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Research

National study of Saudi Arabian emergency medical services professional profiles: an inferential analysis

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Abstract

Introduction
Internationally, emergency medical services (EMS) are an essential access point to the healthcare system. Building an understanding of the professional, educational and demographic profiles of an EMS workforce is important. The aim of this study is to statistically test the professional profiles of EMS providers against the Saudi ParamEdic Competency Scale (SPECS) model factors.

Methods
Healthcare providers working for the Saudi Red Crescent Authority (SRCA) were surveyed using a cross-sectional study design with purposive sampling technique. The independent variables were tested against the five SPECS model factors of 'Professionalism', 'Preparedness', 'Communication', 'Clinical' and 'Personal'.

Results
Of the 1260 surveys distributed, 909 surveys were returned (72.14% response rate). A total of 927 EMS healthcare professionals contributed to the study of whom 866 (93.4%) were male and 61 (6.6%) female. Of the participants, 552 (59.5%) were aged 29–39 years and 508 (54.8%) had 5–9 years' experience.

Conclusion
This is the first national study to explore and contextualise the diverse professional stakeholders in Saudi EMS. The study was able to employ the professional profiles of the participants in understanding the different perceptions of the SPECS model. We recommend that future research address the specific differences identified in the demographic, professional and educational aspects of this study.

Keywords:
allied health personnel; attributes; competence; EMS; paramedic; Saudi Arabia

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Introduction

Emergency medical services (EMS) are the first point of patient contact in pre-hospital emergency care and play a vital role in the overall healthcare system. While the demographic profiles of EMS patients have been subjected to different studies for epidemiological purposes (1), the importance of EMS providers' professional and demographic profiles is important for many reasons, such as understanding of competency perception, benchmarking and development of research specific to the EMS industry. An example is the study by Fernandez (2), which estimated the probability of passing the national paramedic certification examination in the United States (US) and found that demographics, educational background, lead instructor qualification and national program accreditation were all significantly associated with success in the national certification exam.

Generally, there is a dearth of research investigating the professional and demographic profiles of the EMS workforce, especially in Saudi Arabia. Although, employers generally collect workforce data, this is not readily published, especially with regards to gender, age, qualification, experience, medical discipline, professional role and nationality. Thus, by extension, EMS stakeholders' perception regarding the educational core competency framework requirements are also unclear.

Saudi Arabian society (as a whole) is young, with approximately three-quarters of the population less than 40 years of age (3). As expected in an Anglo-American EMS model that is employed in Saudi Arabia, most of the EMS workforce are perceived to be paramedics (4). The EMS system is generally split between post-employment certificate holders with minimal education qualification (5), and a pre-employment model represented by Diploma, Bachelor, Master and PhD holders (6). Although the majority of the population in the country are Saudi (3), only a third of the physicians in the Ministry of Health (MOH) are Saudi nationals. Also, other health care disciplines in the MOH are female dominated, for example, approximately three-quarters of nurses in the Saudi MOH are female (7).

Overall, the composition of Saudi EMS is expected to follow a similar pattern to other countries with a male dominated EMS profession, as the low representation of females in the EMS workforce is an international feature (8-12). One of the reasons for the preference of male over female paramedics is the physical strain involved in the work which leads to the hiring of (perceived) stronger male paramedics (9). However, females have been shown to be equal to males on certain aspects and are reported to even outperform them in specific psychological traits. For example, young female paramedics can tolerate working for 24 hours under the same conditions as males (11). Furthermore, female paramedics can be more empathetic to their patients, which can elevate the quality of patient care (13). The trend for increasing female paramedic education and certification is changing in countries such as the US and Australia (14,15). There is an underlying need for the inclusion of female paramedics in EMS workforce training and clinical practice, specific to the requirements of the Saudi EMS industry (16). This study aims to statistically represent how the professional profiles of the national study participants compare against the confirmed Saudi ParamEdic Competency Scale (SPECS) model factors.

Methods

Study design

The study utilised a non-parametric statistical method in analysing a national cross-sectional survey design of health care professionals in the SRCA.

Setting

The SRCA represents a centralised national provider of public pre-hospital care, with responsibility across the whole of Saudi Arabia (17). The pre-hospital care system comprises health policies, EMS organisational policy development and other organisational governance utilised by the SRCA including training and development (17). However, SRCA EMS station crews vary in the number of providers, level of qualification and type of medical discipline. Even the geographical locations of EMS stations are diverse, ranging from rural to metropolitan regions and industrial sites. The study was distributed using the SRCA email system and utilised the internet based Qualtrics. Furthermore, the paper form study instrument was directly distributed and collected from 42 SRCA stations in the central and eastern regions of the country.

Participants

The research was conducted with a purposive sample technique and the study population encompassed all health care provider staff in the SRCA. The inclusion and exclusion conditions were: i) a minimum qualification of a health care certificate; ii) currently working for the SRCA as a health care provider in any capacity including training, management or clinical; iii) the capacity to read and write in the English language; and iv) a minimum age of 18 years. The study was electronically distributed within all 13 regions of the country. Also, the paper form survey was administered in the highly populated eastern and central regions of Saudi Arabia. The research included all medical disciplines and all levels of qualification involved in the field of Saudi EMS.

Instrumentation

The professional profile element of the SPECS instrument represents the only part directly associated with this study and comprised seven demographic questions: gender, age, qualification, experience, medical discipline, professional role and nationality.

The SPECS model was established using a collection of national Saudi requirements and internationally recognised standards, and comprised seven core competency items from a

review of Saudi Arabian universities and colleges (17) and 33 international core items generated from a systematic scoping review (18). After performing a face and content validity study of the extracted items and a Delphi method study involving key Saudi EMS experts and all Saudi universities offering an undergraduate EMS degree, an additional item was added (19). The model was first generated using Exploratory Factor Analysis for parsimony, resulting in 27 items and five factors entitled 'Professionalism', 'Preparedness', 'Communication', 'Clinical' and 'Personal'. The final SPECS model was then confirmed using structural equation modelling (SEM) and confirmatory factor analysis (CFA) with a different data set (20).

Procedures

The research participants were offered an explanatory statement before completing the questionnaire. The study email was entitled 'EMS research participants invitation' and included an explanatory statement and a Qualtrics software link to the study. The message was sent to the email accounts of SRCA staff and included information regarding the purpose of the study, the voluntary nature of participation and procedures to assure anonymity. Although electronic data collection has the advantages of flexibility and speed, a distinctive disadvantage is the likely low response rate (21). Hence, a paper-based data collection procedure was administered in conjunction with the digital form.

Data analysis

The data was stored and analysed using the IBM SPSS Statistics Version 23 statistical package. The seven independent professional variables were tested against the five confirmed SPECS model factors. The inferential statistical analyses were performed via Kruskal-Wallis H tests with post-hoc analysis and a Mann-Whitney U test. As the assumptions for parametric analysis were not met due to the size of some of the groups, data were not normally distributed, and it wasn't possible to apply a parametric data analysis technique (22,23). To assess for any detected significance of relationship among the data variables, a p value of <.05 was set for this study. As the Kruskal-Wallis H test cannot detect which of the specific groups are statistically significantly different from each other, post-hoc Dunn pairwise analysis with a Bonferroni adjustment to the alpha level was conducted for each significant factor (22,24,25). According to Pallant (22), the Mann-Whitney U test can be used after the Kruskal-Wallis H test to further analyse each significant relationship and identify the effect size. The Cohen (26) criterion was used to evaluate the effect size as small (r>0.1), medium (r>.03) or large (r>.5).

Ethics

Consent was implied when the questionnaire was completed by study participants or when the email link was opened, and the survey electronically completed. Approval from the Monash University Human Research Ethics Committee was approved on 28 February 2017, and the research was assigned project number 8072. SRCA approval was granted on 18-5-1438 Hijra, equivalent to 15 February 2017, and ascribed project number 81211.

Table 1. Participants' profiles

	Category	Frequency	Percent
Gender	Male	866	93.4
	Female	61	6.6
	Total	927	100.0
Age groups	18-28	230	24.8
	29-39	552	59.5
	40-49	122	13.2
	50 or above	23	2.5
	Total	927	100.0
Highest qualification	Certificate	68	7.3
	Diploma	707	76.3
	Bachelor degree	114	12.3
	Master degree	24	2.6
	PhD	14	1.5
	Total	927	100.0
Years of EMS experience	1-4	315	34.0
	5-9	508	54.8
	10 or more	104	11.2
	Total	927	100.0
Primary medical discipline	Paramedic	585	63.1
	Nurse	257	27.7
	Physician	83	9.0
	Public health	1	.1
	Pharmacist	1	.1
	Total	927	100.0
Main professional role	Administrative/ leadership	150	16.2
	Education/ academic	328	35.4
	Clinical/patient care	449	48.4
	Total	927	100.0
Nationality	Saudi	792	85.4
	Egyptian	53	5.7
	Jordanian	41	4.4
	Syrian	21	2.3
	Indian	11	1.2
	Pakistani	3	.3
	Sudanese	5	.5
	Filipino	1	.1
	Total	927	100.0

Results

In total, 1260 surveys were distributed of which 909 were returned, generating a response rate of 72.14%. The online survey generated 104 responses, producing a total of 1013 responses. Of these, 86 were list-wise deleted from the analyses as they contained one or more missing values. Thus, a total of 927 participants provided a complete data set which were utilised for this study. As presented in Table 1, a diverse range of expertise, disciplines and qualifications were identified among the participants. Of the 927 participants, only 61 (6.6%) were female which reflects male dominance of the EMS sector in Saudi Arabia. Most of the participants were aged 29 to 39 years (59.5%), with a mid-range of experience between 5 and 9 years (54.8%). The majority held a diploma degree (76.3%) and were paramedics (63.1%). More than three-quarters were Saudi (85.4%) nationals and the participants were approximately well-distributed in their professional roles (Table 1).

The significant results of the study on the influence of professional profiles on SPECS model factors are presented in Tables 2 to 8. The non-parametric inferential analysis identified a total of 39 different significant relationships. Due to single participation of the public health and pharmacist disciplines and their inability to combine with paramedic, nurse or physician, the two participants were excluded from the analysis. Also, nationalities were merged into three groups: Arabs (Egyptian, Jordanian, Syrian and Sudanese), Non-Arabs (Indian, Pakistani and Filipino) and Saudi. The Mann-Whitney U test revealed a significant difference in terms of professionalism between male (n=866) and female (n=61) participants (p=.005). A significant difference was similarly found in terms of preparedness (p=.000), communication (p=.000) and clinical factors (p=.000) (Table 2).

The Mann-Whitney U tests revealed a significant difference in terms of communication for the 29–39 and 40–49 groups (U=27021.5, p=.001), 18–28 and 49–50 groups (U=9812, p=.000), 18–28 and 29–39 groups (U=55089, p=.003) and 18–28 and 40–49 groups (U=11489, p=.005) (Table 3).

Professionalism had two Mann-Whitney U tests that showed a significant difference: certificate and diploma (U=17787.5, p=.000) and certificate and Bachelor (U=2637, p=.000). Preparedness had three tests that showed a significant difference: certificate and diploma (U=16083, p=.000), certificate and Bachelor (U=2361.5, p=.000) and certificate and Master (U=494.5, p=.003). Communication had four tests that showed a significant difference: certificate and diploma (U=16249, p=.000), certificate and Bachelor (U=2451.5, p=.000), certificate and Master (U=489, p=.003) and certificate and PhD (U=245, p=.003). Clinical had two tests that showed a significant difference: certificate and diploma (U=17132.5, p=.000) and certificate and Bachelor (U=2727.5, p=.001). Personal had three tests that showed a significant difference: certificate and diploma (U=502.16, p=.000), certificate and Bachelor (U=2684, p=.000) and certificate and Master (U=468.5, p=.001) (Table 4).

Table 2. Significant differences between gender groups

Construct	Factor 1		Factor 2		Factor 3		Factor 4	
Group	M	F	M	F	M	F	M	F
N	866	61	866	61	866	61	866	61
U	20783.50		18113.00		15451.50		18277.50	
z	-2.791		-4.12		-5.44		-4.04	
p	.005		.000		.000		.000	
r	.09		.13		.17		.13	
MR	470.50	371.71	473.58	327.93	476.66	284.30	473.39	330.63

Table 3. Significant differences between age groups

Construct	Factor 3		Factor 3		Factor 3		Factor 4	
Group	29-39	40-49	18-28	40-49	18-28	29-39	18-28	40-49
N	552	122	230	122	230	552	230	122
U	27021.50		9812		55089		11489	
z	3.43		-4.66		-2.93		-2.81	
p	.001		.000		.003		.005	
r	.12		.25		.10		.15	
MR	349.55	282.99	194.84	141.93	427.98	376.30	187.55	155.67

The Mann-Whitney U tests revealed a significant difference in professionalism with 1–4 and 10 or more years' experience (U=13792.5, p=.015), professionalism with 5–9 and 10 years or more (U=22347, p=.013), communication with 1–4 and 10 years or more (U=12953, p=.001), clinical with 1–4 and 10 years or more (U=13801, p=.015) and clinical with 1–4 and 5–9 years (U=68920, p=.001) (Table 5).

Table 4. Significant differences between educational groups

Construct	Comparison number	Education	N	U	z	p	r	MR
Factor 1	1	Certificate	68	17787.5	-3.55	.000	.12	479.92
		Diploma	707					379.16
	2	Certificate	68	2637	-3.62	.000	.27	109.72
		Bachelor	114					80.63
Factor 2	1	Certificate	68	16083	-4.53	.000	.16	504.99
		Diploma	707					376.75
	2	Certificate	68	2361.5	-4.45	.000	.32	113.77
		Bachelor	114					78.21
	3	Certificate	68	494.5	-2.94	.003	.30	51.23
		Master	24					33.10
Factor 3	1	Certificate	68	16249	-4.44	.000	.16	502.54
		Diploma	707					376.98
	2	Certificate	68	2451.5	-4.18	.000	.30	112.45
		Bachelor	114					79.00
	3	Certificate	68	489	-2.99	.003	.31	51.31
		Master	24					32.88
	4	Certificate	68	245	-2.98	.003	.37	44.90
		PhD	14					25.00
Factor 4	1	Certificate	68	17132.5	-3.94	.000	.14	489.55
		Diploma	707					378.23
	2	Certificate	68	2727.5	-3.40	.001	.26	108.39
		Bachelor	114					81.43
Factor 5	1	Certificate	68	502.16	-4.45	.000	.16	502.16
		Diploma	707					377.02
	2	Certificate	68	2684	-3.55	.000	.26	109.03
		Bachelor	114					81.04
	3	Certificate	68	468.5	-3.24	.001	.24	109.03
		Master	24					81.04

Table 5. Significant differences between experience groups

Construct	Factor 1		Factor 1		Factor 3		Factor 4		Factor 4	
Group	1-4	10+	5-9	10+	1-4	10+	1-4	10+	1-4	5-9
N	315	104	508		315	104	315		315	508
U	13792.5		22347		12953		13801		68920	
z	-2.42		-2.48		-3.21		-2.43		-3.362	
p	.015		.013		.001		.015		.001	
r	.12		.10		.16		.12		.12	
MR	218.21	185.12	314.51	267.38	220.88	177.05	218.19	185.20	447.21	390.17

The Mann-Whitney U tests showed a significant difference in communication with paramedics and nurses (U=66239.5, p=.006), communication with paramedics and physicians (U=19778, p=.006) and clinical with paramedics and nurses (U=64383, p=.001) (Table 6).

The Mann-Whitney U tests revealed a significant difference in preparedness with administrative/leadership and education/academic (U=20906, p=.008), communication with education/academic and clinical/patient care (U=65915, p=.012), clinical with administrative/leadership and education/academic (U=21129, p=.013), personal with administrative/leadership and education/academic (U=19526.5, p=.000) and personal with administrative/leadership and clinical/patient care (U=26866.5, p=.000) (Table 7).

The Mann-Whitney U tests revealed a significant difference among Saudis and Arabs in professionalism (U=35935.5, p=.000), preparedness (U=34442, p=.000), communication (U=31758.5, p=.000) and clinical (U=32847.5, p=.000) (Table 8).

Discussion

The overall inferential analysis of the national study data represented an important first step in comprehending the different perceptions of professional stakeholders in Saudi EMS in relation to competency. All professional groups had a positive perspective towards the SPECS model with high agreement ratings. However, many significant differences were identified between different groups. Thus, an interpretation of analyses will be discussed in relation to the key differences in gender, age, qualification, experience, medical discipline and nationality of the participants.

Table 6. Significant differences between discipline groups

Construct	Factor 3		Factor 3		Factor 4	
Group	Paramedic	Nurse	Paramedic	Physician	Paramedic	Nurse
N	585	257	585	83	585	257
U	66239.5		19778		64383	
z	-2.76		-2.75		-3.34	
p	.006		.006		.001	
r	.10		.11		.12	
MR	436.77	386.74	342.19	280.29	439.94	379.52

Table 7. Significant differences between professional groups

Construct	Factor 2		Factor 3		Factor 4		Factor 5		Factor 5	
Group	Admin	Edu	Edu	Clinical	Admin	Edu	Admin	Edu	Admin	
N	150	328	328	449	150	328	150	328	150	449
U	20906		65915		21129		19526.5		26866.5	
z	-2.65		-2.51		-2.49		-3.66		-3.75	
p	.008		.012		.013		.000		.000	
r	.09		.09		.11		.17		.15	
MR	264.12	228.24	365.46	406.20	262.64	228.92	273.32		345.39	

Table 8. Significant differences between nationality groups

Construct	Factor 1		Factor 2		Factor 3		Factor 4	
Group	Saudi	Arab	Saudi	Arab	Saudi	Arab	Saudi	Arab
N	792	120	792	120	792	120	792	120
U	35935.5		34442		31758.5		32847.5	
z	-4.32		-4.88		-5.89		-5.48	
p	.000		.000		.000		.000	
r	.14		.16		.19		.18	
MR	471.13	359.96	473.01	347.52	476.40	325.15	475.03	334.23

Note: The Arab group comprises Egyptian, Jordanian, Syrian and Sudanese nationalities. The Saudi group comprises the one nationality.

In relation to gender, data collection was completed 4 days before a royal decree was issued on 26 September 2017 allowing women to drive (27). This provides valuable insight into the perceptions of female EMS providers before removal of the driving ban. The significant difference observed in perceptions of professionalism (p=.005) in this instance may be attributed to females not wanting to appear less competent, as they were unable to drive ambulances or other motor vehicles until this time. Therefore, females would have been at an obvious disadvantage to males who were able to perform the dual role of driver and clinical patient care provider. An example of the limited paramedic role as a result of female gender prior to the lifting of the driving ban, is the 10KSA female-only breast cancer awareness charity event held in Saudi Arabia (28). Of the eight paramedics covering the event, only two were female and their role was limited to performing station oversight for controlled narcotic and antiepileptic medications (28). In contrast, the six male paramedics were equipped with three ambulances to respond to patients (28).

Communication differences between genders is also subjective to the Saudi context and patient care. Issues pertaining to eye contact, touching and smiling are all important aspects of quality patient care (29) and, generally, the context of inter-gender communication is complex and multi-layered (30). Moreover, in clinical competency bases there may be limited differences in actual clinical skills between male and female paramedics (31). Nevertheless, there are social differences between men and women in the EMS profession that affect decision-making such as emotional intelligence and extraversion (sociable, assertive, talkative and active) (10,12,32). However, the influence of gender on risk preference in decision making is acknowledged to be low (10).

Regarding the differences between age groups in this study, the younger the age group, the higher the mean rank, indicating that younger graduates in general rate core competencies higher than older graduates. Some similarities can be drawn from medicine, where approximately one-fifth of graduates above the age of 30 years self-reported an inadequate level of clinical competency, and only 6.2% and 11.9% of graduates aged 25–27 and 28–30 self-reported as inadequate (33). Surprisingly, a near exact opposite was identified by the expert evaluators who were supervising the medical graduates. More than 40% of the 25–27 and 28–30 younger medical graduate age groups were identified as inadequate (33), while only 9.7% of the older 30+ age group were identified as inadequate (33).

The statistical analysis indicated a clear split between the post-employment and pre-employment groups. The split between both groups is not only found in Saudi but also in Australia, where university paramedic students can be made to feel unwelcome by post-employment senior paramedics who may perceive them as a threat to their position (34). Generally, certificate holders are perceived to have a higher commitment to an employing EMS organisation (35). Such post-employment commitment can be the result of limited employment mobility in Saudi EMS, as the current Saudi Commission for Health Specialities (SCFHS) system is based on educational qualification (17). The post-employment training model has been phased out in Saudi Arabia, leading to a small percentage (7.3%) representing the certificate group in the study. Regarding the differences between experience groups, the theoretical model developed by Pfeffer (36) supports the results of the statistical analysis by indicating that similarity between age and experience (time of entry) of employees are contributing factors to an increase in integration, cohesion and frequency of communication (37). This is reflected in research which demonstrates that shared attitudes and experiences among employees within similar age groups leads to increased understanding and liking for one another (36). However, other studies have revealed that this can result in isolation between specific age groups characterised by conflict and power struggles (38) and higher rates of voluntary staff resignation, compared to circumstances where there is strong cohesion between different age groups (38). The findings from the current study demonstrate that the rating of communication competency can be affected by providers' age and experience.

In discussing the difference in importance of communication competency between disciplines, it is interesting to note that paramedics have a consistently higher mean rank when compared to physicians and nurses. Generally, paramedics report frustration with other disciplines in emergency departments, where interactions with medical staff are typified by a lack of active listening, underappreciation, disinterest, distraction and, in some cases, not being believed when handing over patients (39,40). Many solutions have been proposed by different publications, yet the majority agree that standardisation is the key to ensuring an improved handover and communication procedure (39-41).

Statistical analysis of the national study data identified significant differences between the Saudi and Arab nationality groups. The literature to explain these differences in a Saudi EMS context is non-existent and drawing on the scarce international EMS and medical research addressing the differences between immigrant and local health care providers is inappropriate, for two main reasons. First, the labour force in Saudi is made up of expatriate workers and not immigrants (42) and second, Arabs are linguistically and for the most part religiously comparable to Saudis, with certain cultural and economic differences. Thus, the relationship between Arabs and Saudis cannot be compared, as an example, to relations between English locals and Chinese immigrants. To affirm the second point, in a study by Bozionelos (43) regarding nursing in Saudi Arabia, Saudis were specifically clustered under the Arab group, thereby indicating similarity. However, other Saudi Arabian research addressing either health or demographics specifies Saudis and Arabs as distinct groups (42,44,45). Therefore, the difference between Saudis and Arabs is neither well specified nor adequately researched.

This inferential analysis study was part of a larger project aimed at developing a Saudi Arabian EMS core competency framework. We recommend that researchers interested in investigating EMS, especially in a Saudi context, empirically explore gender, age, qualification, experience, medical discipline, professional role and nationality in relation to EMS competency and practice.

Limitations

It is acknowledged that although this is the first large study to contribute to an understanding of the professional profiles of Saudi EMS, the findings cannot be compared to other similar studies as none have yet been published. The self-reporting nature of the study is another limitation; this approach, however, was the only viable one as a large sample size was important for the statistical analysis. Moreover, there is a possibility that some participants may have completed the online and paper-based instrument.

Conclusion

This study represents the initial step in contextualising the professional stakeholders in Saudi EMS. The research was able to utilise the large sample in the national study data to explore how participants' professional profiles compare to the confirmed SPECS model factors. This is expected to improve understanding of the current status and paradigms specific to Saudi EMS. Finally, the most noticeable disadvantage of EMS internationally and locally is a lack of research addressing professional, demographic and educational aspects of the profession.

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Conflict of interest

The authors declare they have no competing interests. Each author of this paper has completed the ICMJE conflict of interest statement.

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