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RESEARCH

EPIDEMIOLOGICAL CHARACTERISTICS OF GERIATRIC PATIENTS IN EMERGENCY DEPARTMENTS: RESULTS OF A MULTICENTER STUDY

ABSTRACT

Introduction: The increasing proportion of elderly individuals in the population due to increased life expectancy has necessitated greater provision of health care. Here we aimed to determine patient characteristics, reasons for referral, and outcomes of emergency department visits and hospitalization in patients aged ?65 years with referrals to emergency departments.

Materials and Method: This prospective, multicenter observational study was conducted over one week at the emergency departments of 13 Turkey hospitals. All patients aged ?65 years who were referred to emergency departments with acute medical or surgical issues during the study period were included. Patients aged <65 years or those referred for trauma were excluded.

Results: In total, 1299 patients with a mean age of 74.8±7.3 years were included. Of these, 51.9% (n=674) were aged 65–74 years, 67.5% (n=877) were discharged from the hospital, and 5.8% (n=75) died during admission. The most frequently diagnosed disorders in the emergency departments were cardiovascular, gastrointestinal, and pulmonary diseases. A significant difference in age was observed between the survival and non-survival groups (p=0.001), with no significant differences in gender distribution (p=0.259), length of stay in intensive care units (p=0.605), or length of stay in hospital (p=0.055).

Conclusion: With an increased proportion of elderly individuals in the general population, the number of elderly patients referred to emergency departments continues to increase. This study presents the demographic features and clinical course of elderly patients referred to study centers.

Key Words: Elderly; Geriatric Assessment; Demography; Emergency Treatment.

ARAŞTIRMA

ACİL SERVİSLERDEKİ GERİATRİK HASTALARIN EPİDEMİYOLOJİK ÖZELLİKLERİ: ÇOK MERKEZLİ ÇALIŞMA SONUÇLARI

Öz

Giriş: Beklenen yaşam süresinin uzamasının sonucu olarak yaşlı popülasyondaki artış, bu yaş grubu için daha sık sağlık bakımı verilmesini zorunlu kılmaktadır. Bu çalışmada acil servise başvuran 65 yaş ve üzeri hastaların genel özelliklerini, başvuru nedenlerini, acil servis ve hastane ziyaretlerinin sonuçlarının saptanması amaçlandı.

Gereç ve Yöntem: Çok merkezli, prospektif, gözlemsel çalışma Türkiye'de 13 hastanenin acil servislerinde bir hafta süre ile gerçekleşti. Çalışma süresi içinde akut tıbbi veya cerrahi sorunlar ile acil servise başvuran 65 yaş ve üstü hastalar çalışmaya dahil edildi. Altmış beş yaş altı ve/veya travma nedenli başvurular ise çalışma kapsamına alınmadı.

Bulgular: Ortalama yaşı 74.8±7.3 yıl olan toplam 1299 hasta çalışmaya dahil edildi. Bu hastalardan %51.9'u (n=674) 65-74 yaş grubundaydı, %67.5'u (n=877) hastaneden taburcu edildi ve %5.8'i (n=75) yatış süreci içinde öldü. Acil serviste en sık konulan tanılar kardiyovasküler, gastrointestinal ve solunum hastalıklarıydı. Hastaneden taburcu olan ve hastane yatışı sırasında ölen hasta grupları kıyaslandığında yaş açısından istatistiksel olarak anlamlı fark varken (p=0.001), cinsiyet dağılımı (p=0.259), hastane yatış süresi (p=0.259) ve yoğun bakım ünitesi yatış süresi (p=0.055) açısından fark tespit edilmedi.

Sonuç: Yaşlı nüfusunun ve genel nüfusa oranının artışı ile birlikte yaşlı hastaların acil servis başvuru sayısı artıyor ve gelecekte daha da artacaktır. Bu çalışma, çalışma merkezlerine başvuran yaşlı hastaların demografik özelliklerini ve klinik seyirlerinin sonuçlarını ortaya koymaktadır.

Anahtar Sözcükler: Yaşlı; Geriatrik Değerlendirme; Demografi; Acil Tedavi.

INTRODUCTION

According to 2014 population statistics, citizens aged ≥65 years comprise 8% of the total population in Turkey. This ageing population comprises over 6 million people, surpassing the total population of a number of countries, including Denmark, Slovakia, Finland, and Norway. Furthermore, this age group comprises 8.3% of the total global population. Among 228 countries, Monaco ranks first with the largest elderly population, followed by Japan and Germany, whereas Turkey ranks 94th. It has been predicted that the proportion of elderly individuals in Turkey will be 10.2% of the total population in 2023, 20.8% in 2050, and 27.7% in 2075 (1). The increased proportion of elderly individuals is predominantly due to increased life expectancy, resulting in a range of associated health issues that necessitate greater provision of health care.

When compared with young individuals, elderly patients are referred to emergency departments (EDs) more often and with more complicated presentations, require longer duration in intensive care units (ICUs) and EDs, and are more frequently hospitalized (2-6). Hence, health professionals working in EDs should be familiar with the characteristics of elderly patients and common reasons for referral in order to provide the necessary infrastructure and training. Thus, a greater level of expertise in the care for the elderly can be attained. The purpose of this multicenter study was to determine patient characteristics, reasons for referral, and outcomes of ED visits and hospitalizations in patients aged ≥65 years with ED referrals.

MATERIALS AND METHOD

Study Design

This prospective, multicenter observational study was conducted over one week at the EDs of 13 hospitals belonging to universities, state, and military. The study included patients aged ≥65 years with medical or surgical issues requiring admission to EDs. The purpose of the present study was to determine patient characteristics and the outcomes of ED visits in a geriatric population in Turkey.

Study Settings

This study was conducted in 13 hospitals in the provinces of Ankara, Aydin, Denizli, Diyarbakir, Erzurum, Gaziantep, Istanbul, Konya, Manisa, Ordu, Rize, and Samsun in 7 different geographical regions of Turkey between September 1 and 7,

2014. All hospitals were academic centers with emergency medicine specialist training programs. The coordination centers of the present study were Konya and Ankara. All patients aged ≥65 years who were referred to EDs with acute medical or surgical issues during the study period were included in the present study. Patients aged <65 years or those referred for trauma were excluded. Patients who had received pre-hospital cardiopulmonary resuscitation or were transferred to hospitals other than the study centers were also excluded from the present study.

Study Protocol

The following data for patients who met the study inclusion criteria were recorded: age, gender, major complaints, comorbidities, medications, diagnosis, admission and discharge information, admission wards, length of stay (LOS) in ICUs, LOS in hospital, and in-hospital mortality. Patients were followed-up until discharge from the hospital or death.

Statistical Analyses

Statistical Package for the Social Science Version 16.0 (SPSS Inc., Chicago, IL, USA) was used for the statistical analysis of all obtained data. Categorical data were expressed as numbers and percentage and continuous data as mean ± standard deviation (SD). Univariate analyses were performed using the Chi-square test for categorical variables and Student's t-test for continuous variables. P-values of <0.05 were considered statistically significant.

RESULTS

A total of 1299 patients aged ≥65 years referred to EDs with non-traumatic, acute surgical, or medical problems were included in the present study. The mean age of the included patients was 74.8±7.3 years. Of these, 674 (51.9%) were aged 65–74 years and 145 (11.2%) were aged ≥85 years, with 680 (52.3%) females (Table 1). No significant differences in gender distribution were observed between the age groups (p=0.422) (Table 2).

The most frequent complaints were related to gastrointestinal (25.8%, n=333), pulmonary (18.2%, n=237), and central nervous (16.8%, n=218) systems (Table 1). No significant difference in the distribution of complaints was observed between the age groups (p=0.081).

According to medical histories provided by patients and/or their relatives, 10.2% (n=133) of patients had no previous history of a known disease. The most frequent comorbi-

Table 1— Distribution of Demographic Features, Leading Complaints, Comorbidities and Number of Daily Medications, Results of ED and Hospital Visiting of the Study Group

A. Demographic parameters		D. Number of Medications[β]	
Age[α]	74.8±7.3	2	282 (21.7%)
Age groups[β]		4-6	254 (19.6%)
65-74	674 (51.9%)	Any known medication	251 (19.3%)
75-84	480 (37.0%)	1	251 (19.3%)
≥85	145 (11.2%)	3	227 (17.5%)
Total	**1299 (100%)**	>6	34 (2.6%)
Gender[β]		**Total**	**1299 (100%)**
Female	680 (52.3%)	**E. ED and hospital visiting results**	
Male	619 (47.7%)	ED visiting[β]	
Total	**1299(100.0%)**	Discharged from ED	877 (67.5%)
B. Leading Complaints[βλ]		Admission to a ward	282 (21.7%)
Gastrointestinal	330 (25.4%)	Admission to the ICU	140 (10.8%)
Pulmonary	237 (18.2%)	**Total**	**1299 (100.0%)**
Central nervous system	218 (16.8%)	Length of stay in hospital[π]	8.3 ± 6.7
Multisystem	194 (14.9%)	Length of stay in ICU[π]	6.3 ± 6.9
Cardiovascular	125 (9.6%)	Exitus during hospital stay[β]	75 (5.8%)
Skeletomuscular	96 (7.4%)	**F. Last Diagnosis**[βλ]	
Genitourinary	60 (4.6%)	Cardiovascular	253 (19.5%)
Others	39 (3.0%)	Gastrointestinal	228 (17.6%)
Total	**1299(100.0%)**	Pulmonary	197 (15.2%)
C. Comorbidities[βΩ]		Genitourinary	98 (7.5%)
Hypertension	673 (51.8%)	Neurology	95 (7.3%)
Diabetes mellitus	321 (24.7%)	Others	74 (5.7%)
Coronary heart disease	279 (21.5%)	Infection	73 (5.6%)
COPD / asthma	232 (17.9%)	Nose-throat-ear	68 (5.2%)
Malignity	198 (15.2%)	Skeletomuscular	65 (5.0%)
Congestive heart failure	150 (11.5%)	Oncology	54 (4.2%)
Any known disease	133 (10.2%)	Nephrology	45 (3.5%)
Cerebrovascular accident	84 (6.5%)	Endocrine	22 (1.7%)
Chronic renal failure	79 (6.1%)	Psychiatric	17 (1.3%)
Hyperlipidemia	78 (6.0%)	Intoxication	10 (0.8%)
Arrhythmia	70 (5.4%)	**Total**	**1299 (100.0%)**
Dementia / Alzheimer disease	64 (4.9%)		

ED: Emergency Department; ICU: Intensive Care Unit; [α]Described as mean value ± SD and year; [β]Described as number (n) and percentage (%); [π]Described as mean value ± SD and day; [λ]Classified according to the organ system; [Ω]One patient can have more than one disease

dities in the remaining patients were hypertension (51.8%, n=673), diabetes mellitus (24.7%, n=321), and coronary heart disease (21.5%, n=279). Of these patients, 19.3% (n=251) had no history of regular medication usage and 61.4% (n=797) had a history of multiple medication usage (two or more medications per day) (Table 1).

ED referrals ended in discharge for 67.5% (n=877) of patients and hospitalization in a ward or ICU in 32.1% (n=422)

of patients (Table 1). A significant difference in the rate of discharge or admission was observed between the age groups (p=0.034). The rate of ED discharge was higher in the 65–74 age group (71.2%) and the rates of admission to a ward or ICU were higher in the 75–84 age group (25.2% and 12.5%, respectively) (Table 2).

The most frequently diagnosed disorders in patients referred to EDs were cardiovascular (19.5%, n=253), gastrointes-

Table 2— Distribution of Parameters by Age Groups

Parameters	Age Group	65 - 74 (n=674)	75 - 84 (n=480)	≥85 (n=145)	p value
Genderβ					0.422
	Male	322 (47.8%)	235 (49%)	62 (42.8%)	
	Female	352 (52.2%)	245 (51%)	83 (57.2)	
Result of ED visitingβ					0.034
	Patients discharged from ED	480 (71.2%)	299 (62.3%)	98 (67.6%)	
	Patients admitted to a ward	131 (19.4%)	121 (25.2%)	30 (20.7%)	
Patients admitted to the ICU		63 (9.3%)	60 (12.5%)	17 (11.7%)	
Length of stay in ICUπ		6.73±7.56	6.60±6.90	5.21±6.35	0.683
Length of stay in hospitalπ		10.33±8.80	8.06±7.82	7.53±6.29	0.340
Result of hospital visitingβ					0.009
	Patients discharged from hospital	646 (95.8%)	448 (93.3%)	130 (89.7%)	
	In hospital mortality	28 (4.2%)	32 (6.7%)	15 (10.3%)	

ED: Emergency Department; ICU: Intensive Care Unit; βDescribed as number (n) and percentage (%); πDescribed as mean value ± SD and day.

tinal (17.6%, n=228), and pulmonary (15.2%, n=197) diseases (Table 1). No significant differences in the distribution of final diagnoses was observed between the age groups (p=0.067).

Patients were most frequently hospitalized in internal medicine (28.5%, n=119), cardiology (19.4%, n=81), and respiratory disease (13.4%, n=56) wards. The mean LOS in hospital was 8.3 ± 6.7 days, whereas the mean LOS in ICUs was 6.3±6.9 days. Of the admitted patients, 75 (5.8%) died during hospitalization (Table 1). No statistically significant difference in the LOS in ICUs or hospital were observed between the age groups (p=0.683, and p=0.340, respectively). However, a significant difference in the prognosis of hospitalized patients was observed between the age groups (p=0.009). The 65–74 age group had a higher rate of discharge (95.8%) compared with the ≥85 age group, which had a high mortality rate (10.3%) (Table 2).

Patients referred to EDs were categorized into "survival" and "non-survival" groups (Table 3). A significant difference in age (p=0.001) was observed between the survival and non-survival groups, with no significant difference in gender distribution (p=0.259), LOS in ICUs (p=0.605), and LOS in

Table 3— Distribution of Parameters by Survival and Non-survival Groups

Parameters	Groups	Survival (n=1224)	Non-survival (n=75)	p value
Ageα		74.64±7.26	77.45±7.47	0.001
Genderβ				0.259
	Male	588 (48%)	31 (41.3%)	
	Female	636 (52%)	44 (58.7%)	
Length of stay in ICUπ		6.07±6.9	6.73±6.85	0.605
Length of stay in hospitalπ		8.55±6.68	6.75±6.59	0.055
Results of hospital admissions (n=422)β				<0.001
	Patients admitted to a ward	256 (73.8%)	26 (34.7%)	
	Patients admitted to the ICU	91 (26.2%)	49 (65.3%)	

ED: Emergency Department; ICU: Intensive Care Unit; αDescribed as mean value ± SD and year; βDescribed as number (n) and percentage (%); πDescribed as mean value ± SD and day.

hospital (p=0.055). When the 422 patients who were hospitalized following referral to ED were evaluated, a significant difference in mortality was observed between patients hospitalized in wards and patients admitted to ICUs (p<0.001). A higher mortality rate was observed in patients admitted to ICUs (65.3%) (Table 3). A significant difference in mortality was also observed according to the major complaint requiring ED referral (p=0.013). The non-survival group had higher rates of multisystemic (29.3%, n=22), pulmonary (21.3%, n=16), and gastrointestinal (20%, n=15) complaints. Furthermore, a significant difference in mortality was observed according to the final diagnosis made in the ED (P<0.001). In the non-survival group, higher rates of diagnosed pulmonary (21.3%, n=16), nephrologic (21.3%, n=16), and infectious (17.3%, n=13) diseases were observed.

DISCUSSION

In Turkey, 3.6%–41% of patients referred to EDs are elderly (2-4, 7-9). In developed countries, 20% of referrals to EDs are patients aged ≥65 years (10-12). These rates are a reflection of the ageing populations of developed countries.

Previous single-center studies in Turkey have reported the mean age of elderly referrals to EDs as 74.50±6.53 (4), 73.18±6.94 (7), and 74.5±8.5 (13) years. The mean age of patients in the present study is consistent with these previous findings in Turkey (4,7,13). The mean age of elderly patients referred to EDs has been reported as 76.8±8.0 years by an Irish study (10) and 82 years (min, 60; max, 103) by a Chinese study (14).

In the present study, we observed a greater number of ED referrals in the 65–74 age group compared with other age groups. A previous study reported more referrals in the 65–74 age group, whereas another study reported the highest number of ED referrals in the 75–84 age group (3,4). The findings of the present study are consistent with those of a previous study reporting that 60.3% of the aged population in Turkey is in the 65–74 age group (1).

The female/male ratio among elderly groups referred to EDs is reportedly variable, with a female predominance. In Turkey, the proportion of female patients among elderly patients with ED referrals reportedly ranges from 44.2%–59.2% (3,4,7,13). In the present study, more females than males were observed in all elderly patient groups. Consistent with the results of Kapçi et al. (3), no difference in gender distribution was observed between the age groups. These findings may be due to the greater number of females than

males in the geriatric population in Turkey (1). A Chinese study (14) reported that more males are referred to EDs, whereas an Irish study (10) reported that more females are referred.

In Turkey, the prevalence of chronic diseases among elderly patients ranges from 72.6%–94.4% (15,16). It has been reported that among elderly patients referred to EDs, 72.8% have at least 1 and 32.5% have ≥2 chronic disease(s) (13). Consistent with the results of the present study, Loğoğlu et al. (4) reported that the most frequently observed disorders in elderly patients referred to EDs are hypertension, coronary artery disease, and diabetes mellitus.

The increased incidence of a number of disorders with advanced age and the tendency to prescribe multiple medications to patients staying in residential services have changed the pattern of medication use in elderly patients (17). Özşaker et al. (13) reported that 56.2% of elderly patients referred to EDs were receiving continuous pharmacological treatment. We observed a high prevalence of chronic disease and frequent continuous pharmacological treatment in elderly patients referred to EDs. In light of these findings, health professionals in EDs should be aware of the different pharmacokinetic and pharmacodynamic features of particular medications and consequent variations in pharmacological response among elderly patients (18). Furthermore, doctors working in EDs should determine the medications currently being used by elderly patients and consider these during diagnosis and treatment planning.

The most frequent complaints among elderly patients referred to EDs in Turkey are related to the respiratory, gastrointestinal, cardiovascular, and central nervous systems (3,4, 7,8,13), findings corroborated by the present study.

It has been reported that the most frequent diagnoses following referral to EDs are pneumonia, cerebrovascular disease, and chronic obstructive pulmonary disease (2). On the other hand, Kapçi et al. (3) reported that gastrointestinal, respiratory, and neurological diseases are the predominant disorders in such patients. In the present study, diagnoses were most frequently related to cardiovascular, gastrointestinal, and respiratory systems (Table 1). The most frequently reported disorders among elderly patients with ED referrals are respiratory, cardiological, and neurological diseases in China (14); infectious diseases, predominantly malaria, and hypertension-related cardiovascular diseases in Nigeria (19); and infectious, cardiovascular, and gastrointestinal diseases in Ireland (10).

The hospitalization rate of elderly patients referred to EDs in Turkey ranges from 11.5%–47.2%. Of the elderly patients hospitalized, 65.4%–81.4% are hospitalized in wards and 18.6%–34.6% in ICUs. These patients are most frequently hospitalized in cardiology, internal medicine, respiratory disease, neurology, and general surgery wards (3,4,7,13). An Irish study (10) reported the rate of hospitalization among elderly patients referred to ED as 63.5%. In the present study, we observed a higher rate of hospitalization, with patients most frequently hospitalized in internal medicine, cardiology, and respiratory disease wards. The results of the present study indicate elderly patients in Turkey are predominantly referred to EDs due to medical complaints rather than surgical complaints, with the exception of trauma.

LOS in hospital among elderly patients varies among previous studies. Regarding the mean LOS in hospital, Baz et al. (7) have reported 7.1±6.2 days whereas Loğoğlu et al. (4) have reported 4±6.6 days. In the present study, we observed a mean LOS in hospital of 8.3±6.7 days. Kennely et al. (10) reported a mean LOS in hospital of 13.1±19.0 days and found that the only important multivariate predictor of prolonged hospitalization was advanced age. We observed no differences in LOS in hospital or ICUs between the age groups in the present study (Table 1).

Among patients included in the present study, 5.8% (n=75) died during hospital admission. Single-center studies of elderly patients in Turkey have reported that following referral to EDs, the mortality rate in the ED ranges between 0.1% and 7.6% and in hospital ranges between 0.8% and 11.5% (7,8). A previous Irish study (10) reported a mortality rate in the ED of 14.6% in elderly patients. In contrast with the results of the present study, Üstündağ et al. (8) found no difference in age distribution between patients who survived compared with those who did not. The same authors (8), in a finding consistent with our results, found no difference in LOS in hospital. Further, this study reported that altered level of consciousness, respiratory distress, and abdominal pain are more frequent among patients referred to EDs who do not survive (8). In contrast with our results, according to data from the Turkish Statistics Institute (1), the most frequent causes of mortality in elderly patients are cardiovascular system disorders (46.8%), benign and malignant tumors (17.7%), and respiratory system disorders (11.7%). Many scoring systems for the prediction of hospitalization and prognosis have been proposed. Clinical studies have reported that the Modified Early Warning Score (MEWS) and VitalPAC Early Warning Score (VIEWS) have efficacy in the prediction of hospitalization and mortality during hospital stays and that the Rapid Emergency Medicine Score (REMS), REMS without the inclusion of age, and HOTEL scoring systems (Hypotension, Oxygen saturation, low Temperature, ECG changes, Loss of independence) have efficacy in the prediction of ICU stay duration and mortality during hospital stays (20,21). It has been posited that high scores on the Charlson Comorbidity Index indicate a high risk of mortality during hospital admissions (10). Mortality rates are dependent on patient factors as well as the quality of health care. Factors associated with mortality should be assessed and those that can be modified should be corrected. It has been reported that the use of the "Comprehensive Geriatric Assessment (CGA)" increases survival by up to 12 months in elderly patients referred to hospitals. The Comprehensive Geriatric Assessment can also be used in EDs (22,23).

We believe that the discrepancy between the results of the present study and those of previous studies are related to the frequency and reasons for the referral of elderly patients to EDs. Furthermore, subsequent clinical courses and prognoses have been shown to be related to the degree of development and demographic, socio-cultural, and climate differences among countries as well as health care infrastructure, diagnostic capability in treatment centers, and different approaches to the treatment of patients.

Concomitant with an increased proportion of elderly individuals in the general population, the number of elderly patients referred to EDs continues to increase. This multicenter study presents the demographic features and clinical course of elderly patients referred to EDs. The findings of the present study may guide the planning of future studies on the measurement and improvement of health care provided to elderly patients by EDs in Turkey.

Conflict of Interest

All authors have no conflict of interest to declare.

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