60.0)	0.634
Ride-along (Air)	1 (7.1)	2 (10.5)	2 (5.7)	0.833**
DMO (direct medical oversight)	8 (57.1)	6 (31.6)	14 (40.0)	0.659
Education of prehospital health care providers	7 (50.0)	12 (63.2)	22 (62.9)	0.873
Mass gathering events	5 (35.7)	12 (63.2)	12 (34.3)	0.272
EMS quality improvement	7 (50.0)	5 (26.3)	8 (22.9)	0.275
Disaster-preparedness	3 (21.4)	11 (57.9)	15 (42.9)	0.117**
Dispatch observation	6 (42.9)	10 (52.6)	19 (54.3)	0.909
Wilderness medicine	2 (14.3)	3 (15.8)	5 (14.3)	1.000**

Notes: *Chi-square test. ** Fisher-Exact Test.

Table 7 Comparison of the Existence of Evaluation Services for the Emergency Medicine Residents, According to Their Residency Program Location

	Residency Program's Location			p-value*
	Eastern Region N=14 N (%)	Western Region N=19 N (%)	Central Region N=35 N (%)	
Residents are given a formal introduction to EMS provider training	7 (50.0)	18 (94.7)	27 (77.1)	0.006
Residents are given EMS quality assurance	6 (42.9)	9 (47.4)	15 (42.9)	0.276
Residents are given EMS risk management	6 (42.9)	12 (63.2)	15 (42.9)	0.468
Residents are given EMS system organization	7 (50.0)	15 (78.9)	27 (77.1)	0.060
Residents are required to observe/participate in activities directly related to EMS operation/management	7 (50.0)	8 (42.1)	19 (54.3)	0.830
A formal course for residents to give telemetry instructions to prehospital providers is available	5 (35.7)	3 (15.8)	5 (14.3)	0.271**
Research opportunities related to EMS are available	5 (35.7)	7 (36.8)	18 (51.4)	0.366

Notes: *Chi-square test. **Fisher-Exact Test.

showed discrepancies in availability between program directors, graduated residents, and current residents, as well as across different regions. Program directors consistently reported higher availability of activities compared to residents, with regional disparities observed, particularly in access to specialized activities like ride-along (Air) and disaster preparedness. Evaluation services, such as EMS quality assurance and risk management, were inconsistently reported across groups and regions. Residents identified ride-along and dispatch observation as the most meaningful components

of the EMS rotation, emphasizing the importance of experiential learning. These findings underline the need for greater standardization and equitable distribution of resources to ensure a uniform and effective EMS rotation experience.

Integrating EMS rotations in the Saudi Board of Emergency Medicine (SBEM) curriculum reflects a global trend in emergency medicine education. The emphasis on pre-hospital care within the curriculum aligns with practices in countries like the United States, where exposure to pre-hospital care is mandated for EM training physicians by the ACGME. Research indicates that early exposure to pre-hospital settings enhances the readiness and skills of emergency medicine residents.[7] The specific objectives of the EMS rotation aim to provide comprehensive training, encompassing everything from patient management protocols to participation in disaster exercises.[8]

However, the study highlights a disparity in the availability of various EMS activities, such as ride-alongs (ground and air), disaster preparedness, and education of prehospital healthcare providers. These activities are crucial for providing hands-on experience and insight into real-world emergency scenarios, enhancing emergency medicine residents' decision-making and practical skills.[9] The variation in availability suggests a need for standardization across different training centers to ensure uniform quality of training.

There are also notable differences in perceptions among program directors and residents regarding the availability and importance of various EMS activities. This discrepancy could be due to varying expectations and experiences between these groups.[10] Bridging this gap is essential to ensure that the curriculum aligns with residents' actual needs and experiences.[11] Feedback mechanisms and continuous curriculum evaluation can be vital in this process.

The emphasis on certain mandatory activities, such as education of prehospital healthcare providers and disaster preparedness, is essential. Mandatory activities ensure all residents receive baseline exposure and training in critical EMS areas. This approach is supported by literature emphasizing the importance of core competencies in emergency medicine education.[12]

The study's findings on evaluation-related services provided to residents, such as EMS quality assurance and risk management, are significant. Continuous evaluation and quality assurance are fundamental to maintaining high medical education and practice standards.[13] The variance in the provision of these services again points to the need for a more standardized approach across different programs.

Residents' perspectives on what constitutes meaningful components of their EMS rotation are particularly informative. The high valuation of ride-along and dispatched observations highlights the importance of experiential learning in medical education.[14] This aligns with educational theories that stress hands-on, experiential learning's value in deepening understanding and enhancing skill retention.[15,16]

Lastly, the time residents spend in the field with EMS providers indicates the practical emphasis of the training. Fieldwork is crucial for the real-world application of classroom knowledge and skills.[17] The variation in time spent in the field may affect the residents' competence and confidence, as studies link clinical exposure to proficiency in emergency settings.

Despite the significant findings reported in this study, several limitations must be acknowledged. Firstly, the sample size and diversity were limited, which may not adequately capture the full range of experiences and perceptions across all Saudi emergency medicine programs. Geographical representation from different regions was potentially unequal, which could skew the results and limit their reflection of national trends. The reliance on self-reported electronic questionnaires introduces the possibility of response bias, with participants potentially providing answers they deemed favorable or expected, rather than fully accurate.

Furthermore, the study primarily relied on perceptions and self-reported data from participants, without incorporating objective data sources such as training records, attendance logs, or facility audits. Including such records in future research would provide a more robust and comprehensive evaluation of the EMS rotation curriculum. The cross-sectional design of the study also limits the ability to assess changes or trends over time, and the lack of comparative analysis with international standards or programs in other countries misses an opportunity for broader insights.

Additionally, the focus of the study was mainly on curriculum availability and structure, with less emphasis on the direct impact of the EMS rotations on learning outcomes or patient care quality. Potential confounding factors, such as varying levels of resources at different training centers and differences in residents' educational backgrounds, may not have been adequately addressed. The absence of qualitative data, such as in-depth interviews or focus group

discussions, further limits the depth of understanding regarding the experiences and perceptions of residents and program directors.

The findings might also lack generalizability to other countries or healthcare systems due to cultural, economic, and systemic differences. Moreover, the reliance on basic statistical methods, such as the Chi-square test, may not have fully captured the complexity and nuances of the data. Future research addressing these limitations, including the use of objective data sources and more sophisticated analytical approaches, would enhance our understanding of EMS rotations and contribute to the development of more effective educational strategies in emergency medicine training.

Implications and Recommendations

This study sheds light on the critical role that standardized EMS rotations play in preparing emergency medicine residents for the demands of pre-hospital care in Saudi Arabia. The findings emphasize the importance of aligning the EMS rotation curriculum with the SCHS requirements while adapting to the specific challenges and resources available within the Saudi healthcare system. Standardizing the availability and quality of EMS activities, such as ride-alongs and disaster preparedness, can enhance residents' experiential learning and better equip them to handle emergency scenarios. Given the discrepancies identified between program directors' and residents' perceptions, fostering open communication and incorporating multi-stakeholder feedback into curriculum development are vital. Establishing structured feedback mechanisms, such as regular surveys and workshops, can help bridge gaps in expectations and ensure that training programs remain responsive to the evolving needs of residents.

Furthermore, aligning the Saudi EMS rotation curriculum with global best practices, including frameworks used by the ACGME, could offer valuable insights. Comparative studies with international standards would enable benchmarking and identify areas for improvement. While this study did not include direct comparisons, future research should explore how Saudi EMS training programs measure up to those in other countries, particularly in terms of resident preparedness, competencies, and patient care outcomes. Finally, addressing regional disparities in resource allocation and activity availability is paramount. Ensuring equitable access to essential EMS activities across all training centers, regardless of location, is a step towards fostering a more unified and effective emergency medicine training system. A targeted approach that accounts for regional challenges and leverages local strengths can help achieve this goal. Such efforts will ultimately align Saudi emergency medicine training with international standards while addressing the unique needs of the country's healthcare system.

Conclusion

In conclusion, the study offers valuable insights into the current state and effectiveness of EMS training in Saudi Arabia. Despite its limitations, the study highlights the importance of integrating comprehensive EMS training in emergency medicine curricula. It underscores the need for standardization across training centers, the importance of experiential learning, and the potential benefits of aligning the curriculum with international standards since there was no official curriculum before 2015 to compare with. The findings catalyze further research and development in this field, pointing towards the need for a more nuanced, longitudinal, and comparative approach to fully understand and enhance the quality of emergency medical education and practice in Saudi Arabia in the future; more educational efforts include simulation-based training, case-based learning, hands-on practical sessions, and interactive workshops will be applied to demonstrate and enhance learning outcomes to improve the skills and knowledge of trainees in emergency medicine service rotations.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Khattab E, Sabbagh A, Aljerian N, et al. Emergency medicine in Saudi Arabia: a century of progress and a bright vision for the future. *Int J Emerg Med*. 2019;12(1):16. doi:10.1186/s12245-019-0232-0
2. AlShammari T, Jennings P, Williams B. Evolution of emergency medical services in Saudi Arabia. *J Emerg Med Trauma Acute Care*. 2017;2017(1). doi:10.5339/jemtac.2017.4

3. Mutairi M, Jawadi A, Harthy N, et al. Emergency medical service system in the kingdom of Saudi Arabia. *J Med Sci Clin Res*. 2016;4:13084–13092. doi:10.18535/jmscr/v4i10.31
4. Al-Jawder N, Abuzeyad F. A comparison of three emergency medical services organizations in the gulf council cooperation countries. *JEMS J Emerg Med Serv*. 2022;2022:1.
5. Alwohaiby DA. Saudi Board Emergency Medicine Curriculum. Available from: www.scfhs.org.sa. Accessed January 24, 2025.
6. Martin-Gill C, Roth RN, Mosesso VN. Resident field response in an emergency medicine prehospital care rotation. *Prehospital Emerg Care*. 2010;14(3):370–376. doi:10.3109/10903121003770647
7. Tušer I, Bekešienė S, Navrátil J. Emergency management and internal audit of emergency preparedness of pre-hospital emergency care. *Qual Quant*. 2020;1–13. doi:10.1007/s11135-020-01039-w
8. Ventura C, Denton E, Van Court E. *The Emergency Medical Responder*. Springer International Publishing; 2021; doi:10.1007/978-3-030-64396-6
9. Spain AE. *Integration of Healthcare Simulation Activities Into the Paramedic Education Curriculum: An Embedded Case Study Analysis of the Decision-Making Process*. Columbia: University of Missouri; 2022.
10. Steeps RJ, Wilfong DA, Hubble MW, Bercher DL. Emergency medical services professionals' attitudes about community paramedic programs. *West J Emerg Med*. 2017;18(4):630–639. doi:10.5811/westjem.2017.3.32591
11. Ahn J, Golden A, Bryant A, Babcock C. Impact of a dedicated emergency medicine teaching resident rotation at a large urban academic center. *West J Emerg Med*. 2016;17(2):143–148. doi:10.5811/westjem.2015.12.28977
12. Gowing JR, Walker KN, Elmer SL, Cummings EA. Disaster preparedness among health professionals and support staff: what is effective? An integrative literature review. *Prehosp Disaster Med*. 2017;32(3):321–328. doi:10.1017/S1049023X1700019X
13. Saiyad S, Virk A, Mahajan R, Singh T. Online teaching in medical training: establishing good online teaching practices from cumulative experience. *Int J Appl Basic Med Res*. 2020;10:149. doi:10.4103/ijabmr.IJABMR_358_20
14. Haggins A, Clery M, Ahn J, et al. Untold stories: emergency medicine residents' experiences caring for diverse patient populations. *AEM Educ Train*. 2021;5(Suppl 1):S19–S27. doi:10.1002/aet2.10678
15. Matriano EA. Ensuring student-centered, constructivist and project-based experiential learning applying the exploration, research, interaction and creation (Eric) learning model. *Int Online J Educ Teach*. 2019;7(1):214–227.
16. Asad M, Ansari AN, Churi P, Tahanzadeh M. Virtual reality as pedagogical tool to enhance experiential learning: a systematic literature review. *Educ Res Int*. 2021;2021:1–17. doi:10.1155/2021/7061623
17. Bergstresser-Simpson R, Sweetman E, Maloberti C, Hall M, Hermes F, Worl B. OT graduate students' perceived preparedness for level II fieldwork: traditional, nontraditional and mixed fieldwork I experiences. *J Occup Ther Educ*. 2023;7. doi:10.26681/jote.2023.070115