Epidemiological Study Emergency Medical Services used by the Elderly Population in Riyadh: An Analysis of Patient Care Records

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Abstract: *Objective: This study aimed to describe the epidemiology of the geriatric or elderly population(aged≥60) availing prehospital care in Riyadh, Saudi Arabia. Methods: A retrospective, cross-sectional design was adopted. The Emergency Medical Services (EMS) of Saudi Red Crescent Authority (SRCA) ambulances, which transport patients to emergency departments in Riyadh, were strategically selected from five regions. Between January and April 2017, the Patient Care Record (PCR) forms of elderly patients were selected, sorted, and analyzed. Incomplete or illegible PCR forms were excluded, leaving 1,994 forms. The members of the study population were compared in respect to demographics, incident location, past medical history, working shift, and case type. Results: 1,994 geriatric PCR forms were analyzed. The mean age of the study population was 72.6. 55% were male, and 45% were female. 85% were transported to the hospital from the patients' residences. The sample evidenced a high proportion of past histories of diabetes (53%), hypertension (52%), and neurological (15%) and cardiovascular diseases (13%). 20% of the patients were unresponsive at the scene, and 6% of deaths occurred en route to the hospital. Conclusions: Cardiovascular diseases were the leading cause of elderly people seeking EMS. Geriatric emergency care must be improved and the EMS system strengthened in Riyadh.*

Keywords: Geriatric, Older adult, Prehospital Care, Ambulance, Transportation, Saudi Arabia

1. Introduction

Aging is not a new phenomenon, but, considering the rising life expectancy and the corresponding increase in elderly people, its significance is heightened every day. [1] According to the World Health Organization (WHO), people aged ≥60 are considered elderly. [2] The unprecedented improvement in human longevity is one of the most remarkable events of the twentieth century. Saudi Arabia's demographics are changing as it also follows the global trend of an increased aging population. This is mainly due to a heightened life expectancy, high birthrates in the last four decades, and a recent decline in fertility rates. The proportion of people in Saudi Arabia aged ≥60 is predicted to be 25% of the country's total population of 40 million by the end of 2050. The number of people aged ≥80 is expected to reach 1.6 million, or 4% of the country's total population, in the same period. The proportion of the population aged ≥60 was 4.4% (1.1 million) in 2010 and 6.9% (2.1 million) in 2020. [3] Another projection suggests that the proportion of those aged ≥60 will increase from approximately 3% in 2010 to 18.4% in 2050. [4] With inadequate resources (including qualified human capital) and a poor understanding of aging, Saudi Arabia faces many challenges in caring for Saudi Older Adults (SOAs). [5] The geriatric population is directly affected by specific characteristics, health issues, and social conditions. These factors impact the geriatric population differently than they would impact other age groups because elderly persons' responses to and abilities to cope with illnesses or alterations in their environments are limited. Such changes can dramatically impact their quality of life. Furthermore, with advancing age, rates of chronic diseases and multiple chronic conditions sharply escalate, placing tremendous burdens on individuals, health systems, and society. [6],[7] One of the main challenges to advancing the health of the elderly is the huge gap in the scientific literature concerning this population's characteristics, health statuses, and needs. According to the General Authority of Statistics, in 2015, Riyadh's total population of 4,745,101 included 246,580 elderly people (5.2%). [8],[9] Previous studies indicate that patients aged ≥60 use Emergency Medical Services (EMS) at a higher rate than younger patients. [10],[11] Therefore, an important method of filling the abovementioned gap in the literature is to pursue, in one representative geographical area, a better understanding of the epidemiology and anticipated EMS trends of elderly individuals. This is particularly crucial for planning EMS resource use and EMS

personnel training. The objective of this research, therefore, is to study the epidemiology of the geriatric population availing prehospital care in Riyadh, Saudi Arabia.

2. Material and Methods

A retrospective, cross-sectional study design was adopted. The EMS of Saudi Red Crescent Authority (SRCA) ambulances, which transport patients to emergency departments in Riyadh, were strategically selected from five regions: east, west, center, north, and south. From January to April 2017, the Patient Care Record (PCR) forms of elderly patients aged ≥60 were selected, sorted and analyzed. Incomplete or illegible PCR forms were excluded, leaving 1,994 forms. The members of the study population were compared in respect to demographics, incident location, past medical history, working shift, and case type. Information from the PCR forms was analyzed using Microsoft Excel, and results were drawn as numerical counts and percentages.

3. Results

The 1,994 geriatric PCR forms were analyzed over the four-month study period. The sample was distributed across the five geographic regions as follows: eastern – 32%, western – 22%, central – 12%, northern – 16%, and southern – 17% [Table 1].

Table 1: Distribution of Geriatric Patients Transferred by SRCA Ambulances from Selected Regions (January–April 2017), (N=1,994)

S. No.	Region	Day (n)	(n %)	Night (n)	(n %)	Grand Total (N)	(N %)
1	East	336	52%	310	48%	646	32%
2	West	238	54%	202	46%	440	22%
3	Center	90	36%	157	64%	247	12%
4	North	164	50%	163	50%	327	16%
5	South	150	45%	184	55%	334	17%
	Total	978	49%	1016	51%	1994	100%

Demographics: Out of the 1,994 sampled cases, most of the elderly were Saudi (1,932; 97%), while only 3% (62) were non-Saudi. The mean age of the study population was 72.6, and 34% of patients (681) were between 60 and 65 years of age. 55% of patients (1,104) were male, and 45% (890) were female. The mean age among females was 74.1, while the mean age among males was 71.4. The percentage of patients transferred decreased steadily with age **[Table 2]**.

Table 2: Distribution of the Characteristics of Geriatric Patients (N=1,994) Who Used the EMS of SRCA Ambulances

Characteristics of Elderly	Male (n=1,104)	(n %)	Female (n=890)	(n%)	Grand Total (N=1,994)	(N %)
Nationality						
Saudi	1,066	55%	866	45%	1,932	97%
Non-Saudi	38	61%	24	39%	62	3%
Age Group (in years)						
60–65	427	63%	254	37%	681	34%
66–70	215	59%	147	41%	362	18%
71–75	106	53%	94	47%	200	10%
76–80	156	48%	172	52%	328	16%
81–85	95	46%	112	54%	207	10%
86–90	61	44%	78	56%	139	7%
>90	44	57%	33	43%	77	4%
Total	1,104	55%	890	45%	1,994	100%

Incident Location: Out of 1,994 patients, the majority were transferred to the hospital from their residences (1,700; 85%), other areas (152; 8%), the roadside (123; 6%), and the workplace (19; 1%) **(Figure 1)**.
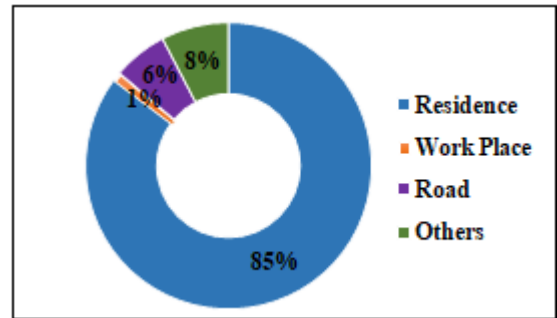

Figure 1: Locations of Incidents

Type of Emergency: Most cases reported to the EMS of SRCA ambulances in Riyadh involved medical emergencies (1,600; 80.2%), followed by trauma (247; 12.4%), other incidents (13; 0.7%) and abuse (7; 0.4%) **(Figure 2)**.
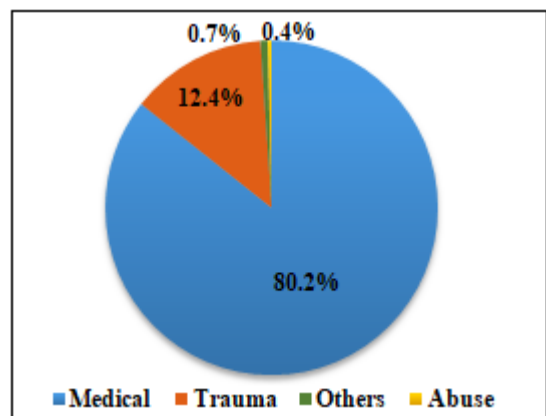

Figure 2: Distribution of Reported Emergency Types

Past Medical History: The findings indicated that elderly people, on an individual basis, had more than one condition in their past medical histories: diabetes (1,057; 53%), hypertension (1,038; 52%), stroke (301; 15%), cardiovascular disease (251; 13%), respiratory disease (143; 7%), cancer (72; 4%), renal failure (66; 3%), psychiatric disorders (50; 3%), and others ailments (43; 2%). While, for most diseases, there were no significant differences in prevalence between males and females, certain gendered variations were noted. For instance, history of cancer was significantly higher among males (69%) than females (31%). This pattern was also seen for cardiovascular disease (males vs. females: 54% vs. 46%), while the opposite pattern was evident for respiratory disease (male vs females: 36% vs 64%), renal failure (males vs. females: 44% vs. 56%) and hypertension (males vs. females: 46% vs. 54%), as shown in **Figure 3**.
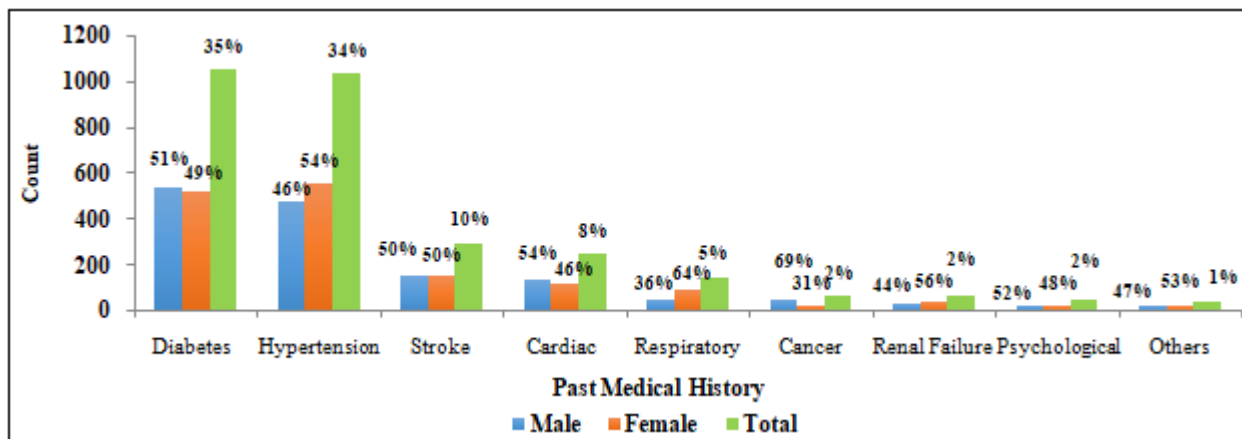
Figure 3: Past Medical History Distribution for Elderly Patients, Reported by Gender

Patient Status and Mortality: Out of the 1,994 patients, 20% were found unresponsive on arrival at the scene, and 6% of deaths occurred en route to the hospital, which highlights the higher mortality rates among elderly people.

4. Discussion

This study analyzed how EMS are used by elderly patients from five regions of Riyadh. The findings highlighted that, concerning past medical histories, most sampled patients (35%) had diabetes, which is higher than the diabetes prevalence in Saudi Arabia (17%) reported by the International Diabetes Federation (IDF) in 2015. [12] Diabetes was closely followed by hypertension (34%), which is associated with increased mortality and morbidity. For instance, in 2008, the WHO reported that approximately 400 individuals per 100,000 died annually from cardiovascular-related diseases in Saudi Arabia. [13] Most of the elderly patients (85%) were transferred to the hospital from their residences. Prehospital care providers play a crucial role in the emergency care of elderly patients, not only in providing direct patient care, but also in providing information regarding acute illnesses or injuries to the hospital emergency department personnel. Another study has found that EMS providers, rather than the patient or family members, are the primary source of information in cases in which elderly patients receive immediate, lifesaving interventions in hospitals. [14] However, as this research also found some incomplete documentation when analyzing the PCR forms, methods of transferring or linking high-quality information from prehospital to hospital settings must be developed to improve care for elderly patients availing EMS services.

5. Limitations

This study has three limitations, which must be considered when interpreting the results. First, to derive data of the highest quality, a substantial number of PCR forms with incomplete or illegible data were excluded. Secondly, because there were no links between paper-based PCR forms and the electronic dispatch information system, information relevant to ambulance response time was also excluded. Thirdly, no information could be retrieved regarding elderly patients who used EMS services multiple times.

6. Conclusions

Based on the findings from the characteristics of the sampled elderly population, the present authors conclude that focused and detailed interventions should be planned in the geriatric emergency field by promoting awareness of medical problems and the complications they bring to health, preventive measures, and the use of EMS services in emergencies. Prehospital patient care must be improved and the EMS strengthened to provide better service to the elderly people of Riyadh, Saudi Arabia.

7. Recommendations

PCR forms must be completed, and quality data must be collected, thereby reducing incomplete documentation. Links must also be forged between paper-based PCR forms and electronic data on patients' characteristics so that comparative research studies may be conducted in the future. The authors suggest that the SRCA develop an advanced, online system, such as the Disease Event Tracking and Epidemiologic Collection Tool (DETECT), to record and retrieve accurate, complete patient information. Such a tool should be linked to the SRCA dispatch information system, the ambulance tracking system, the receiving hospital's electronic system the Ministry of Health's system, the Saudi National Survey for Elderly Health (SNSEH) system, the Saudi National Cardiopulmonary Resuscitation Committee system, and the Saudi National Portal electronic system. In this way, information will be quickly available regarding patients' frequency of EMS use, EMS financial burden, patient follow-up, and ambulance response time, as well as information about lives saved and en route deaths, to continuously assure EMS quality. Many of the elderly patients sampled in this research were found unresponsive. Therefore, the authors strongly recommend that more studies evaluate the efficacy of the emergency care provided by EMS professionals to the geriatric population.

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9. Ethics Committee Approval

Institutional Review Board approval for this study (COP-2018/17) was provided by Research Committee, Almaarefa University, Riyadh, Saudi Arabia 24th January 2018. Necessary permission was taken from Saudi Red Crescent Authority to use their Patient Care Records.

10. Funding

None

11. Conflict of Interest

The authors declare that there are no potential conflicts of interest with respect to this research or the publication of this article.

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