

Retrospective Analysis of the Oldest-Old Patients Who Applied to the Emergency Department and Their Differences from the Young-Old And Middle-Old

Acil Servise Başvuran İleri-Yaşlı Hastaların Retrospektif Analizi ve Genç-Yaşlı ve Orta-Yaşlılardan Farklılıkları
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ABSTRACT

Aim: Our study examined young, middle, and oldest-old patients who visited the emergency department (ED) and their differences.

Material and Methods: The research was executed retrospectively, utilizing the medical data of patients aged 65 and over who applied to the ED of a research hospital in Kayseri for the two years between January 1, 2020, and December 31, 2021. The patients were young-old, between 65 and 74 years old; aged 75 to 84 were middle-old, and those aged 85 and over were classified as oldest-old.

Results: 84415 (13.7%) older patients visited the ED during the study period. The patients' median age was 74 years, IQRs (69- 80) and 53.9% (n=45466) were female. 53.4% of the patients were young-old, 33.4% middle-old, and 13.2% were oldest-old. 7.2% (n=6060) of the hospitalized patients were admitted to the intensive care unit, and 7.8% (n=1719) died. Among the first three reasons for admitting the patients to the ED, 20% (n=16874) had COVID-19, 14.4% (n=12131) had gastrointestinal symptoms, and 13.9% (n=11718) had circulatory system symptoms. Oldest-old patients were brought to the ED by ambulance more (38.4% vs. 50.9% vs. 63.2% p< 0.001), stayed longer in the ED (81 vs. 103 vs. 116 minutes, p<0.001), fewer discharged (76.2% vs. 69.5% vs. 66%, p<0.001) and a higher in-hospital mortality rate (6% vs. 8.1% vs. 12.4% p<0.001).

Conclusion: We found that the length of stay in the ED, hospitalization rate, and ED and hospital mortality increased with age and were higher in oldest-old patients. We think that emergency health services should be developed according to the groups of elderly patients.

Keywords: Aged, patient outcome assessment, emergency medicine

ÖZ

Amaç: Çalışmamızda acil servise (AS) başvuran genç, orta ve ileri yaşlı hastaları ve farklılıklarını incelemeyi amaçladık.

Gereç ve Yöntemler: Çalışma 1 Ocak 2020 ile 31 Aralık 2021 arasındaki 2 yıllık dönemde Kayseri'de bir araştırma hastanesinin AS' e başvuran 65 yaş ve üzeri hastaların tıbbi kayıtları kullanılarak geriye dönük olarak yapıldı. Hastalar 65 ile 74 yaş arasında genç-yaşlı; yaşları 75 ile 84 arasında olanlar orta yaşlı; 85 yaş ve üzerindeki olanlar ileri-yaşlı olarak sınıflandırıldı.

Bulgular: Çalışma süresi boyunca 84.415 (%13,7) yaşlı hasta AS' e başvurdu. Hastaların yaş ortancası 74 yıl, ÇAA (69- 80) ve %53.9' u (n=45466) kadındı. Hastaların %53,4' ü genç-yaşlı, %33,4 orta-yaşlı ve %13,2' si ileri-yaşlı idi. Hastaneye yatan hastaların %7,2' sinin (n=6060) yoğun bakıma yattığı ve %7,8' inin (n=1719) öldüğü tespit edildi. Hastaların acil servise başvuru nedenlerinde ilk üç sırada %20 ile (n=16874) COVID-19, %14,4' ünün (n=12131) ile gastrointestinal sistem, %13,9 ile (n=11718) dolaşım sistemi semptomları vardı. İleri-yaşlı hastaların AS' e daha fazla ambulans ile geldiği (%38,4 vs %50,9 vs % 63,2 p<0,001), AS' de daha uzun süre kaldığı (81 vs 103 vs 116 dakika, p<0.001), daha az taburcu edildiği (%76,2 vs %69,5 vs %66, p<0.001) ve hastane içi ölüm oranının daha fazla olduğu (%6 vs %8,1 vs %12,4 p<0.001) bulundu.

Sonuç: AS kalış süresi, hastaneye yatış oranı ve AS ve hastane mortalitesinin yaşla birlikte arttığını ve ileri-yaşlı hastalarda daha yüksek olduğunu bulduk. Acil sağlık hizmetlerinin yaşlı hasta gruplarına göre geliştirilmesi gerektiğini düşünüyoruz.

Anahtar Kelimeler: Yaşlı, hasta sonuçlarının değerlendirilmesi, acil tıp

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Introduction

Because of the increase in the older population (65 years and over) worldwide and these patients need health services more frequently, it is a significant challenge for the emergency departments (ED). According to the United States census data, it is estimated that by 2030, approximately 20 percent of the total population will be over 65, which will be about 77 million (1). In Turkey, the older population increased by 17% in 2016 compared to 2012 and reached approximately 6.7 million. The proportion of the elderly society to the whole community has risen from 7.5% to 8.3% (2).

The rise in the older population brings important concomitant diseases such as diabetes, coronary artery disease, chronic obstructive pulmonary disease, and cancer. As a result, it increases health services, especially EDs. Various studies showed that elderly patients in the EDs are growing. These studies were generally conducted on patients over 65 years, and this patient group was not grouped. (3, 4). The studies have stratified the elderly population as young-old (65-74 years), middle-old (75-84 years), and oldest-old (85 years and older) (5). In Turkey, in 2016, 61% of the elderly were young-old, 30% were middle-old, and 8% were oldest-old (2).

We aimed to investigate the trends of patients aged 85 and over who visited the ED in two years in our tertiary hospital, which serves as a pandemic and regional hospital and compare them with those of the young and middle-old. And the difference of our study from other studies was that studies conducted in Turkey examined the elderly patients in a single group aged 65 and over.

Material and Methods:

Study group

Our study was retrospective; we used the medical data of elderly patients who visited the ED of a research hospital in Turkey over two years, from January 1, 2020, to December 31, 2021. Our study included patients aged ≥ 65 with medical problems who visited the ED. We only excluded the patients who visited at ED due to out-of-hospital cardiopulmonary arrest (dead on arrival). We classified the patients as young-old, aged 65 to 74; middle-old aged 75 to 84; oldest-old, aged 85 and over. We gathered data on age, gender, the ED visit reasons, transport and route of the visit to ED, ED outcome, hospitalization department, hospital outcome, and length of stay (LOS) in the ED and hospital. ED outcome was classified as discharge, hospitalization, death, referral, leaving the ED without permission, and treatment refusal. We recorded the hospitalization site as an intensive care unit (ICU) or ward.

We used the International Classification of Diseases 10 (ICD-10) codes to identify the ED visit's reason. According to ICD-10 codes, the reasons for elderly patients' emergency room visits are gastrointestinal, cardiovascular, and respiratory systems, etc., classified as complaints. For example, we ranked abdominal pain, diarrhea, and constipation as the gastrointestinal system, chest pain, and palpitation as the cardiovascular system, shortness of breath, cough, and hemoptysis as the pulmonary system.

Statistical analysis

We used the IBM SPSS (version 26) program and summarized the categorical data as frequency and percentage,

continuous data with normal distribution as mean value \pm standard deviation, and non-normally distributed data as median 25%-75% interquartile range (IQR). After performing the normal distribution test (Kolmogorov-Smirnov) of continuous variables, the Kruskal Wallis test was used to compare more than two groups of variables incompatible with the normal distribution. The Chi-square test was used to compare categorical variables. We considered the p-value <0.05 as statistically significant.

Ethical approval

The Kayseri City Hospital Ethics Committee approved our study (Approval no: 434, approval date: 01.07.2021). We waived the informed consent form because the study was retrospective.

Results

Demographic characteristics of elderly patients

During the 2-year study period, 613686 patients, 84415 (13.7%) of whom were 65 years and older, visited the ED. The patients' median age was 74, IQRs (69- 80) (min: 65, max: 122) years. 53.9% (n=45466) of the patients were women. 53.4% (n=45063) of the patients were young-old, 33.4% (n= 28233) were middle-old, and 13.2% (n= 11119) were oldest-old. It was found that 45.8% (n=38687) of the patients came to the ED by ambulance. 26% (n=21942) of patients were hospitalized, 0.6% (n=466) were referred to another hospital, and 0.3% (n=256) died. The first three reasons for visiting the ED were COVID-19 with 20% (n=16874), gastrointestinal symptoms with 14.4% (n=12131), and circulatory system symptoms with 13.9% (n=11718). 7.2% (n=6060) of the hospitalized patients were admitted to the ICU, and 7.8% (n=1719) died. The median LOS in the ED was 94 minutes, IQRs (19-168) (min: 5, max: 2158). The median LOS of the hospital was four days of IQRs (1-8) (min: 1-119).

Distribution of variables by age groups

According to age category, the rate of female patients was 51.2% in the young-old and 58.3% in the oldest-old. Conversely, the rate of the male was 48.8% in the young-old, while it was 41.7% in the oldest-old ($p < 0.001$) (Table 1).

Regarding the arrival at the ED, the oldest-old patients used ambulance more frequently (38.4% vs. 50.9% vs. 63.2% $p < 0.001$) ($p < 0.001$) (Table 1).

Oldest-old patients fewer discharged (76.2% vs. 69.5% vs. 66%, $p < 0.001$) and a higher mortality rate in the ED (0.2% vs. 0.4% vs. 0.5%, $p < 0.001$) (Table 1) (Graphic 1).

While the admission rate to ICU was 32.4% for the oldest-old, it was 26.6% for the middle-old and 26.7% for the young-old ($p < 0.001$). Oldest-old patients had a higher in-hospital mortality rate (6% vs. 8.1% vs. 12.4% $p < 0.001$) (Table 1).

Oldest-old patients had higher LOS in the ED (81 vs. 103 vs. 116 minutes, $p < 0.001$). We found no crucial statistical difference among age categories regarding the LOS in the hospitals ($p = 0.053$) (Table 1).

The main reasons for admitting the elderly patients to the ED, first three were COVID-19 (20%), gastrointestinal (14.4%), and circulation (13.9%) systems.

Significantly, the rate of oldest-old patients admitted to ED for COVID-19 was statistically significantly higher (17% vs. 22.8% vs. 25%, $p < 0.001$) (Table 2).

	n (%)				
	Young-old (65-74)	Middle-old (75-84)	Oldest-old (≥85)	Total	p value
Gender					
Female	23077 (51.2)	15902 (56.3)	6487 (53.9)	45466 (53.9)	< 0.001
Male	21986 (48.8)	12331 (43.7)	4632 (41.7)	38949 (46.1)	
Type of visit to ED					
Ambulance	17301 (38.4)	14364 (50.9)	7022 (63.2)	38687 (45.8)	< 0.001
Ambulatory	27762 (61.6)	13869 (49.1)	4097 (36.8)	45728 (54.2)	
ED outcome					
Discharge	34334 (76.2)	19618 (69.5)	7338 (66)	61290 (72.6)	< 0.001
Admission	10099 (22.4)	8226 (29.1)	3617 (32.5)	21942 (26)	
Leave without permission	89 (0.2)	0 (0)	1 (0)	90 (0.1)	
Referral	238 (0.5)	161 (0.6)	67 (0.6)	466 (0.6)	
Refuse treatment	205 (0.5)	123 (0.4)	43 (0.4)	371 (0.4)	
In-ED death	98 (0.2)	105 (0.4)	53 (0.5)	256 (0.3)	
Admission to					
Ward	7402 (73.3)	6034 (73.4)	2446 (67.6)	15882 (72.4)	< 0.001
ICU	2697 (26.7)	2192 (26.6)	1171 (32.4)	6060 (27.6)	
Admission Department					
Surgical ward	1344 (13.3)	1051 (12.8)	503 (13.9)	2898 (13.2)	< 0.001
Internal medicine ward	2046 (20.3)	1624 (19.7)	626 (17.3)	4296 (19.6)	
Pandemic ward	4012 (39.7)	3359 (40.8)	1317 (36.4)	8688 (39.6)	
Surgical ICU	323 (3.2)	284 (3.5)	137 (3.8)	744 (3.4)	
Internal medicine ICU	1179 (11.7)	715 (8.7)	307 (8.5)	2201 (10)	
Pandemic ICU	1195 (11.8)	1193 (14.5)	727 (20.1)	3115 (14.2)	
Hospital outcome					
Discharge	9493 (94)	7560 (91.9)	3170 (87.6)	20223 (92.2)	< 0.001
In-hospital death	606 (6)	666 (8.1)	447 (12.4)	1719 (7.8)	
		Median (IQRs)			
LOS in ED, minutes	81 (15- 154)	103 (40- 179)	116 (60-191)	94 (19-168)	<0.001*
LOS in hospital, days	4 (1-8)	4 (1-8)	4 (1-8)	4 (1-8)	0.053*

*p= Kruskal Wallis test

The chi-square test was used for the calculation of other p values.

ED= Emergency department, ICU= Intensive care unit, LOS= Length of stay

Table 1. Demographic characteristics of elderly patients who visited the ED

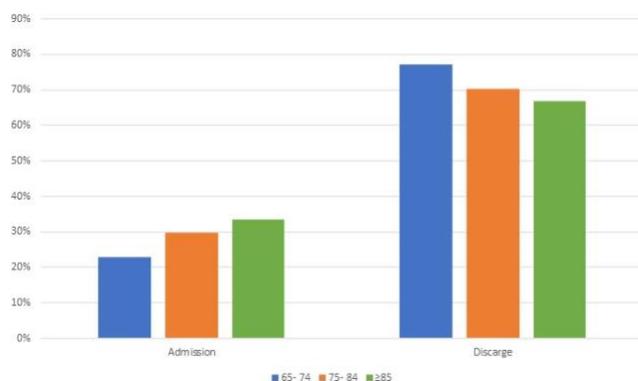


Figure 1. Admission and discharge rates of elderly patients

Discussion

The elderly population is increasing rapidly in the world and Turkey. Within the Organization for Economic Cooperation and Development, Turkey is a younger country with a 9.3% oldest age population in 2022 compared to countries such as Japan, Italy, and Germany, which have an elderly population of over 20% (6). In the province of Kayseri, where our study was conducted, the total population was 1376722 in 2017, according to TUIK data. According to the data, 8.5% of the total population belonged to older adults aged 65 and over, corresponding to approximately 118 thousand older people (2). Between 2014 and 2017, according to the US Department of Health and Human Services data, patients aged 60 and over visited the ED rate was 20% of all ED visits. The ED visit rate increased with age; for every 100 older people, 43 ED visits occurred. At the same time, 34 visits per 100 persons aged 60-69 years and 86 per 100 persons aged 90 and over happened (7). Elderly patients comprised 13.7%

of the ED visits in 2020 and 2021 when our study was conducted, corresponding to 42 thousand elderly patients annually. Approximately 35% of our research's elderly population applied to the ED. We think that this rate is high for Turkey with a young population.

Studies showed that visits to the ED in elderly female patients increase with age (5). In our research, female patients were higher numbers. Women constituted 53.9% of all elderly patients, and the rate of female patients was higher than male patients in the young-old, middle-old, and oldest-old. Therefore, especially for elderly patients, hospital managers should consider increasing the number of women's services and the number of medical services for women.

In our study, 54.2% of the patients visited the ED by an ambulatory, but using an ambulance was higher for oldest-old patients than young-old (63.2% vs. 38.4%). In studies conducted during the pandemic period, like our study, it was shown that the total number of ED visits decreased in all age groups, and the number of patients arriving by ambulance, especially elderly patients, increased (8–10).

In our study, approximately one-fourth of the elderly were hospitalized, around 30% of the oldest-old patients. A systematic review has shown that elderly patients have a higher rate of arriving at the ED by ambulance and hospitalization. It has been reported that one-third to half of all ED visits by elderly patients result in hospitalization, 2.5 to 4.6 times higher than the hospitalization rate for younger patients (11).

	n (%)				p value
	Young-old (65-74)	Middle-old (75-84)	Oldest-old (≥85)	Total	
Main conditions					
COVID-19	7647 (17)	6445 (22,8)	2782 (25)	16874 (20)	
Gastrointestinal	6350 (14,1)	4028 (14,3)	1753 (15,8)	12131 (14,4)	
Cardiovascular	6156 (13,7)	4064 (14,4)	1498 (13,5)	11718 (13,9)	
Other conditions*	4300 (9,5)	2699 (9,6)	1106 (9,9)	8105 (9,6)	
Respiratory	4526 (10)	2282 (8,1)	643 (5,8)	7451 (8,8)	
Musculoskeletal	4068 (9)	1943 (6,9)	596 (5,4)	6607 (7,8)	
Traumatic injury	3799 (8,4)	2063 (7,3)	959 (8,6)	6821 (8,1)	
Nervous system	3257 (7,2)	1928 (6,8)	715 (6,4)	5900 (7)	
Genitourinary	1652 (3,7)	976 (3,5)	413 (3,7)	3041 (3,6)	
Otorhinolaryngology	687 (1,5)	300 (1,1)	90 (0,8)	1077 (1,3)	
Nephrology	368 (0,8)	281 (1)	114 (1)	763 (0,9)	<0,001
Hematology	350 (0,8)	291 (1)	105 (0,9)	746 (0,9)	
Dermatology	472 (1)	169 (0,6)	56 (0,5)	697 (0,8)	
Infectious diseases	224 (0,5)	190 (0,7)	78 (0,7)	492 (0,6)	
Endocrine and metabolic	219 (0,5)	129 (0,5)	44 (0,4)	392 (0,5)	
Eye	307 (0,7)	110 (0,4)	33 (0,3)	450 (0,5)	
Cardiopulmonary arrest	157 (0,3)	143 (0,5)	74 (0,7)	374 (0,4)	
Mental and behavioral disorders	170 (0,4)	63 (0,2)	25 (0,2)	258 (0,3)	
Intoxication	170 (0,4)	53 (0,2)	21 (0,2)	244 (0,3)	
Gynecology	113 (0,3)	40 (0,1)	9 (0,1)	162 (0,2)	
Oncology	71 (0,2)	36 (0,1)	5 (0,05)	112 (0,1)	

p= The chi-square test

*= weakness, eating disorders, senility, symptoms, signs, and abnormal clinical and laboratory findings, not classified elsewhere

Table 2. Reason for ED visit of elderly patient groups

Elderly patients are at higher risk of hospitalization and death, including atypical clinical complaints, multi-comorbidities, increased frailty, delayed diagnosis, dementia, falls, and multiple drug use (12, 13). In our study, in-hospital mortality was 7.8% in all elderly patients, higher in the oldest-old.

Studies have reported that elderly patients stay longer in the ED, which may be due to the need for more extended consultation and diagnostic testing and the increase in the number of age-related diseases (5). One study showed oldest-old patients stayed in the ED 1.5 hours longer than young-old patients (14). Our research found that LOS in the ED in oldest-old patients was approximately 35 minutes longer than in young-old patients.

Common reasons for the visiting elderly patients to the ED are cardiovascular system disorders (ischemic heart disease, congestive heart failure, syncope, cardiac rhythm disorders), acute cerebrovascular strokes, pneumonia, abdominal pain, urinary tract infections, and fall-related injuries (11). We conducted our study during the pandemic. The most prevalent cause for visiting ED was COVID-19; the most common non-pandemic cause was gastrointestinal system complaints, similar to other studies from Turkey and other countries (15, 16, 17).

Our study had some limitations. First, our study was conducted in a regional hospital in the Kayseri province for two years. Therefore, applying the results to all elderly patients in the country may be challenging due to the region's characteristics, hospital scale, and length of study. Second, this was a retrospective study of medical records, which may contain inaccuracies or insufficient information.

Conclusion

We found that older adults visited the ED most frequently with gastrointestinal system complaints, except for the

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cause of the COVID-19, and the rate of using ambulances increased with age. The hospitalization of the elderly patient's rate was about a quarter. We found that the LOS in the ED, hospitalization rate, and ED and hospital mortality increased with age and were higher in oldest-old patients. Due to the differences between age groups, we recommend that healthcare services tailored to the needs of older patients be developed and delivered at the national level.

Conflict of Interest: The authors declare no conflict of interest regarding this study.

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Ethical Statement: The Kayseri City Hospital Ethics Committee approved our study (Approval no: 434, approval date: 01.07.2021). We waived the informed consent form because the study was retrospective. All authors declared that they follow the rules of Research and Publication Ethics.

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