



Characteristics of the Admissions of Old-old Patients to the Emergency Department

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Authors' contributions

This work was carried out in collaboration among all authors. Authors SD, BB and UMK designed the study, wrote the protocol and wrote the first draft of the manuscript. Author UMK performed the statistical analysis. Authors BB, MD and SD managed the analyses of the study. Authors BC and DC managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJMAH/2020/v18i430198

Editor(s):

(1) Darko Nozic, University of Belgrade, Serbia.

Reviewers:

(1) Maria Justine, Universiti Teknologi MARA, Selangor, Malaysia.

(2) Nwagu Marcellinus Uchechukwu, Edo University, Nigeria.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/57220>

Original Research Article

Received 17 March 2020

Accepted 22 May 2020

Published 30 May 2020

ABSTRACT

Aim: Through advances in technology and medicine, life expectancy is longer than before. The area covered by elderly people in the population pyramid has been changing over the years. Emergency departments are often used by elderly patients. It increases the density and fullness in already-crowded departments. In this study, we aimed to examine characteristics of the admissions of old-old people through the EDs and we wanted to discuss the precautions and regulations that might be taken in order to improve the quality of care and management.

Methodology: This study was carried out cross-sectionally and retrospectively in the one-year period between 01.01.2017-31.12.2017 in a department of emergency medicine. Patients' age, gender, the hours of admissions to the emergency department, the month of admissions, reasons for admissions, diagnoses, consultations, final status, the place of hospitalization, the name of the hospitalization department and the number of readmissions in a one-year period were recorded in the study form. The study data were analyzed with SPSS for Windows 22.0. $P < 0.05$ was considered statistically significant.

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Results: 4331 of these patients were included in the study. The mean age of the patients was 85.25 ± 3.90 and 60.5% of them were female. According to the months, the first three of the admission months were December, November and October (9.7%, 9.6%, 9.2% respectively). The most common admission was in the 08: 00-15: 59 time zone with 47%, followed by 41.8% with the 16: 00-23: 59 time zone. 4331 patients included in the study admitted to the emergency department 12.988 times during the study period. 46.2% of the patients admitted to the department once, 53.8% of them admitted 2 times and more. The discharge rate of patients who were admitted only once was 84.2% and the rate was 88.4% for twice and more admissions.

Conclusion: The existence and increasing number of this population should not be forgotten in changes to be made in emergency departments and other parts of the health system. Efforts should be made to improve the quality of care and to train staff to manage these patients more quickly and safely.

Keywords: Elder; emergency; geriatrics; readmission; sociodemographic.

1. INTRODUCTION

It is a known fact that the world population has started getting older. It is the first time in history that people in many countries of the world think that they will see their sixties. Through advances in technology and medicine, life expectancy is longer, especially in developed and developing countries. According to the "Life Tables 2016-2018" in Turkey announced by Turkey Statistical Institute (TSI) in 2019, the life expectancy at birth is 78.3 years, while for men 75.6 and for women 81 years [1]. Although Turkey is considered a country with a young population, the area covered by elderly people in the population pyramid has been changing over the years. When the old population archives are analyzed; the population over 65 years old was 690,662 in 1950, while this number was determined as 7.550.727 in 2019 [2].

Aging is a definition that includes changes in each part of the biopsychosocial model. Conditions requiring urgent treatment such as ischemic or hemorrhagic stroke, cardiovascular diseases, chronic lung diseases aggravated by infections and dehydration related problems observe more due to changing physiological and pathological processes with advanced age [3]. Emergency departments (EDs) are compartments that undertake a considerable burden of the health care system, and are often used by elderly patients for their acute or chronic problems. It increases the density and fullness in a crowded department which patients of all ages already admit to [4].

In a classification made by the World Health Organization (WHO), it defined the age group of 65-79 young-old and the age group of 80 and above as old-old patients [5]. While the number of old-old patients was quite low in the past, this

number is increasing day by day. Defining the characteristics of this patient group will be effective in improving the diagnosis and treatment services of patients.

In this study, we aimed to examine characteristics of the admissions of old-old patient group which is increasingly getting bigger and discuss the precautions or regulations that can be taken in the entire health care system, especially in the emergency departments, in order to improve the quality of care and management.

2. MATERIALS AND METHODS

This study was carried out cross-sectionally and retrospectively in the one-year period covering the dates 01.01.2017-31.12.2017 with the approval of the Ethics Committee numbered KAEK / 2018.6.02 in our emergency department. All patients aged 80 years or older who were admitted to the emergency department were included and by scanning the Hospital Information Management System and patient files. In this one-year period, 554,552 patients (aged 18 and over) who were admitted to the emergency department were identified. There were 13,855 patients aged 80 and over and 4331 of these patients, who have complete data, were included in the study. Patients' age, gender, the hours of admissions to the emergency department, the month of admissions, reasons for admission (trauma and non-trauma), diagnoses, consultations, final status (hospitalization, discharge, referral, treatment rejection, death), the place of hospitalization (Intra-institutional intensive care, out-of-institution intensive care, other departments) and the number of readmissions in one-year period were recorded in the prepared study form.

The diagnoses of the patients were recorded in the data form as respiratory diseases (Upper and lower respiratory tract infections, chronic obstructive pulmonary disease, asthma, pulmonary embolism, thoracic trauma etc.), cardiovascular diseases (Acute myocardial infarction, hypertension, chest pain, heart failure, arrhythmia etc.), neurological (Cerebrovascular diseases, epilepsy, intracranial bleeding, dizziness, peripheral nerve diseases etc.), musculoskeletal diseases (Limb trauma, joint pain, myalgia, limb swelling etc.), urinary system (Prostate diseases, urinary tract infections, hematuria, nephrolithiasis, ureterolithiasis etc.), gastrointestinal diseases (Gastritis, cholecystitis, appendicitis, bowel diseases, gastrointestinal bleeding etc.), endocrine-metabolic-nephrological diseases (Kidney failure, diabetes mellitus, electrolyte disorders, oral intake disorders, thyroid and hormonal disorders etc.), oncological diseases and others (dermatology, psychiatric diseases etc.) according to the relevant body system.

The study data were analyzed with SPSS for Windows 22.0. When evaluating the data, descriptive statistics (mean, standard deviation, median, frequency, percentage, minimum, maximum) were used. The Mann-Whitney U test was used to compare between two groups of quantitative variables that do not show normal distribution and the Pearson's chi-squared test was used to compare qualitative data. $p < 0.05$ was considered statistically significant.

3. RESULTS

Of the 554.552 patients who were admitted to our hospital's emergency department in 2017, 13855 (2.5%) were 80 years old and over. 4331 of these patients were included in the study. The mean age of the patients was 85.25 ± 3.90 and 60.5% of them were female. According to the months, the first three of the admission months were December, November and October (9.7%, 9.6% and 9.2% respectively). In the distribution of patient admissions, it was determined that the most common admission was in the 08:00-15:59 time zone with 47% , followed by 41.8% with the 16:00-23:59 time zone. The most common reasons for admission were non-traumatic reasons with %92.2. It was found that 4331 patients included in the study admitted to the emergency department 12.988 times during the study period. While 2001 of these patients applied to the ED only once, it was found that 1814 patients admitted to the ED 2-5 times, 322 patients 6-10 times and 194 patients 11 times

and more. While 86.5% of the patients were discharged, 12.2% of them were hospitalized or referred to another institution (Table 1).

There wasn't any consultation for 67.6% (n=2927) of the patients and the most frequent consultation branch was found to be internal medicine with 11%. 86.5% (n=3745) of the patients was discharged, 12.2% (n=530) of the patients was hospitalized, died or transferred to another hospital (Table 1).

In the study, it was found that 84.2% (n=1685) of the patients who were admitted to the hospital only once and 88.4% of them (n=2060) who were admitted twice or more were discharged. Similarly, while there wasn't any consultation requested for %63.7 (n=1275) of the patients who were admitted only once, this rate was 70.9% (n=1652) for the patients admitted twice or more (Table 2).

According to diagnoses of the patients, the most common diagnoses were respiratory system diseases with 27.1% (n=1182), whereas it was found that the diseases of the gastrointestinal tract and musculoskeletal system were followed by 20.5% (n=893) and 19.6% (n=852), respectively (Table 3).

When the patients are grouped based on their gender; there is no significant difference in the grouping of patients according to age, months or season of admission in terms of admission time zone, clinical outcome and hospitalization.

4. DISCUSSION

Elderly patient admissions to the EDs are also increasing related to the aging of the population and the increasing population, and this affects the operation of the emergency departments that have been already busy. There are different numbers in the literature regarding of the rates of ED admissions for elderly patients [4,6]. In a ten-year study conducted by Roberts et al., they found that admissions for patients aged 65 to 74 years increased 34% [7]. Although these numbers vary according to the health care systems of the countries, the area occupied by geriatric patients in the system, their socioeconomic or cultural status; the common result of all studies is that the numbers increase compared to the past. Studies on geriatric patients gain importance in the field of emergency medicine as in all branches, also the sociodemographic data of this patient group and the course of their visits form the key to solutions.

Table 1. General characteristics of patients aged 80 years and above admitted to the ED

Characteristics	Female (n=2620)	Male (n=1711)	P value	
Age (mean±SD)	85.25±3.94	85.25±9.82	0.641	
The number of emergency admissions (Mean ± SD)	2.58±2.93	3.63±5.25	<0.01	
Month of admission	n (%)	n (%)		
January	203 (7.7)	161 (9.4)	0.280	
February	203 (7.7)	114 (6.7)		
March	209 (8)	120 (7)		
April	187 (7.1)	112 (6.5)		
May	226 (8.6)	127 (7.4)		
June	196 (7.5)	142 (8.3)		
July	212 (8.1)	153 (8.9)		
August	226 (8.6)	158 (9.2)		
September	202 (7.7)	146 (8.5)		
October	252 (9.6)	147 (8.6)		
November	247 (9.4)	168 (9.8)		
December	257 (9.8)	163 (9.5)		
Admission Interval	n (%)	n (%)		
08:00-15:59	1236 (47.2)	801 (46.8)	0.408	
16:00-23:59	1104 (42.1)	705 (41.2)		
00:00-07:59	280 (10.7)	205 (12)		
Number of readmissions during the study period	n (%)	n (%)		
Once	1262 (48.2)	739 (43.2)	<0.01	
Two-Five times	1116 (42.6)	698 (40.8)		
Six-Ten times	166 (6.3)	156 (9.1)		
Eleven and more times	76 (2.9)	118 (6.9)		
Admission Patterns	n (%)	n (%)		
Trauma	235 (69.5)	103 (30.5)	<0.01	
Non-Trauma	2385 (59.7)	1608 (40.3)		
Consultants*	n (%)	n (%)		
None	1764 (60.3)	1163 (39.7)	<0.01	
Internal Medicine	284 (59.5)	193 (40.5)		
Orthopedics	190 (69.5)	83 (30.5)		
Neurology	152 (63)	89 (37)		
General Surgery	151 (64.2)	84 (35.8)		
Anesthesia	142 (63.1)	83 (36.9)		
Cardiology	76 (59.3)	52 (40.7)		
Pulmonology	81 (66.9)	40 (33.1)		
Urology	21 (23.3)	69 (76.7)		
Neurosurgery	31 (62)	19 (38)		
Others	10 (58.8)	7 (41.2)		
Hospitalization Status	n (%)	n (%)		
Nonhospitalized	2251 (60.1)	1494 (39.9)		0.759
Hospitalized	167 (63.3)	97 (36.7)		
Exitus in ED	25 (61)	16 (39)		
Referral to Another Hospital	168 (63.2)	98 (36.8)		
Refuse Treatment	9 (60)	6 (40)		
Hospitalization places	n (%)	n (%)		
Internal Medicine	68 (63.6)	39 (36.4)	0.495	
Orthopedics	46 (67.6)	22 (32.4)		
General Surgery	32 (60.4)	21 (39.6)		
Neurology	9 (60)	6 (40)		
Intensive Care Unit				
<i>In Hospital</i>	10 (55.6)	8 (44.4)		
<i>Referral to Another Hospital</i>	164 (64.1)	92 (35.9)		
Other	6 (54.5)	5 (45.5)		

*More than one consultation, Mann Whitney U Test, Pearson Chi Square Test

Table 2. Patient distribution according to readmission groups

	Once admission to ED (n=2001) (%)	Twice and more admissions to ED (n=2330)	P value	
Age	85.21±3.84	85.29±3.94	0.653	
Female	1262 (63.1)	1358 (58.3)	<0.01	
Male	739 (36.9)	972 (41.7)		
Hospitalization Status				
Hospitalization	143 (7.1)	121 (5.2)	<0.01	
Nonhospitalization	1685 (84.2)	2060 (88.4)		
Exitus in ED	20 (1)	21 (0.9)		
Referral to Another Hospital	139 (6.9)	127 (5.5)		
Refuse Treatment	14 (0.7)	1 (0.0)		
Diagnosis*				
Pulmonary System	524 (26.2)	658 (28.2)	<0.01	
Gastrointestinal System	370 (18.4)	523 (22.3)		
Musculoskeletal System	446 (22.2)	406 (17.4)		
Neurologic System	255 (12.7)	237 (10.1)		
Cardiovascular System	164 (8.1)	179 (7.7)		
Genitourinary System	102 (5)	181 (7.7)		
Endocrine-Nephrology Systems	139 (6.9)	137 (5.7)		
Oncology	7 (0.3)	12 (0.4)		
Others	6 (0.2)	11 (0.5)		
Consultation**				
None	1275 (63.7)	1652 (70.9)		<0.01
Internal Medicine	227 (11.3)	250 (10.7)		
Orthopedics	166 (8.2)	107 (4.6)		
Neurology	141 (7)	100 (4.3)		
Anesthesia	119 (5.9)	106 (4.5)		
General Surgery	106 (5.2)	129 (5.5)		
Cardiology	55 (2.7)	73 (3.1)		
Pulmonology	54 (2.7)	67 (2.8)		
Urology	38 (1.9)	52 (2.2)		
Neurosurgery	28 (1.4)	22 (0.9)		
Others	13 (0.6)	4 (0.1)		

*More than one diagnosis ** More than one consultation, Mann Whitney U Test, Pearson Chi Square Test

Table 3. Patient distribution according to diagnosis

Diagnosis	n (%)
Pulmonary System	1182 (27.1)
Gastrointestinal System	893 (20.5)
Musculoskeletal System	852 (19.6)
Neurologic System	492 (11.3)
Cardiovascular System	343 (7.9)
Genitourinary System	283 (6.5)
Endocrine-Nephrology Systems	276 (6.3)
Oncology	19 (0.4)
Others	17 (0.4)
Total	4357 (100)

*More than one diagnosis

According to the data of TSI, life expectancy for women is longer than men, as in many countries [1]. This situation reflects on the EDs and the majority of geriatric patients are female. In the

study conducted by Ergin et al., 52.3% of the cases and in the study published by Ukkonen et al. in 2019, 67% of the cases were stated as females [8,9]. In our study, 60.5% of cases were

found to be female, and this result was compatible with many publications in the literature.

Considering the distribution of case admissions by months in our study, it was observed that the most frequent months were December, November and October, respectively. Although there are differences in the literature regarding the frequent admission months, however it was observed that the geriatric patient group admitted most frequently in autumn and winter season [10, 11]. This might be explained by the seasonal flu period starting from mid-autumn to early spring and the resistance of geriatric patients to respiratory infections is different from other age groups. Because it is known that advanced age patients may show serious symptoms even in simple respiratory infections due to decreased mucociliary activity, weakened immune system and coexistence of chronic diseases [12,13].

When it comes to the admission hours during the day, the results in our study also support the data in the literature [10,14]. It was determined that the admissions are most frequently in between 08:00-15:59 and the second was in between 16:00-23:59. While some of the elderly patients undertake their own care and can request their own assistance at any time of the day in case of illness; the necessary assistance is provided by the caregivers (family members, nursing staff, etc.), especially in case of need for old-old patients. During daytime hours and in the evening, caregivers can notice the changes in the patients and bring the patients to the emergency department via ambulance services or their own vehicles. We believe that this situation may explain pretty much the distribution in admissions of the patients aged 80 years and over.

Changes occur in all systems of the body with aging. Changes in some systems affect the development of acute diseases, acute exacerbation of chronic diseases and these are important causes of admissions to the ED's for elderly patients. As the age progresses; besides the decrease in respiratory mucociliary activity, a decrease in the strength and compliance of the respiratory muscles, drying in the mucous membranes, decreased cough reflex, decreased response to hypoxia and hypercapnia occur and these changes become evident especially on the patients aged 80 years and above [15-17]. Chronic obstructive pulmonary disease is observed 2-3 times more in patients over the age

of 60 compared to the normal population [18]. Decreased ability to taste and thirst sensation, degenerated mucous membrane, decreased gastric motility, slow gastric emptying, and decreased absorption of vitamins and carbohydrates are also seen in the gastrointestinal tract. This may cause dehydration, malnutrition, constipation, gastro esophageal reflux; in some cases, aspiration and ileus [19]. Although additional reasons such as nutritional habits from the past, relatively few numbers of additional diseases, physical activity status in young-old people mask the effects of these changes on acute diseases, they become evident especially in old-old patients. In addition, multiple drug use increases due to increased chronic diseases with advanced age and it certainly increases the risk of gastrointestinal bleeding [20]. In our study, when the distribution was analyzed according to the diagnoses, the most frequently respiratory system and subsequent gastrointestinal system-related diagnoses were observed. When the studies related to geriatric patients are examined, a wide range is seen in terms of the most common reasons for admission to the emergency department and the diagnoses received. While Ünsal et al showed the frequency of lung diseases and cardiological diseases [21], LaMantia et al. emphasized the reasons for admissions such as falls, dyspnea, chest pain, abdominal pain [22]. These different data in the literature may be explained by regional and ethnical differences, departments participating in emergency health services in hospitals, and the state of consultation services. We believe that the frequent diagnoses we found in our study are compatible with the changes and possible pathologies encountered with advanced age.

Another physiological changes that occur with advancing age are related to bone tissue, and low bone mass and micro architectural deterioration of bone tissue are observed [23]. This situation becomes more evident especially in postmenopausal women and fragility increases with advanced age. While the lifetime risk of hip fracture is about 14% for postmenopausal women, it is about %6 for men [24]. Also, while urinary tract infections and urinary incontinence are more common in women in the early state of aging; they are also common in men due to prostate pathologies and associated operations as the age progresses [25,26]. In our study, when the diagnoses according to gender were examined, it was observed that female patients

had more musculoskeletal system related diagnoses than male patients. Furthermore, male patients had more genitourinary system related diagnoses than females and those results were statistically significant. The aforementioned changes were found compatible with the data determined in our study.

In our study, it was determined that 86.5% of the patients who were admitted to the emergency department were discharged after the treatment in the emergency department and there wasn't any consultation for 67.6% of the patients. During the study, it was determined that 46.2% of the patients were admitted to the department once, 53.8% of them were admitted twice and more. The discharge rate of patients who were admitted only once was 84.2% and the rate was 88.4% for twice and more admissions. In the study of Demircan et al., they mentioned that the re-application rate was 37% in one-year period [11], in another study, this rate was reported as 50% [6]. Patients whose acute treatment is completed in the emergency department and have no indication for hospitalization should be followed by appropriate polyclinics or home care services. The need for post-discharge follow up may not be fully comprehended by caregivers and can cause disruptions in the course of treatment. In addition, the transport problems experienced during transferring of the immobile patients to the hospital for controls also make the ambulance services necessary. The use of this service outside of admission to emergency departments sometimes creates problems in some areas. Furthermore due to physiological changes that occur with advanced age, symptoms and signs may become unremarkable and specificity rates of them may change. The consciousness of the old-old patients or the information about the patient that caregivers have affects the process of history taking and decreases the accuracy of the history [11]. All these factors restrain getting the correct diagnosis and treatment for old-old patients, extend the length of stay of older patients in the ED and compose the source of the readmissions.

Emergency departments are the parts of the health care systems with strong adaptability skills. Taking global measures as well as changes on a country basis would make the emergency departments relationship with geriatric patients easier to manage.

As a result of socio-demographic studies conducted to define the problem, the concept of

"Geriatric patient friendly emergency departments" has been introduced in recent years. This concept is not only physical features and infrastructure works; it also describes staff needs to be ready for geriatric adaptations about interactions of multiple drug use, nursing services and recognizing geriatric syndromes [27,28]. Given the increase in geriatric patient admission rates, the length of stay in the ED and readmission rates, this change is inevitable to reduce the workload of the ED and improve the quality of care.

5. CONCLUSION

As in the rest of the world, the life span in our country is prolonging as well and the number of old-old people is increasing day by day. The existence and increasing number of this population should not be forgotten in changes to be made in emergency departments and other parts of the health system. Efforts should be made to improve the quality of care and to train staff to manage these patients more quickly and safely.

CONSENT

It is not applicable.

ETHICAL APPROVAL

This study was carried out cross-sectionally and retrospectively in one-year period between 01.01.2017-31.12.2017 with the approval of the Ethics Committee numbered KAEEK / 2018.6.02 Kanuni Sultan Suleyman Training and Research Hospital, Department of Emergency Medicine.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
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