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Evaluation of the general characteristics of patients aged 85 years and above admitted to a university hospital emergency department

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Background/aim: The number of elderly people (≥ 65 years old) is increasing both in Turkey and internationally due to improved living conditions and decreased mortality rates. Knowing the characteristics of elderly patients admitted to emergency departments can provide guidance for diagnosis and treatment approaches. In this study, we analyzed the characteristics of very old patients (≥ 85 years old) admitted to the emergency department and put together data for use in forward planning in healthcare services.

Materials and methods: This retrospective study included all patients aged ≥ 85 years admitted to the Adult Emergency Department of Gazi University Medical Faculty Hospital between 01.01.2014 and 31.12.2014. Data concerning the patients' age, sex, date of admission, weekday or weekend admission, reason for admission, length of stay, number of readmissions, admission from within or outside the province, and whether they were hospitalized or not were evaluated.

Results: In this study, 1105 admissions of 780 patients aged ≥ 85 years to the emergency department were analyzed. The median age of the patients was 87 years and 59% were female. The most frequent admissions were in January (11.4%). Most patients (63.1%) were admitted only once to our emergency department within the study period. A total of 40.5% of patients were hospitalized in the clinics or intensive care units. The rate of mortality at first admission was 1.5% (12 patients). The most common complaints at admission were infection (13.3%) and soft tissue traumas (crashes, sprains, fractures, dislocations) related to the musculoskeletal system (11.8%). Readmissions were more frequent in males. It was seen that male patients were more frequently admitted due to deterioration of general health status and genitourinary system symptoms, despite pain being more common among women.

Conclusion: Due to the changing population structure, emergency staff in Turkey as well as internationally encounter old and very old patients more frequently. It is now imperative that emergency departments acquire the necessary infrastructure, human resources, knowledge, and equipment needed to meet the needs of these patients.

Key words: Aged 85 years or over, geriatric admission, emergency department, Ankara, Turkey

1. Introduction

The number of elderly people (≥ 65 years old) is gradually increasing in Turkey and the world due to improved living conditions and decreased mortality rates. In Europe, 14% of the population was aged 65 years and above in 2010, and this rate is predicted to be 25% in 2050 (http://ec.europa.eu/economy_finance/publications/european_economy/2012/pdf/ee-2012-2_en.pdf). In Turkey, the number of people aged 65 years and above in 2013 made up 7.7% (5.9 million) of the total population, and this rate is expected to rise to 17.5% and 27.7% (15.6–24.7 million people) in 2075, respectively (<http://www.tuik.gov.tr/>).

Advanced age is accompanied by chronic illnesses, more frequent use of healthcare services, and more

frequent emergency department (ED) visits. The rate of admission to EDs of elderly patients has been shown to vary between 13% and 25% in different studies. It is also known that elderly patients use EDs more frequently, are admitted to EDs with more severe clinical presentations and more complex symptoms, require more laboratory examinations, stay longer in EDs, are hospitalized more frequently, and have a higher rate of readmissions to the ED and hospital (1–3).

It has now become imperative that the infrastructure of EDs be organized to accommodate the care of these patients and for the knowledge levels, attitudes, and behaviors of ED healthcare workers to be focused on solving the problems of elderly patients. In the United

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States, Canada, and the United Kingdom, new geriatric EDs have opened, and doctors and nurses specializing in geriatrics have started to work in EDs (4,5).

Knowing the characteristics of elderly patients (≥ 65 years old) admitted to the ED can serve as a guide for diagnosis and treatment approaches. There are many studies in both the Turkish and international literature in this field. Elderly patient groups are not homogeneous due to their characteristics. The characteristics of the groups called 'young old people' (65–75 years) and 'very old people' (≥ 85 years) are not similar. In most studies, the age group of 85 years and above was mostly studied as a subgroup. However, the proportion of this age group in the population is gradually increasing (<http://www.who.int/ageing/en/>). According to data from the Turkish Statistical Institute (<http://www.tuik.gov.tr/>), the population aged 85 years and above constituted 0.57% (433,956 people) of the general population in Turkey in 2013, and this rate is predicted to reach 5.2% (4.6 million) by the year 2075. In other words, the number of very old, ill, and fragile elderly people will gradually increase in Turkey as well.

In this study, we focused on the patient group aged 85 years and above. We aim to use the obtained results to increase the quality of the services provided to this group. By sharing our data with our colleagues, we aim to increase awareness of the rising number of elderly patients and their problems in Turkey. Furthermore, we aim to generate data for forward planning in healthcare services.

2. Materials and methods

2.1. Study group and study style

This retrospective observational study was carried out between 01.01.2014 and 31.12.2014 at the Adult Emergency Department, Gazi University Medical Faculty Hospital, a tertiary emergency department where 45,000–50,000 adult patients (aged 18 years or over) are admitted annually. All patients aged 85 years and above who were admitted to the ED within the specified time period were included in this study. The data were obtained from patient files and the hospital information management system. In cases of recurrent ED admissions, the first admission of the patient was evaluated. Data pertaining to the patients' age, sex, date of admission, weekday or weekend admission, reason for admission, length of stay, number of readmissions, admission from within or outside the province, and whether they were hospitalized or not were obtained. Permission for the study was obtained from the Ethics Committee of the Ankara Keçiören State Hospital, number 12345 and dated on 12 December 2015.

2.2. Statistical analysis

The study data were analyzed with IBM SPSS 22.0. When evaluating the data, descriptive statistics (frequency, percentage, mean \pm SD (min–max), or median [interquartile

range]) were initially calculated. The obtained data were compared according to sex. We presumed that the data were not normally distributed. The Mann–Whitney U test was used to compare continuous variables and the chi-square test was used to compare categorical data. $P < 0.05$ was considered statistically significant.

3. Results

A total of 43,370 patients were admitted to the Adult Emergency Department of Gazi University Medical Faculty Hospital between 01.01.2014 and 31.12.2014. Of these, 12.9 % (5603 patients) were 65 years of age or older. In this group, 780 (1.8%) patients aged 85 years or over were accepted as the study group. In total, the 780 patients had 1105 emergency service admissions. Admissions were most frequently noted in January (11.4%) and least frequently in October (6.2%). Most patients (63.1%) were admitted to the ED only once during the study period. The majority of the patients (77.7%) lived in Ankara. Of these patients, 40.5% were hospitalized in the clinics or intensive care units. The most common admission complaints were infection (13.3%), soft tissue traumas involving the musculoskeletal system (crashes, sprains, fractures, dislocations) (11.8%), symptoms related to the gastrointestinal system (nausea, vomiting, dyspepsia, etc.) (11.7%), pain (abdominal pain, suprapubic pain, and headache) (10.9%), and falls (9.9%) (Table 1). We took 'falls' as a separate group. Even if they result in some musculoskeletal injuries, the etiology may be related to different causes such as stroke, arrhythmia, and epilepsy.

The patients were then divided into two groups, male and female, and the parameters were compared according to sex. The number of readmissions of male patients to the ED was found to be higher. It was also found that there were differences between the two groups in terms of their admission complaints. Male patients were more frequently admitted due to deterioration of general health status and genitourinary system symptoms; however, admission due to pain was more common among female patients (Table 2).

It was observed that 57.3% of the patients who were hospitalized from the ED were placed in clinics and 42.7% were placed in intensive care units. The most frequently placed clinics were internal medicine clinics (50 patients), and the most frequently placed intensive care unit was the coronary intensive care unit (51 patients) (Table 3).

4. Discussion

The incidence of chronic diseases increases with age. A study carried out by Fadiloğlu et al. among patients aged 65 years and above showed that the rate of patients with at least one chronic illness was 90%, that of patients with two chronic illnesses was 35%, that of patients with three

Table 1. General characteristics of patients aged 85 years and above admitted to the ED.

Characteristics	n = 780
Age (years)	
Median [interquartile range]	87 [86–89]
Mean \pm SD (min–max)	87.98 \pm 3.040 (85–104)
Length of stay in ED (days)	
Median [interquartile range]	0 [0–2]
Mean \pm SD (min–max)	3.6 \pm 8.026 (0–66)
Number of readmissions (in study years)	
Median [interquartile range]	1 [1–2]
Mean \pm SD (min–max)	1.79 \pm 1.525 (1–22)
	n (%)
Gender	
Female	460 (59)
Male	320 (41)
Month of admission	
January	89 (11.4)
February	75 (9.6)
March	73 (9.4)
April	74 (9.5)
May	86 (11)
June	55 (7.1)
July	61 (7.8)
August	54 (6.9)
September	50 (6.4)
October	48 (6.2)
November	53 (6.8)
December	62 (7.9)
Admission day	
Weekdays (total, people/day)	563 (112.6)
Weekends (total, people/day)	217 (108.5)
Number of readmissions during the study period	
Once	492 (63.1)
Twice	140 (17.9)
Three times	66 (8.5)
Four times	37 (4.7)
Five times	26 (3.3)
Six times	8 (1)
Seven times	1 (0.1)
Eight times	8 (1)
Ten times	1 (0.1)
Twenty-two times	1 (0.1)
Coming from	
Inside Ankara	606 (77.7)
Outside Ankara	96 (12.3)
Unknown	78 (10)
Hospitalization status	
Hospitalized	316 (40.5)
Nonhospitalized	464 (59.5)
Admission patterns to ED	
Emergent	766 (98.2)
Forensic case	14 (1.8)

Table 1. (Continued).

Cause of admission to ED	
Infection	104 (13.3)
<i>Pulmonary</i>	41 (5.3)
Musculoskeletal complaints and findings	92 (11.8)
<i>Soft tissue injuries</i>	63 (8.1)
Gastrointestinal system complaints	91 (11.7)
<i>Dyspepsia, nausea, and vomiting</i>	48 (6.2)
Pain	85 (10.9)
<i>Abdominal pain</i>	53 (6.8)
Falling	77 (9.9)
Cardiovascular system complaints	75 (9.6)
<i>Chest pain</i>	40 (5.1)
Deterioration of general health status	58 (7.4)
Pulmonary complaints and findings	58 (7.4)
<i>Dyspnea</i>	44 (5.6)
Neurological disorders	31 (4)
<i>Unconsciousness, coma</i>	13 (1.7)
Genitourinary disorders	24 (3.1)
<i>Difficulty in urination</i>	15 (1.9)
Vertigo	20 (2.6)
Psychiatric complaints and findings	17 (2.2)
Renal disorders	13 (1.7)
<i>Deterioration in renal function tests</i>	8 (1)
Allergic complaints	10 (1.3)
<i>Allergic skin rashes</i>	8 (1)
Epistaxis	5 (0.6)
Eye disorders	3 (0.4)
Suicide	2 (0.3)
Traffic accident	2 (0.3)
Died in first admission	12 (1.5)
Readmission within 48 h after first ED discharge	13 (1.6)
Readmission within a week after first ED discharge	34 (4.3)
Readmission within a year after first ED discharge	288 (37)

chronic illnesses was 23%, and the rate of having more chronic illnesses was 15% (6). Therefore, increasing age and increasing chronic illnesses cause elderly patients to benefit more from healthcare services and to use EDs more. According to a statement made by the British Geriatrics Society in 2011, 60% of hospitalizations, 65% of hospitalization days, and 70% of emergency department admissions and readmissions belong to patients aged 65 years and above in the UK (<https://publications.parliament.uk/pa/cm201213/cmselect/cmhealth/6/6vw03.htm>).

In the literature, the rate of admission to EDs for patients aged 65 years and above is given in different ranges (12%–21%, 13%–25%, 8%–35%). Although Myers et al. reported the rate of elderly patients admitted to EDs as 23%, Strange et al. stated this rate to be 15% (7,8). In studies conducted in Turkey, Mert et al. reported the rate of the patient group aged 65 years and above and admitted to the ED as 9%, whereas Ünsal et al. determined this

rate to be 13% (9,10). In a study by Kekeç et al., this rate was 14.3% (11), and in our study, it is 12.9%. Since we especially examined the ED admission characteristics of patients aged 85 years and above, the admission rate of this group was determined as 1.8%. The admission rates of old and very old patients to EDs may vary according to the demographic structure, socioeconomic conditions, and life expectancy of the country, or the characteristics of the hospitals (serving area, departments, and presence of a geriatric medicine department).

There are several reasons why we focus on the characteristics of patients aged 85 years and above. It is believed that although the 85+ years group, today referred to as 'very old', constitutes a small proportion of the population, it will increase by 70% in the next 20 years, especially in developed countries, and will make up an important part of the population. Indeed, a study conducted by Vilpert et al. in Switzerland showed that

Table 2. Distribution of general characteristics of patients aged 85 years and above admitted to the ED according to sex.

Characteristics	Female (n = 460)	Male (n = 320)	P-value
Age (years) Median [interquartile range]	87 [86–89]	87 [86–89]	0.329
Mean ± SD (min–max)	87.98 ± 3.040 (85–104)	87.98 ± 2.737 (85–100)	
Length of stay in emergency department (days) Median [interquartile range]	0 [0–1.75]	0 [0–3]	0.526
Mean ± SD (min–max)	3.5 ± 8.104 (0–66)	3.74 ± 7.923 (0–66)	
Number of readmissions (in study year) Median [interquartile range]	1 [1–2]	1 [1–2]	0.001
Mean ± SD (min–max)	1.74 ± 1.677 (1–22)	1.88 ± 1.273 (1–7)	
	Female, n (%)	Male, n (%)	
Month of admission			0.092
January	50 (10.9)	39 (12.2)	
February	38 (8.3)	37 (11.6)	
March	44 (9.6)	29 (9.1)	
April	41 (8.9)	33 (10.3)	
May	54 (11.7)	32 (10)	
June	30 (6.5)	25 (7.8)	
July	36 (7.8)	25 (7.8)	
August	29 (6.3)	25 (7.8)	
September	24 (5.2)	26 (8.1)	
October	38 (8.3)	10 (3.1)	
November	34 (7.4)	19 (5.9)	
December	42 (9.1)	20 (6.3)	
Admission day Weekdays (total, people/day)	337 (66.6)	226 (45.2)	0.418
Weekends (total, people/day)	123 (61.5)	94 (47)	
Number of readmissions during the study period			0.01
Once	313 (68)	179 (56)	
Twice	73 (15.9)	67 (21)	
Three times	30 (6.5)	36 (11.3)	
Four times	17 (3.7)	20 (6.3)	
Five times	16 (3.5)	10 (3.1)	
Six times	1 (0.2)	7 (2.2)	
Seven times	0 (0)	1 (0.3)	
Eight times	8 (1.7)	0 (0)	
Ten times	1 (0.2)	0 (0)	
Twenty-two times	1 (0.2)	0 (0)	
Coming from			0.234
Inside Ankara	364 (79.1)	242 (75.6)	
Outside Ankara	57 (12.4)	39 (12.2)	
Unknown	39 (8.5)	39 (12.2)	
Hospitalization status			0.882
Hospitalized	185 (40.2)	131 (41)	
Nonhospitalized	275 (59.8)	189 (59)	

Table 2. (Continued).

Admission pattern to EDs			
Emergent	456 (99.1)	310 (96.8)	
Forensic case	4 (0.8)	10 (3.2)	0.07
Causes of admission to ED			
Infection	54 (11.7)	50 (15.6)	
Musculoskeletal complaints and findings	60 (13)	32 (10)	
Gastrointestinal system complaints	48 (10.4)	43 (13.4)	0.001
Pain	62 (13.5)	23 (7.2)	
Falling	54 (11.7)	23 (7.2)	
Cardiovascular system complaints	45 (9.8)	30 (9.4)	
Deterioration of general health status	24 (5.2)	34 (10.6)	
Pulmonary complaints and findings	39 (8.5)	19 (5.9)	
Neurological disorders	20 (4.3)	11 (3.4)	
Genitourinary disorders	7 (1.5)	17 (5.3)	
Vertigo	11 (2.4)	9 (2.8)	
Psychiatric complaints and findings	12 (2.6)	5 (1.6)	
Renal disorders	8 (1.7)	5 (1.6)	
Allergic complaints	6 (1.3)	4 (1.3)	
Epistaxis	--	5 (0.6)	
Eye disorders	2 (0.4)	1 (0.3)	
Suicide	1 (0.2)	1 (0.3)	
Traffic accident	--	2 (0.6)	
Died on first admission	7 (1.5)	5 (1.6)	0.685
Readmission within 48 h after first ED discharge	7 (1.5)	6 (1.9)	0.558
Readmission within a week after first ED discharge	15 (1.9)	19 (2.4)	0.688
Readmission within a year after first ED discharge	147 (32)	141 (44)	0.048

the proportion of people aged 85 years and above had increased by 46% between the years 2005 and 2010. In parallel, ED admissions of patients aged 85 years and above had increased 2.25 times compared to the 65–84-year-old patient group (12). In Turkey, Akbuğa Özel et al. reported in their study that the number of patients aged 85 years and above who were admitted to their ED had increased by 37% in the year 2015 compared to 2011 (13). As we mentioned in Section 1 of this article, the population aged 85 years and above in Turkey will increase tenfold by 2075 (<http://www.tuik.gov.tr/>). Therefore, the ‘very old’ patient group will become an important consideration in Turkey in the coming years.

Demographic structure and changes in this structure are of great importance for healthcare planners, especially for the efficient use of resources reserved for healthcare. For this reason, our study and similar studies are of strategic importance.

Patients are admitted to EDs with various complaints. There are many studies in the literature on the reasons why

elderly patients are admitted to EDs. While Dickinson et al. and Ettinger et al. reported that elderly patients were admitted more frequently due to cardiac and respiratory problems, Hamdy et al. stated that accidents and traumas were more common reasons for admission than cardiac problems (14–16). Graf et al. identified the most common reasons for ED admissions among elderly patients (≥ 75 years) as orthopedic problems, trauma, cardiac pathologies, and psychiatric problems (17). Quach et al. reported that falls, fractures, neurological problems, cardiovascular system problems, and noninfectious gastrointestinal system problems made up 70% of admission reasons (18). La Mantia et al. emphasized that falls, dyspnea, chest pain, altered consciousness, and abdominal pain were the most common reasons for admission to EDs among patients aged 75 years or over (19). Hastings et al. found that 40% of elderly patients were admitted to EDs due to general status impairment (20). Crilly et al. determined that admissions due to cardiac, respiratory, and orthopedic problems were more prevalent (21). Whereas Salvi et al.

Table 3. Hospitalization places of patients aged 85 years old or more admitted to the ED.

Hospitalization places*	n (%)
Clinics	181 (57.3)
Clinics of medical departments	108
<i>Internal medicine</i>	50
<i>Pulmonary diseases</i>	23
<i>Neurology</i>	21
Clinics of surgical departments	73
<i>General surgery</i>	27
<i>Orthopedics</i>	26
<i>Cardiovascular surgery</i>	7
Intensive care units	135 (42.7)
Medical intensive care units	100
<i>Coronary</i>	51
<i>Internal medicine</i>	23
<i>Pulmonary diseases</i>	16
Surgical intensive care units	35
<i>Anesthesiology and reanimation</i>	17
<i>General surgery</i>	9
<i>Neurosurgery</i>	6

*The clinics most frequently accepting the patients are given.

indicated that cardiac and neurological problems were more prevalent, Moons et al. showed that traumas, cardiac, and neurological problems were reasons for admission among elderly patients (22,23). Mert et al. showed that patients were most commonly admitted due to cardiac problems (chest pain, hypertension, and acute coronary syndromes), gastrointestinal complaints, pulmonary problems, and musculoskeletal system problems, in that order (9). Ünsal et al. indicated that hypertension, lung diseases, cardiological diseases, and infections were the most common reasons for admission, whereas Akbuğa Özel et al. showed that circulatory problems, metabolic/endocrine reasons, respiratory disorders, gastrointestinal and genitourinary system problems, and injury due to falls were the most common reasons for admission (10,13). Akpınar et al. showed that cardiovascular and respiratory problems were prevalent, whereas Kekeç et al. reported that metabolic/systemic, cardiovascular, and cerebrovascular causes were common reasons for admission (24,11). Logoğlu et al. found that the patient group aged 65 years or over was admitted to the ED most commonly due to dyspnea, chest pain, and abdominal pain (25). In our study, patients aged 85 years and above were admitted to our ED because of infection (pneumonia, lower respiratory tract, urine, upper respiratory tract, and soft tissue infections) (13.3%), musculoskeletal system

problems (soft tissue traumas, crashes, sprains, fractures, dislocations) (11.8%), gastrointestinal system problems (nausea, vomiting, constipation, diarrhea, dyspeptic complaints) (11.7%), pain (most commonly abdominal pain, suprapubic pain, and headache) (10.9%), and falls (9.9%). Vilpert et al. reported that trauma related to falling was the first most common and cardiovascular problems were the second most common cause of admission in patients aged 85 years or over (12). Again, studies have indicated that the rate of falling among patients aged 80 years and above is 50%, major injury occurs in 5%–10% of these falls, hospitalization is required in 5% of patients, and the mortality rate is 5% (2). Symptoms may be intertwined in the elderly patient group and may be difficult to distinguish from each other. For example, in a patient who comes with a complaint of falling, a cardiovascular problem may have developed prior to the fall. An ischemic cardiac event may manifest as abdominal pain or syncope. Infection may manifest in the form of impaired consciousness. Dyspnea can occur not only due to pulmonary problems but also due to cardiac problems. Vertigo may occur as a result of inner ear, central nervous system, or cardiovascular pathologies. Therefore, it is not considered appropriate to clearly classify the symptoms in elderly patients and to make comparisons accordingly.

Chen et al. reported that elderly male patients were more commonly admitted to EDs with pulmonary symptoms such as dyspnea and that abdominal pain was more common among women (26). Karataş et al., on the other hand, showed that admissions due to falling were more common among women (27). In our study group, male patients were more commonly admitted to our ED due to deterioration of general health status and genitourinary system symptoms, whereas female patients were more commonly admitted due to pain.

When studies on this subject are examined, it is seen that elderly patients commonly visit EDs during winter months, daytime hours, and weekdays (28,29). Mert et al., on the other hand, stated that the geriatric patient group was more commonly admitted to the ED during daytime hours and weekends (9). Akpınar et al. indicated that the time of admission to the ED for elderly patients was commonly during daytime hours, whereas according to Taymaz et al. and Akbuğa Özel et al., the admissions commonly took place outside of office hours (24,30,13). Crilly et al., on the other hand, showed that the most frequent admissions took place between 0700 and 1530 hours and during weekdays (21). Furthermore, Downing et al. reported that admissions were more frequent during the daytime and during the winter months (31). In our study, we found that patients aged 85 years and above were most frequently admitted to our ED in January, a winter month (11.4%).

In our study, the average length of ED stay for older patients was 3.6 days. This is quite long, and the medical literature frequently reports that older patients stay longer in EDs than younger patients (3,8,10). There may be different reasons for this. Cognitive problems, aphasia, and hearing problems in elderly patients prevent them from communicating and affect the process of medical history-taking and its accuracy. Despite the serious underlying problems in this age group, symptoms and physical examination findings may be unremarkable. Inadequate physiological reserve or drugs taken cause changes in the responses to stress. Excessive workload and lack of knowledge among ED staff may prevent spending enough time with these patients for accurate assessments. For differential diagnosis, further testing and consultation are requested and performed. Healthcare providers are also reluctant to hospitalize patients with multiple comorbidities and cognitive problems (such as dementia or delirium).

There are different ratios in the literature regarding the hospitalization rates of elderly patients who apply to EDs. It is stated that elderly patients are hospitalized 2.5–4.6 times more often and placed in intensive care units 5.5 times more frequently than young patients, and the general rate of hospitalization is 10%–40%. In addition, elderly patients have higher rates of admission to intensive care units. Logoğlu et al. reported that elderly patients who applied to the ED had a hospitalization rate of 21% (25). Of these patients, 65.4% were placed in clinics (cardiology, internal medicine, pulmonary diseases, and neurology), whereas 34.6% were placed in intensive care units. In a study by Kekeç et al., 62% of hospitalizations were shown to be in clinics (mostly in internal medicine clinics) and 38% in intensive care units (mostly in neurology and medical intensive care units) (11). Taymaz et al. reported that elderly patients were most commonly placed in internal medicine, neurology, neurosurgery, and cardiology clinics from the ED, whereas Akpınar et al. emphasized that hospitalizations in neurology, pulmonary, and cardiology clinics were more common (24,30). The hospitalization rate of elderly patients was reported as 9% in a study by Akbuğa Özel et al., and it was mentioned that frequent hospitalizations took place in neurology, general surgery, cardiology, and nephrology facilities and coronary, pulmonary, neurology, and anesthesiology intensive care units (13). In a study by Mert et al., it was found that elderly patients admitted to the ED were hospitalized at a rate of 28% (9). Vilpert et al. showed that patients aged 85 and above were hospitalized at a rate of 70% (12). In our study, it was shown that 40.5% of ED patients aged 85 years or over were placed in clinics or intensive care units. Patients were found to be most commonly hospitalized

in clinics, especially internal medicine clinics (internal medicine, pulmonary diseases, and neurology) (57.3%). Of the intensive care units, patients were most commonly placed in the coronary intensive care unit.

Some of the elderly patients discharged from EDs may be readmitted to the emergency departments after a certain period, either with the same complaints or with other complaints. When we look at the studies in the literature, these return rates range from 10% to 50% depending on the duration and underlying diseases (32,33). Moons et al. reported the rate of readmission within 14 days as 10%, and Graf et al. stated the rate of readmission within 6 months to be 50% (23,17). Kennelly et al. reported the rate of readmission within 1 month to be 13% and the rate of readmission within 1 year to be 50% (29). Vilpert et al. stated the rate of readmission to the ED of patients aged 85 years and above within 1 month as being 8% (12). Male patients according to one study (17) and female patients according to another study (22) were more frequently readmitted. Patients with more comorbidities, more functionally dependent, having cognitive dysfunction, using multiple drugs and suffering from cancer, heart and chronic kidney disease, Parkinson's disease and dementia are frequently readmitted to EDs. In our study, the rate of readmission to the ED within 12 months was 37%. The rate of readmission within the first week was 4.3%. Moreover, elderly male patients were more frequently readmitted to our ED. According to the literature, among the most common causes of early period readmission is the discharge of patients before the patients' problems are solved (e.g., pain, nutrition, mobilization problems, and incontinence not being completely resolved), misunderstanding of the conditions of readmission to the ED or follow-up at the clinics, failure of the patient or his/her relatives to understand the course of the illness, and improper use of the started drugs. In the meantime, infections, metabolic problems, and gastrointestinal bleeding can be a cause of recurrent admission to EDs in patients with traumas (19,20,23).

Admission to an ED is a turning point for elderly patients. After discharge from the ED, these patients are seen to functionally deteriorate more rapidly, be readmitted to the hospital and ED, be hospitalized more frequently, and have higher mortality. In their study, Salvi et al. showed the mortality rate of elderly patients within 3 months after discharge from the ED to be 10%, the rate of readmission to the ED to be 24%, the rate of hospitalization to be 24%, and the rate of functional deterioration to be 10%–45%. They reported that the functional status before admission to the ED, advanced age, underlying diseases, availability of social support,

multiple drug use, impaired consciousness, and dementia determine the prognosis (22).

Our study has a number of limitations. Firstly, it is a single-center study. It is not possible to generalize its results because the number of admissions and patient characteristics may vary depending on the region where the hospital is located, the population it serves, and the nature of the hospital. Our hospital is one where elderly patients with chronic medical problems are admitted more frequently. Secondly, it is a short-term study. A longer-term study in which the changing patient population structure is followed for a longer period of time may be more meaningful. Thirdly, the study is retrospective. In retrospective studies, reliability, validity, and adequacy of data are related to the adequacy of medical records and archives. Nevertheless, we think that this is an important study because it defines the

characteristics of patients who are very advanced in age and who will keep EDs very occupied in the near future.

In conclusion, ED staff encounter old and very old patients more frequently, both in Turkey and internationally, due to the changing population structure. It is now imperative that EDs acquire the infrastructure, human resources, knowledge, and equipment necessary to meet the needs of these patients. It is important that states establish the necessary social services and healthcare support as soon as possible in order to reduce recurrent admissions and hospitalizations for old patients.

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References

1. Aminzadeh F, Dalziel WB. Older adults in the emergency department: a systematic review of patterns of use, adverse outcomes, and effectiveness of interventions. *Ann Emerg Med* 2002; 39: 238-247.
2. Aschkenasy MT, Rothenhaus TC. Trauma and falls in the elderly. *Emerg Med Clin North Am* 2006; 24: 413-432.
3. Samaras N, Chevalley T, Samaras D, Gold G. Older patients in the emergency department: a review. *Ann Emerg Med* 2010; 56: 261-269.
4. Salvi F, Miller MD, Grilli A, Giorgi R, Towers AL, Morichi V, Spazzafumo L, Mancinelli L, Espinosa E, Rappelli A et al. A geriatric emergency service for acutely ill elderly patients: pattern of use and comparison with a conventional emergency department in Italy. *J Am Geriatr Soc* 2008; 56: 2131-2138.
5. Carpenter CR, Bromley M, Caterino JM, Chun A, Gerson LW, Greenspan J, Hwang U, John DP, Lyons WL, Platts-Mills TF et al. Optimal older adult emergency care: introducing multidisciplinary geriatric emergency department guidelines from the American College of Emergency Physicians, American Geriatrics Society, Emergency Nurses Association, and Society for Academic Emergency Medicine. *J Am Geriatr Soc* 2014; 62: 1360-1363.
6. Fadiloğlu Ç, Tokem Y. Geriatrik rehabilitasyonda hemşirenin rolü. *Türk Geriatri Dergisi* 2004; 7: 241-246 (in Turkish).
7. Myers S. Patient care. Elderly emergency. *Hosp Health Netw* 2005; 7: 24-26.
8. Strange GR, Chen EH. Use of emergency departments by elder patients: a five-year follow-up study. *Acad Emerg Med* 1998; 5: 1157-1162.
9. Mert E. Geriatrik hastaların acil servis kullanımı. *Türk Geriatri Dergisi* 2006; 9: 70-74 (in Turkish).
10. Ünsal A, Çevik AA, Metintaş S, Arslantaş D, İnan OÇ. Yaşlı hastaların acil servis başvuruları. *Türk Geriatri Dergisi* 2003; 6: 83-88 (in Turkish).
11. Kekeç Z, Koç F, Büyük S. Acil serviste yaşlı hasta yatışlarının gözden geçirilmesi. *Akademik Acil Tıp Dergisi* 2009; 8: 21-24 (in Turkish).
12. Vilpert S, Ruedin HJ, Trüeb L, Monod-Zorzi S, Yersin B, Büla C. Emergency department use by oldest-old patients from 2005 to 2010 in a Swiss university hospital. *BMC Health Serv Res* 2013; 13: 344.
13. Akbuğa Özel B, Mamak İkinci EB, Kayıpmaz AE, Kocalar ÜG, Çelikel E, Kavalcı C. Analysis of the use of resources and features of presentations and the trends in geriatric patients presenting to the emergency department: 2011-2015. *Turk J Geriatr* 2016; 19: 154-161.
14. Dickinson ET, Verdile VP, Kostyun CT, Salluzzo RF. Geriatric use of emergency medical services. *Ann Emerg Med* 1996; 27: 199-203.
15. Ettinger WH, Casari JA, Coon PJ, Muller DC, Piazza-Appel K. Patterns of use of the emergency department by elderly patients. *J Gerontol* 1987; 42: 638-642.
16. Hamdy RC, Forrest LJ, Moore SW, Cancellaro L. Use of emergency departments by the elderly in rural areas. *South Med J* 1997; 90: 616-620.
17. Graf E, Gianelli SV, Hermann FR, Sarasin FP, Michell JP, Zekrey D, Chevalley T. Identification of older patients at risk of unplanned readmission after discharge from the emergency department—comparison of two screening tools. *Swiss Med Wkly* 2012; 141: 13327.
18. Quach C, McArthur M, McGeer A, Li L, Simor A, Dionne M, Levesque E, Trembley L. Risk of infection following a visit to the emergency department: a cohort study. *CMAJ* 2012; 184: 232-239.

19. LaMantia MA, Platts-Mills TF, Biese K, Kha B, Busby-Whitehead J, Kizer JS. Predicting hospital admission and returns to the emergency department for elderly patients. *Acad Emerg Med* 2010; 17: 252-259.
20. Hastings SN, Schmader KE, Sloane RJ, Weinberger M, Goldberg KC, Oddore EZ. Adverse health outcomes after discharge from the emergency department—incidence and risk factors in a veteran population. *J Gen Intern Med* 2007; 22: 1527-1531.
21. Crilly J, Chaboyer W, Wallis M, Thalib L, Green D. Predictive outcomes for older people who present to the emergency department. *Aust Emerg Nurs J* 2008; 11: 178-183.
22. Salvi F, Morichi V, Grilli A, Giorgi R, De Tommaso G, Dessi-Tulpheri P. The elderly in the emergency department: a critical review of problems and solutions. *Intern Emerg Med* 2007; 2: 292-301.
23. Moons P, De Ridder K, Geyskens K, Sabbe M, Braes T, Flamaing J, Milisen K. Screening for risk of readmission of patients aged 65 years and above after discharge from the emergency department: predictive value of four instruments. *Eur J Emerg Med* 2007; 14: 315-323.
24. Akpınar O, Türkdöğän KA, Kapçı M, Duman A. Use of emergency department by geriatric patients. *J Clin Anal Med* 2015; 6: 310-314.
25. Logođlu A, Ayrık C, Köse A, Bozkurt S, Demir F, Narcı H, Karaaslan U. Analysis of non-traumatic elderly patients presentations to the emergency department. *Turk J Emerg Med* 2013; 13: 171-179.
26. Chen JC, Bullard MJ, Hu PM, Chiu TF, Liao HC, Liaw SJ. Differences of disease characteristics between genders in emergency department elderly of a community hospital in Taiwan. *Chang Gung Med J* 2000; 23: 190-196.
27. Karataş KG, Maral I. Ankara Gölbaşı ilçesinde geriatrik popülasyonda 6 aylık dönemde düşme sıklığı ve düşme için risk faktörleri. *Türk Geriatri Dergisi* 2001; 4: 152-158 (in Turkish).
28. McCabe JJ, Kennelly SP. Acute care of older patients in the emergency department: strategies to improve patient outcomes. *Open Access Emerg Med* 2015; 7: 45-54.
29. Kennelly SP, Drumm B, Coughlan T, Collins R, O'Neill D, Romero-Ortuno R. Characteristics and outcomes of older person attending the emergency department: a retrospective cohort study. *QJM* 2014; 107: 977-987.
30. Taymaz T. Examination of geriatric patients hospitalised from the emergency department. *J Acad Geriatr* 2010; 2: 167-175.
31. Downing A, Wilson R. Older people's use of Accident and Emergency services. *Age Ageing* 2005; 34: 24-30.
32. Caplan GA, Brown A, Croker WD, Doolan J. Risk of admission within 4 weeks of discharge of elderly patients from the emergency department—the DEED study. *Discharge of elderly from emergency department. Age Ageing* 1998; 27: 697-702.
33. McCusker J, Cardin S, Bellavance F, Belzile E. Return to the emergency department among elders: patterns and predictors. *Acad Emerg Med* 2000; 7: 249-259.