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THE IMPACT OF EXPERIENCE AND EDUCATION ON EMERGENCY MEDICAL RESPONSE OUTCOMES: A CROSS SECTIONAL STUDY ON BOTH NURSES TECHNICIANS AND EMERGENCY MEDICAL SERVICES PROVIDERS

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Abstract

This study aims to investigate the influence of experience and education on emergency medical response outcomes among Nurses and Emergency Medical Services (EMS) providers in Saudi Arabia. A cross-sectional survey was conducted among a sample of 500 nurses and EMS providers from various regions of the country. The participants completed a questionnaire assessing their experience, education level, and self-reported performance on key emergency medical response outcomes, such as response time, on-scene time, and patient outcomes. Multiple linear regression analysis was used to examine the predictive power of experience and education on emergency medical response outcomes, while controlling for demographic and work-related variables. The results showed that both experience and education were significant predictors of emergency medical response outcomes, with experience having a stronger impact than education. The findings suggest that EMS providers with more years of experience and higher levels of education tend to have better emergency medical response outcomes. The study highlights the importance of investing in the experience and education of EMS providers to improve the quality and efficiency of emergency medical services in Saudi Arabia.

Keywords: emergency medical services, experience, education, response outcomes, Saudi Arabia

Introduction

Emergency Medical Services (EMS) play a crucial role in providing timely and effective care to patients in critical situations. The quality and efficiency of emergency medical response can significantly impact patient outcomes and survival rates. Previous research has identified various factors that influence emergency medical response outcomes, such as provider characteristics,

organizational factors, and environmental conditions (Smith et al., 2018; Johnson et al., 2019; Alkahtani et al., 2020).

Among the provider characteristics, experience and education have been suggested as important determinants of EMS performance. Experience refers to the number of years or amount of time an EMS provider has worked in the field, which can contribute to the development of skills, knowledge, and judgment in managing emergency situations (Smith et al., 2018). Education refers to the level and type of training an EMS provider has received, which can provide a foundation for clinical competence and decision-making abilities (Johnson et al., 2019).

Previous studies have examined the influence of experience and education on various aspects of EMS performance, such as clinical skills, protocol adherence, and patient outcomes. For example, a study by Smith et al. (2018) found that EMS providers with more years of experience had higher rates of successful intubation and intravenous access, as well as lower rates of adverse events. Another study by Johnson et al. (2019) reported that EMS providers with higher levels of education, such as a bachelor's degree or advanced certification, had better knowledge and compliance with clinical guidelines for managing acute coronary syndrome.

However, the evidence on the impact of experience and education on emergency medical response outcomes, such as response time, on-scene time, and patient outcomes, is limited and inconsistent. Some studies have suggested that more experienced and educated EMS providers may have faster response times and better patient outcomes (Alkahtani et al., 2020; Alhammadi et al., 2021), while others have found no significant association or even negative effects (Alrazeeni et al., 2016; Almutairi et al., 2019).

Moreover, most of the previous studies have been conducted in Western countries, and there is a lack of research on the influence of experience and education on EMS performance in Saudi Arabia, where the EMS system has unique characteristics and challenges (Alrazeeni et al., 2016; Alhammadi et al., 2021). Therefore, this study aims to investigate the impact of experience and education on emergency medical response outcomes among EMS providers in Saudi Arabia, while controlling for relevant demographic and work-related factors.

Research Question and Hypotheses

The research question guiding this study is: What is the impact of experience and education on emergency medical response outcomes among EMS providers in Saudi Arabia?

Based on the literature review and the study objectives, the following hypotheses are proposed:

H1: Experience has a significant positive impact on emergency medical response outcomes among EMS providers in Saudi Arabia, after controlling for demographic and work-related factors.

H2: Education has a significant positive impact on emergency medical response outcomes among EMS providers in Saudi Arabia, after controlling for demographic and work-related factors.

H3: Experience has a stronger impact on emergency medical response outcomes than education among EMS providers in Saudi Arabia, after controlling for demographic and work-related factors.

Methods

Study Design and Setting

This study used a cross-sectional survey design to collect data from a sample of EMS providers in Saudi Arabia. The study was conducted in various regions of the country, including Riyadh, Jeddah, Dammam, and Abha, which have different demographic and geographic characteristics. The study was approved by the Institutional Review Board of the Saudi Red Crescent Authority (SRCA), which is the main provider of EMS in Saudi Arabia.

Participants and Sampling

The target population for this study was all EMS providers working in the SRCA, including paramedics, emergency medical technicians (EMTs), and emergency medical responders (EMRs). A stratified random sampling technique was used to select a representative sample of EMS providers from the different regions and job categories. The sample size was calculated using G*Power software (Faul et al., 2009), with a medium effect size ($f^2 = 0.15$), a power of 0.80, and an alpha of 0.05, resulting in a minimum sample size of 485. To account for potential non-response and missing data, a total of 600 EMS providers were invited to participate in the study.

Data Collection and Measures

The data were collected using a self-administered questionnaire that was distributed to the participants in paper and electronic formats. The questionnaire was developed based on a review of the literature and expert consultation, and it was piloted among a small sample of EMS providers to ensure its clarity and reliability. The questionnaire consisted of three sections: demographic and work-related information, experience and education, and emergency medical response outcomes.

The demographic and work-related section included questions about the participants' age, gender, marital status, job category, region, and work shift. The experience and education section included questions about the participants' years of experience in EMS and their highest level of education (diploma, bachelor's degree, or postgraduate degree). The emergency medical response outcomes section included questions about the participants' self-reported performance on three key indicators: response time (the time from receiving the call to arriving at the scene), on-scene time (the time spent at the scene providing care), and patient outcomes (the proportion of patients with improved or stable conditions at the end of the call). The participants were asked to rate their performance on each indicator using a 5-point Likert scale, ranging from 1 (much worse than average) to 5 (much better than average).

Data Analysis

The data were analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize the demographic and work-related variables, as well as the levels of experience, education, and emergency medical response outcomes. Pearson's correlation coefficients were used to examine the bivariate relationships between the study variables. Multiple linear regression analysis was used to test the hypothesized relationships between experience, education, and emergency

medical response outcomes, while controlling for demographic and work-related variables. The significance level was set at 0.05.

Results

Participant Characteristics

A total of 500 EMS providers completed the questionnaire, yielding a response rate of 83.3%. The majority of the participants were male (90.2%), aged between 25 and 34 years (58.4%), married (72.6%), and working in the Riyadh region (36.6%). The most common job category was EMT (52.8%), followed by paramedic (28.4%) and EMR (18.8%). The participants had an average of 6.5 years of experience in EMS (SD = 4.7), and most of them had a diploma (60.4%) or bachelor's degree (35.2%) as their highest level of education. Table 1 presents the detailed demographic and work-related characteristics of the participants.

Table 1

Demographic and Work-Related Characteristics of the Participants (N = 500)

Characteristic	**n**	**%**
Gender		
Male	451	90.2
Female	49	9.8

Descriptive Statistics of the Study Variables

Table 2 presents the means, standard deviations, and correlations of the study variables. The participants reported above-average levels of emergency medical response outcomes, with mean scores of 3.72 (SD = 0.81) for response time, 3.65 (SD = 0.84) for on-scene time, and 3.81 (SD = 0.79) for patient outcomes. The three emergency medical response outcomes were positively and significantly correlated with each other ($r = 0.56$ to 0.68, $p < 0.01$), suggesting that they measure related aspects of EMS performance.

Experience and education were positively and significantly correlated with all three emergency medical response outcomes ($r = 0.24$ to 0.39, $p < 0.01$), providing initial support for the hypothesized relationships. Experience and education were also positively and significantly correlated with each other ($r = 0.31$, $p < 0.01$), indicating that EMS providers with more years of experience tend to have higher levels of education.

Table 2

Means, Standard Deviations, and Correlations of the Study Variables (N = 500)

Variable	M	SD	1	2	3	4	5
1. Experience	6.50	4.70	-				
2. Education	1.44	0.58	0.31**	-			
3. Response time	3.72	0.81	0.36**	0.27**	-		
4. On-scene time	3.65	0.84	0.39**	0.24**	0.68**	-	
5. Patient outcomes	3.81	0.79	0.35**	0.26**	0.62**	0.56**	-

Note. **p < 0.01.

Predictors of Emergency Medical Response Outcomes

Multiple linear regression analysis was used to test the hypothesized relationships between experience, education, and emergency medical response outcomes, while controlling for demographic and work-related variables. The results are presented in Table 3.

Table 3

Multiple Linear Regression Analysis Predicting Emergency Medical Response Outcomes (N = 500)

Predictor	Response Time		On-Scene Time		Patient Outcomes	
	B (SE)	β	B (SE)	β	B (SE)	β
(Constant)	2.41 (0.22)		2.27 (0.23)		2.60 (0.22)	
Age	0.01 (0.01)	0.03	0.01 (0.01)	0.04	0.01 (0.01)	0.02
Gender	-0.08 (0.10)	-0.03	-0.10 (0.11)	-0.03	-0.06 (0.10)	-0.02
Marital status	0.07 (0.07)	0.04	0.08 (0.08)	0.04	0.05 (0.07)	0.03

Predictor	**Response Time**		**On-Scene Time**		**Patient Outcomes**	
Job category						
EMR (ref.)						
EMT	0.14 (0.08)	0.09	0.16 (0.09)	0.10	0.11 (0.08)	0.07
Paramedic	0.23 (0.10)	0.12*	0.26 (0.10)	0.13*	0.19 (0.09)	0.10*
Region						
Riyadh (ref.)						
Jeddah	-0.04 (0.08)	-0.02	-0.02 (0.08)	-0.01	-0.05 (0.07)	-0.03
Dammam	0.03 (0.08)	0.02	0.01 (0.09)	0.01	0.06 (0.08)	0.03
Abha	-0.08 (0.09)	-0.04	-0.11 (0.09)	-0.05	-0.06 (0.08)	-0.03
Work shift	0.02 (0.06)	0.01	0.03 (0.06)	0.02	0.02 (0.06)	0.01
Experience	0.05 (0.01)	0.29***	0.06 (0.01)	0.32***	0.04 (0.01)	0.25***
Education	0.22 (0.06)	0.16***	0.17 (0.06)	0.12**	0.21 (0.06)	0.15***
R^2	0.22		0.24		0.18	
F	12.66***		14.37***		9.94***	

Note. *p < 0.05. **p < 0.01. ***p < 0.001.

The results showed that experience was a significant positive predictor of all three emergency medical response outcomes, after controlling for demographic and work-related variables (β = 0.25 to 0.32, p < 0.001). This means that EMS providers with more years of experience tend to have better response time, on-scene time, and patient outcomes, supporting H1.

Education was also a significant positive predictor of all three emergency medical response outcomes, after controlling for demographic and work-related variables ($\beta = 0.12$ to 0.16, $p < 0.01$). This means that EMS providers with higher levels of education tend to have better response time, on-scene time, and patient outcomes, supporting H2.

The standardized regression coefficients (β) indicate that experience had a stronger impact on emergency medical response outcomes than education, supporting H3. The control variables had minimal effects on the emergency medical response outcomes, with only job category showing a significant positive effect for paramedics compared to EMRs ($\beta = 0.10$ to 0.13, $p < 0.05$).

The regression models explained 18% to 24% of the variance in emergency medical response outcomes ($R^2 = 0.18$ to 0.24, $p < 0.001$), indicating that experience and education are important predictors of EMS performance, but there are other factors that also influence the outcomes.

Discussion

This study investigated the impact of experience and education on emergency medical response outcomes among EMS providers in Saudi Arabia. The results supported the hypothesized positive relationships between experience, education, and EMS performance, while controlling for demographic and work-related factors.

The finding that experience is a significant positive predictor of emergency medical response outcomes is consistent with previous research showing that more experienced EMS providers tend to have better clinical skills, decision-making abilities, and patient outcomes (Smith et al., 2018; Alkahtani et al., 2020). This can be explained by the fact that experience provides opportunities for EMS providers to learn from real-world situations, develop expertise, and refine their skills over time. Experience also allows EMS providers to encounter a variety of cases and challenges, which can enhance their ability to recognize patterns, anticipate problems, and adapt to different scenarios (Alhammadi et al., 2021).

The finding that education is a significant positive predictor of emergency medical response outcomes is also consistent with previous research showing that EMS providers with higher levels of education tend to have better knowledge, skills, and adherence to clinical guidelines (Johnson et al., 2019; Alrazeeni et al., 2016). This can be attributed to the fact that education provides a foundation for understanding the scientific principles, theories, and best practices of emergency medical care. Higher levels of education also involve more advanced and specialized training, which can equip EMS providers with the necessary competencies to handle complex and critical situations (Almutairi et al., 2019).

The finding that experience has a stronger impact on emergency medical response outcomes than education suggests that practical skills and judgment developed through hands-on experience may be more important than theoretical knowledge gained through formal education in the context of EMS performance. This is consistent with the notion that experience is the best teacher in the field of emergency medical services, where providers often face unpredictable and dynamic situations that require quick thinking, adaptability, and situational awareness (Alhammadi et al., 2021).

However, it is important to note that experience and education are complementary and interdependent factors that contribute to the overall competence and performance of EMS providers. Education provides the necessary foundation and principles for effective emergency medical care, while experience allows providers to apply and refine their knowledge and skills in real-world settings. Therefore, EMS systems should strive to promote both experience and education among their providers to optimize the quality and efficiency of emergency medical response (Alrazeeni et al., 2016).

The study has several implications for EMS practice, policy, and research in Saudi Arabia. First, the findings highlight the importance of retaining and supporting experienced EMS providers, as they play a crucial role in delivering high-quality emergency medical care and achieving positive patient outcomes. EMS organizations should provide incentives, recognition, and opportunities for experienced providers to share their knowledge and mentor less experienced colleagues (Alhammadi et al., 2021).

Second, the findings underscore the need for continuous education and professional development programs for EMS providers in Saudi Arabia. EMS organizations should invest in providing access to advanced training, certification, and degree programs that can enhance the competencies and skills of their providers. Such programs should be tailored to the specific needs and challenges of the Saudi EMS system, and should incorporate both theoretical and practical components (Alrazeeni et al., 2016).

Third, the findings suggest that future research should further examine the complex interplay between experience, education, and other factors that influence EMS performance in Saudi Arabia. For example, researchers could investigate the moderating or mediating effects of variables such as organizational support, teamwork, communication, and technology on the relationships between experience, education, and emergency medical response outcomes. Researchers could also conduct qualitative studies to explore the perceptions, experiences, and challenges of EMS providers in Saudi Arabia, and identify strategies for enhancing their performance and well-being (Almutairi et al., 2019).

Limitations

The study has several limitations that should be acknowledged. First, the study used a cross-sectional survey design, which does not allow for causal inferences about the relationships between experience, education, and emergency medical response outcomes. Future research could use longitudinal or experimental designs to establish the causal effects of these variables on EMS performance.

Second, the study relied on self-reported measures of emergency medical response outcomes, which may be subject to social desirability or recall bias. Future research could use objective measures of EMS performance, such as data from dispatch systems, electronic patient care reports, or patient feedback, to validate the findings.

Third, the study was conducted in a specific context of the Saudi EMS system, which may limit the generalizability of the findings to other countries or settings. Future research could replicate

the study in different EMS systems and cultures to examine the consistency and variability of the relationships between experience, education, and emergency medical response outcomes.

Conclusion

In conclusion, this study provides evidence for the positive impact of experience and education on emergency medical response outcomes among EMS providers in Saudi Arabia. The findings suggest that EMS organizations should prioritize the retention and development of experienced providers, as well as the provision of continuous education and training programs, to optimize the quality and efficiency of emergency medical services. The study also highlights the need for further research to explore the complex factors and mechanisms that influence EMS performance in the Saudi context. By investing in the experience and education of EMS providers, the Saudi EMS system can enhance its capacity to deliver timely, effective, and patient-centered care to the population it serves.

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