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Characteristics and outcomes of older patients attending the emergency department at an academic university hospital

Bir akademik üniversite hastanesinde acil servise başvuran yaşlı hastaların özellikleri ve sonuçları

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SUMMARY

Objective: Because older populations have been increased significantly over the last decades globally, emergency departments (ED) have become a vital place in the care of older patients. Characterizing the usage of the ED by older patients will facilitate the qualifying planning activities in emergency care delivery.

Method: The retrospective data were extracted from a database and included all patients, aged 65 years or over, admitted to the ED between 1 January 2017- 31 December 2017.

Results: The rate of ED visits accounted for 16.1%. A large majority of the ED visits were during the day shift (49.6 %), and in summer months (June-August 28.7 %). The most common diagnoses (18.4%) were cardiovascular conditions. A large majority (67.8%) of ED visits involved diagnostic imaging, and nearly half (46.7%) of them received consultation services. Nearly one-third (31.3%) of older patients were admitted to hospital following their ED visit. Hospital admission, length of stay in ED, having consulting service, involving some kind of diagnostic imaging and being triaged as urgent/emergent are more likely to be increased with age group.

Conclusions: ED visits increase with age and also the resource use intensity of the ED, including the length of stay, diagnostic imaging, consultation and admission to the hospital after an ED visit appears to increase with aging. Patterns of the ED usage were described in this study may be helpful in resource planning, or may provide an approach for the future the investigation involving improved or alternative care options for the older patient.

Keywords: Emergency service, geriatric patients

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ÖZET

Amaç: Dünyada son yıllarda yaşlı nüfusun sayısı önemli ölçüde arttığından, acil servisler (AS) yaşlı hastaların bakımında hayati öneme sahip bir yer haline gelmiştir. Acil servisin yaşlı hastalar tarafından kullanımını belirlemek, acil bakım hizmetinin sunumundaki nitelikli planlama faaliyetlerini kolaylaştıracaktır.

Yöntem: 1 Ocak 2017-31 Aralık 2017 tarihleri arasında AS'e başvuran 65 yaş ve üzeri tüm hastalara ait veriler retrospektif olarak veri tabanından çıkarıldı.

Bulgular: AS ziyaretlerinin oranı % 16,1'dir. AS ziyaretlerinin büyük çoğunluğu gündüz (% 49.6) ve yaz aylarında (Haziran-Ağustos % 28.7) yapıldı. En sık görülen tanı (% 18.4) kardiyovasküler durumlardı. AS ziyaretlerinin büyük

çoğunluğu (% 67,8) tanısal görüntülemeyi içermekteydi ve neredeyse yarısı (% 46,7) konsültasyon hizmeti almıştır. Yaşlı hastaların yaklaşık üçte biri (% 31,3) AS ziyaretlerini takiben hastaneye yatırıldı. Hastaneye yatış, AS'de kalma süresi, konsültasyon isteme, acil / acil olarak istenen bazı tanısal görüntülemeyi içeren tetkikler yaş grubu ile artış olasılığı daha yüksektir.

Sonuç: AS ziyaretleri yaşla birlikte artmakta ve ayrıca AS'nin kalış süresi, tanı görüntüleme, konsültasyon ve bir AS ziyaretinden sonra hastaneye kabul de dahil olmak üzere kaynak kullanımı yoğunluğunun yaşlanma ile birlikte arttığı görülmektedir. AS kullanımının örnekleri bu çalışmada tarif edilmiştir. Kaynak planlamasında yardımcı olabilir veya yaşlı hasta ileride yapılacak araştırmalar için geliştirilmiş veya alternatif bakım seçeneklerini içeren bir yaklaşım sağlayabilir

Anahtar sözcükler: Acil servis, geriatrik hastalar, hasta kabulü

INTRODUCTION

The aging of the population is a major public health concern which has been resulting from the effect of increased life expectancy in Turkey as in western countries [1,2]. The median age of the world population is estimated to reach to 38 years by 2050 from 27 years in 2000 [3]. Life expectancy in the Turkish population has also grown from 48 to 74 years between 1960 and 2011. As a result the proportion of elderly population estimates to rise to 21% in 2050 from 8% in 2014, in Turkey [4].

The growth in the absolute numbers of persons 65 years of age and older will potentially lead to an increase in the emergency department (ED) visits rates [5-8]. This tendency represents a significant challenge for the ED in the context of resource scarcity and restricted specific critical skills of emergency healthcare workers in caring for this population [5-9].

Because of age-related changes and long-standing problem among them, older patients are more likely to be admitted to ED with more serious illnesses as measured by triage acuity, diagnostic work-up, and with more complex symptoms, which require more laboratory examinations. Moreover, older patients have a longer ED stay [10,11]. Despite this, higher rates of admissions to ED with an increased risk of adverse consequences such as early hospital readmission or mortality are a potentially preventable burden on ED [12, 13].

Providing information related to the age-specific burden on ED visits is a valuable tool for raising the awareness of healthcare managers in the context of impending demographic changes that have an important impact on the future utilization of health care resources. Additionally, providing this information is also valuable since it makes ED health providers aware of those patients' evolving needs.

Due to the limited data on geriatric patients (aged 65 years and above), in Turkey, and currently no method is used for data collection on presenting complaints, this study sought to investigate ED visits by older patients regarding mode of admission, triage level, schedule, and main reason for ED visit as well as their outcomes such as length of stay in the ED and ED discharge dispositions, at an academic hospital.

MATERIAL AND METHODS

Study design and population

This retrospective study examined hospital administrative data from all patients presenting to the ED of a university hospital in Sivas, Turkey. All geriatric patients (aged 65 years and above) presenting to EDs between 1 January 2017 and 31 December 2017 were eligible for inclusion. All visits during the study period were included. Multiple ED visits by the same patients were also included. The study was approved by the university research ethics committee.

ED of the university hospital is open 24 hours. The ED treats patients according to how serious their condition or health problem is. The total number of patients admitted annually in the ED of this university hospital is around 65,000.

Variables

Hospital administrative data contain patient age, gender, date and time of ED visit, reasons for ED visit (presenting chief complaints), triage level, length of ED stay in hours, diagnosis, consulting services, and disposition (outpatient or hospital admission, death, other).

Length of stay (LOS) for each patient was defined as from the time registration to the time he leaves the ED. Only completed visits were included in the calculation of the average length of stay in the ED. Visits lasting lower than 15 minutes were excluded from calculations.

Statistical analysis

Data analysis was undertaken with the Statistical Package of Social Science version 16.0. Software (SPSS Inc., Chicago, IL). Firstly, all data were exported to SPSS for subsequent data analyses. Then, categorical and quantitative data were expressed as percentages and as the mean ± standard deviation, SD, respectively. Finally, older patients were divided into three groups; 65-74, 75-84, and ≥85. Significant differences in the characteristics between three groups and differences by gender were assessed by using the chi-square test for nominal data. A P value of less than 0.05 was considered statistically significant.

RESULTS

During the study period, the total number of ED visits in the university hospital was 64,508, of which 10,371 were patients aged 65 and older (16.1%). The overall number of 10,371 visits by older patients was included in the analysis.

Hourly distributions of ED admission by older patients was presented in Figure 1. A large majority of the older patient's ED visit (49.6 %) was observed during the day shift (08:00-16:00 hours) while their visiting late at night shift (22:00-6:00 hours) was only a minority (16.8 %). As presented in Figure 1**,** seasonal distribution of ED visits for older patients showed a slight predominance in summer (June-August 28.7 %,) compared to spring (March-May 26.0 %), autumn (September-November 24.4 %) or winter (December-February 20.9 %).

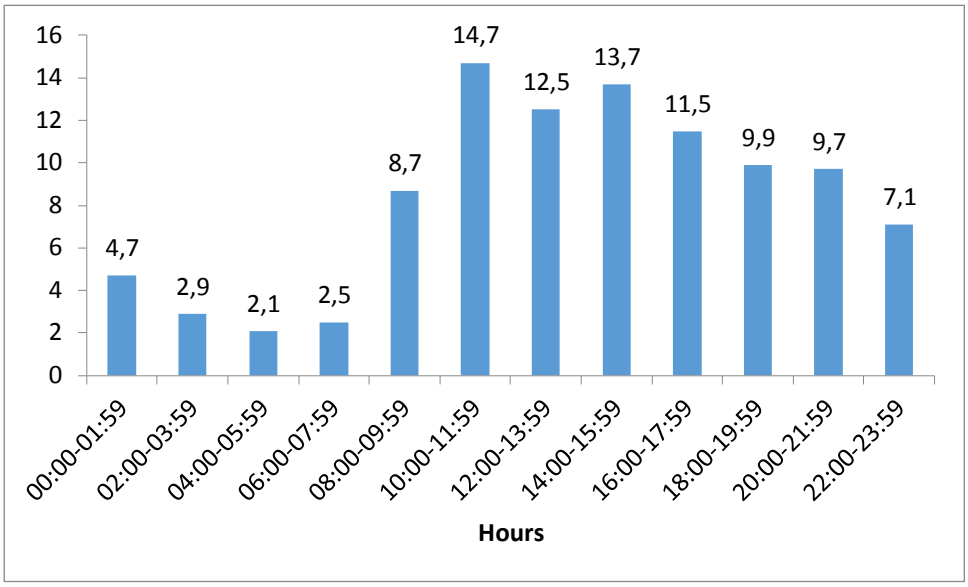

Figure 1: Hourly distributions of ED admission by older patients

Table 1 summarises the characteristics of ED visits by older patients. Almost all patients (99.9%) had an ambulance as the mode of arrival. Shortness of breath (25.8%) was the most common presenting complaints followed by chest pain (18.7%), and general weakness (17.4%), and 90.9% of older patients were triaged as urgent or emergent. More than two-thirds (67.8%) of ED visits involved any type of diagnostic imaging, and nearly half (46.7%) of them received consultation services with other departments. The average length of stay was 7.5 hours (median = 8 hours). The most (64.7%) of the ED visits resulted in discharge, while 31.3% of them resulted in admission to hospital, and a small percentage of older patients died in the ED during the study period (n = 413, death rate 4.0%).

The most common reasons for each ED visit by gender according to major clinical category were clustered in Table 2. According to Table 2, the most common diagnoses were cardiovascular conditions (18.4%). Diagnoses related to the gastrointestinal and respiratory system constituted 12.3% and 10.2% of diagnoses, respectively. Any kind of trauma/injury constituted 8.1% of diagnoses, while neurological conditions constituted 7.0% of diagnoses. Furthermore, as presented in Table 2,

diagnoses related to the respiratory system were more common in male patients, while any kind of trauma/injury was more present in female patients ($p<0.001$).

Table 1: Characteristics and outcomes of emergency department visits by older patients

Characteristics	Number	Percentage
Gender		
Female	4902	47.3
Male	5469	52.7
Age groups (year)		
65-74	5441	52.5
75-84	3591	34.6
>84	1339	12.9
Mode of arrival		
Ambulance	10357	99.9
Other	14	0.1
Number of emergency department visits		
Once	5422	52.3
More than one	4949	47.7
The most common complaints about emergency department visits		
Shortness of breath	2676	25.8
Chest pain	1939	18.7
General weakness	1704	17.4
Abdominal pain	1504	14.5
Any kind of trauma/injury	965	9.3
Others	1583	14.3
Triage level		
Urgent/Emergent	9431	90.9
Less urgent	940	9.1
Diagnostic testing (Any imaging)		
Presence	7033	67.8
Absence	3338	32.2
Consulting service		
Yes	4845	46.7
No	5526	53.3
Length of stay in the emergency department		
≤8 hours	7118	61.8
>8 hours	3253	38.2
Disposition		
Hospital admission	251	31.3
Home discharge	6707	64.7
Dead in-ED	413	4.0

Table 2: The most common reasons for emergency department visit by older patients

Disorder/Illness Category	Total (n, %)	Female (n, %)	Male (n, %)	P value (Chi-square test)
Cardiovascular conditions	1908 (18.4)	809 (16.5)	1099 (20.1)	<0.001
Gastrointestinal conditions	1272 (12.3)	632 (12.9)	640 (11.7)	
Respiratory conditions	1056 (10.2)	378 (7.7)	678 (12.4)	
Any kind of trauma/injury	838 (8.1)	466 (9.5)	372 (6.8)	
Neurological conditions	725 (7.0)	309 (6.3)	416 (7.6)	
Other	4572 (44.0)	2308 (47.1)	2264 (42.4)	

Table 3: Characteristics of emergency department visits for older patients by age groups

Characteristics	Age Groups			P value (Chi-square test)
	65 to 74 n (%)	75 to 84 n (%)	85+ n (%)	
Total	**5441 (100.0)**	**3591 (100.0)**	**1339 (100.0)**	
Gender				
Female	2506 (46.1)	1665 (46.4)	731 (54.6)	<0.001
Male	2935 (53.9)	1926 (53.6)	608 (45.4)	
Number of emergency department visits				
Once	2840 (52.2)	1810 (50.4)	772 (57.7)	<0.001
More than one	2601 (47.8)	1781 (49.6)	567 (42.3)	
The most common complaints about emergency department visits				
Chest pain	1065 (19.6)	684 (19.0)	190 (14.2)	<0.001
Abdominal pain	626 (11.5)	672 (18.7)	206 (15.4)	
Shortness of breath	1297 (23.8)	1004 (28.0)	375 (28.0)	
Any kind of trauma/injury	340 (6.2)	408 (11.4)	217 (16.2)	
General weakness	1034 (19.0)	547 (15.2)	123 (9.2)	
Others	1079 (19.1)	276 (7.7)	228 (27.0)	
Triage level				
Urgent/Emergent	4810 (88.4)	3332 (92.8)	1289 (96.3)	<0.001
Less urgent	631 (11.6)	259 (7.2)	50 (3.7)	
Diagnostic testing (Any imaging)				
Presence	3277 (60.2)	2640 (73.5)	1116 (83.3)	<0.001
Absence	2164 (39.8)	951 (26.5)	223 (16.7)	
Consulting service				
Yes	2108 (38.7)	1872 (52.1)	865 (64.6)	<0.001
No	3333 (61.3)	1719 (47.9)	474 (35.4)	
Length of stay in the emergency department				
≤8 hours	3347 (61.5)	2277 (63.4)	785 (58.6)	0.007
>8 hours	2094 (38.5)	1314 (36.6)	554 (41.4)	
Disposition				
Hospital admission	1474 (27.5)	1225 (34.1)	552 (41.2)	<0.001
Home discharge	3825 (70.3)	2197 (61.2)	685 (51.2)	
Dead in-ED	142 (2.2)	169 (4.7)	102 (7.6)	

Table 4: Characteristics of emergency department visits for older patients by gender

Characteristics	Gender		P value (Chi-square test)
	Female (n, %)	Male (n, %)	
Total	**4902 (100.0)**	**5469 (100.0)**	
Number of emergency department visits			
Once	2625 (53.5)	2797 (51.1)	0.014
More than one	**2277 (46.5)**	**2672 (48.9)**	
The most common complaints for emergency department visits			
Shortness of breath	**1070 (21.8)**	**1606 (29.4)**	<0.001
Chest pain	**712 (14.5)**	**1227 (22.4)**	
General weakness	932 (19.0)	772 (14.1)	
Abdominal pain	805 (16.4)	699 (12.8)	
Any kind of trauma/injury	394 (8.0)	571 (10.4)	
Others	989 (20.3)	594 (10.9)	
Triage level			
Urgent/Emergent	4436 (90.5)	4995 (91.3)	0.137
Less urgent	466 (8.5)	474 (8.7)	
Diagnostic testing (Any imaging)			
Presence	3288 (67.1)	3745 (68.5)	0.127
Absence	1614 (32.9)	1724 (31.5)	
Consulting service			
Yes	**2199 (44.9)**	**2646 (48.4)**	<0.001
No	2703 (55.1)	2823 (51.6)	
Length of stay in emergency department			
≤8 hours	3405 (62.3)	3004 (61.3)	0.306
>8 hours	3374 (37.7)	1898 (38.7)	
Disposition			
Hospital admission	**1409 (28.7)**	**1842 (33.7)**	<0.001
Home discharge	3265 (66.6)	3442 (62.9)	
Dead in-ED	228 (4.7)	185 (3.4)	

In terms of age group, the characteristics of the ED visits by older patients are presented in Table 3. As a result of their ED visit, admission to hospital, length of stay in ED, having consulting service, involving some kind of diagnostic imaging and being triaged as urgent/emergent are more likely to be increased with age group ($p < 0.0001$, respectively, only for the length of stay ($p= 0.007$).

The ratio of visits associated with ED stay of greater than 8 hours increased with age group to a high of 41.4% for older patients aged 85 years and over. The most common diagnoses among patients 85 years and over were any kind of trauma/injury (16.2%, $p < 0.0001$), while chest pain and general weakness were less common diagnoses among them (14.2%, $p < 0.0001$; 9.2%, $p < 0.0001$, respectively).

The proportion of repeated visits decreased with age group to a low of 42.3% for older patients aged 85 years and over ($p < 0.0001$).

The characteristics of the ED visits, in terms of gender, are shown in Table 4. The proportion of repeated visits, having consulting services and hospital admission were more prevalent among male patients than female ones (48.9% vs. 46.5%, $p < 0.014$; 48.4% vs. 44.9%, $p < 0.001$; 33.7% vs. 28.7%, $p < 0.001$, respectively). The most common complaints among patients aged 85 years and over related to any kind of trauma/injury were more common in male patients (16.2%, $p < 0.001$), while complaints related to chest pain and general weakness were more present in female patients (14.2%, $p < 0.001$; 9.2%, $p < 0.001$, respectively).

DISCUSSION

In our study, 10,371 ED visits by older patients were analyzed at an academic hospital and provided a detailed profile regarding differences in ED visits for these patients. Although nearly 12% of the current population living in Sivas is aged 65 years and over according to current census data, these people accounted for 16.1% of ED visits in Sivas, indicating greater ED usage by seniors (age 65 and older) compared with relatively younger ones. This finding was also comparable with the results of recent studies that show the rate of ED visits by older patients ranges from 3.6 to 28.0 [14,15]. A large proportion of ED visits by older patients are triaged as urgent or emergent. Consume of healthcare resource for older patients in the ED is substantial, with more than two-thirds of visits (67.8%) involving any type of diagnostic imaging and 46.7% involving consultation services with other departments. In this study, almost one-third of older patients (31.3%), following their ED visit, was admitted to the hospital. This is expected, considering the ultimate goal of ED care is to create an appropriate place for patients with any emergency medical condition or life-threatening illness. However, as older patients more rely on ED services for timely access, it is significant to consider that the substantial, rapid, goal-oriented model of care delivery in the emergency services may not always be sufficient model or valuable substitute for primary care, especially for these patients that often need coordinated evaluation, continuity of care, and follow-up interval [16].

Any kind of injuries is the most common definitive diagnosis in the ED visits among older patients. The possibility of hospital admission following the ED visit and prolonged a length of stay in ED visits increased with age, as did the possibility of receiving consultation from other departments or diagnostic testing. Increased intensity use of the ED resource may reflect the clinical complexity of disorders or illnesses that tend to emerge with age [17]. As mentioned above, the length of stay in the ED visits increases with age (Table 3). This is indicating, as the longer length of stay in the ED visits may expose these patients to a greater risk of negative outcomes relating to delayed diagnosis and medication errors [11,18,19]. Since the older population (aged 65 years and over) is a growing demographic in Turkey [2], reducing the length of stay in the ED visits and assessing the effect of ED overcrowding on these people is crucial to achieving the goals of the ED care.

The findings of our study are confirming the results of other studies that have assessed patterns of ED usage by older patients. A similar ratio of ED visits in this current study resulted in admission to the hospital compared with others of the same age groups (20-50%); however, the percentage of hospital admission varied across studies to a high of 30%. A rate of ED visits in our study was related to some kind of diagnostic imaging, in line with other studies [14,20,22]. The rate of the most common presenting complaints and diagnoses (including trauma/injury, respiratory, and cardiovascular problems) in ED were also comparable to the data from recent reports in which indicated that diseases related to the cardiovascular and respiratory system, as well as traumas/injuries, constitute top-ranked reasons for ED visits [20,22,23].

Contrary to previous research which reported that a large proportion of all ED visits were presented during the day shift and the winter months [8,15,24] in our study similar to a study by Cigar from Turkey [25], the highest proportion of ED visits was found during the working hours and the summer months. One explanation for this is that presentation in the ED during the working hours had a timely response to consultants and more easily available beds, but arrival to ED during the late hours may lead to delay in hospital admission because of excessive whole hospital occupancy for the said reasons. Also, such differences among studies may be attributed to geographical contexts in which the studies were conducted or variations in profiles of the older patients and differences in clinical characteristics of the older population.

In this present study, consistent with resents studies from Pakistan and Swiss [26,27], the majority of older patients were male. But, studies from Turkey and other setting reported the majority of the older patients were female [15,23]. Such differences related to gender might be explained by reflects of social or regional variations in profiles of the older population where the research is carried out.

In this present study, 4.0% of older patients were dead on the present in the ED visits and had no return of spontaneous circulation even after termination of resuscitation attempts according to Advanced Cardiac Life Support (ACLS) guidelines. A possible explanation is that prolonged illness may contribute to a failure to recognize and respond to the signs of deterioration in older patients. This needs to be investigated in future research.

The findings of this current study may be useful in the re-design of ED care services for older patients. For example, geriatric approaches to improving emergency-based care for older patients, such as geriatric evaluation, geriatric case-management, as well as re-designs of the physical condition of ED for older patients, may choose to focus resources to manage common medical problems in ED for this population, including trauma/injury, and may encompass strengthened self-management of acute exacerbations of respiratory and cardiovascular illness [28-32]. Also, because of older patients receiving numerous diagnostic imaging and consultations, it can be appropriate as a whole or in part to closely assess integration, coordination, and continuity of care in the ED for them.

Older patient attending ED are susceptible to negative outcomes related to ED visits, due to in part functional/social declines, comorbidities, and polypharmacy [33,34]. It has been indicated that the fast-paced, goal-oriented approaches of the ED may not be entirely conducive to the treatment of older patients, who often have more acute or complex presentations of diseases [35]. Therefore, descriptive information on ED usage is to determine older patients visiting the ED for health concerns that may be amenable to other types of health care supply that are more appropriate for the needs of this age group.

Strengths and limitations

Strengths of this current research include the comprehensive documentation of any kind of diagnostic imaging use and consultation service presented during ED visits, information which is often unavailable and may contain an inaccurate registration for large data sets. Furthermore, a more detailed examination of rates of admission and kind of illness for diagnostic classification was also provided.

This study had several limitations. First, it is not population-based but a single tertiary care study, which may not make it necessarily representative of the older adult population in Turkey. Second, the analysis of this study was limited to data sets related to the ED visit. Finally, we did not have any type of information related to patient's functional status, frailty, comorbidities, and polypharmacy that are well known to effect enabling ED factors (resource and support) and outcomes of the ED visits [33,34].

CONCLUSION

In our study, ED visits increased with age and also resource use intensity of the ED, including the length of stay, diagnostic imaging, consultation, and admission to the hospital after an ED visit appears to increase with aging. Patterns of the ED usage were described in this study may be helpful in resource planning, or may provide an approach to the future investigation involving improved or alternative care options for older patients.

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