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Original Articles

Geriatric Patients Presenting to the Emergency Department of a Japanese University Hospital

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Abstract To evaluate the trend of elderly patients visiting the emergency department of a Japanese University Hospital, out patient-based records were reviewed of the emergency department of Kyushu University Hospital from 2000 to 2004. A total number of 7610 emergency patients visited the department during the five year period. The median (25%, 75%) of age was 32 (22, 56). Patients aged 65 years and over accounted for 16 % of all attendances. All the patients were classified into 6 groups according to the diagnosis, (1) Respiratory, (2) Circulatory, (3) Central nervous system, (4) Abdominal, (5) Trauma, and (6) Others. The median age in each group was (1) 27 (15, 49), (2) 66 (53, 76), (3) 51 (27, 67), (4) 33 (22, 56), and (5) 26 (20, 46), respectively. There was a statistically significant difference observed, reciprocally except between (1) and (5) ($P<0.05$). The patients showed statistically significant difference in the annual transition of the disease ($P<0.0001$). In the elderly, the annual transition of the disease showed statistically significant decreases in Circulatory ($P=0.0015$) and in Central nervous ($P<0.0001$), and an increase in Abdominal ($P<0.0001$), respectively. Death rate at the outpatient clinic in the elderly showed much higher than in the younger ($P<0.0001$). Admission rate was also much higher in the elderly than in the younger ($P<0.0001$). Elderly emergency patients have both internal and external intrinsic factors. They have to be treated carefully since their condition easily deteriorates. Provisions for the problems surrounding the elderly should be made as a nationwide effort.

Key words: emergency medicine, geriatric, elderly

Introduction

The aging of the Japanese is progressing. According to a white paper from the Ministry of Health and Welfare of Japan, only 7.1% of Japanese were over the age of 65 years and the population was 7.37 million in 1970. In 2000, it was 17.2% and 21.87 million. It is estimated that by the year 2020, it will be 26.9% and 33.34 million. The number of families with a single elderly person living alone was 3.4 million in 2000, which increased 5.6 times more than in 1975 when it was 0.61 million[1]. Similar tendency is also recognized in western countries[2)~6)].

Clinically, older adults are shown to pres-

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ent with nonstandard diseases, altered laboratory values, multiple co-morbid diseases, extensive medical histories, communication problems, and potentially altered mental status. This might lead to increased attendance rates at emergency departments (ED) by older people. Despite this there have been few studies looking at older people's use of ED.

The aim of this study is to describe the ED of a Japanese University Hospital attendance pattern of older people, using data of the patients' record and the system of the Japanese emergency medicine has also been reported.

Methods

This study was conducted in the ED of Kyushu University Hospital, a 1352-bed teaching hospital in Fukuoka city of Fukuoka prefecture, which is in the Kyushu district, south of Japan. Our ED managed 5 beds with some extra common beds for the emergency patients and 16 beds of intensive care units for tertiary patients who need respiratory and/or circulatory care with or without consciousness disorder. As a tertiary referral center, particularly since 2004, our ED has received a wide variety of emergency cases by ambulance. Fukuoka city is ordinance-designated city and its population is 1.32 million. There are two emergency medical service centers for all kinds of emergency patients from primary to tertiary emergency in this city. There are 39 emergency hospitals registered in Fukuoka city, of which 4 is public and 35 private. Most of mild emergency cases are treated in the private emergency hospital.

To facilitate this study, a computerized database has been established to collect information on ED admission to the hospital. The database holds individual records of each patient presented to the ED. A retrospective analysis was performed using this data. Analysis was conducted on five years of data from January, 2000 to December, 2004. The attendance was split into two groups: patients aged 0-64 years and patients aged 65 and over.

Statistical analysis

In order to analyze annual ED attendances, Spearman's correlation analysis was used. Data were expressed as median (25%, 75%) on age. Differences of age in the disease classification were assessed using Kruskal-Wallis test with Bonferroni correction. For comparisons of the proportion, the chi-square test for proportion and Cochran-Armitage test for trend in proportions were used. Significant level was determined at the 5 %. The SAS 8.2 statistical package was used for the analyses.

Results

During the five-year period from January 2000 to December 2004, a total of 7610 patients visited the ED of Kyushu University Hospital, of whom 4084 were male and 3526 were female. Median (25%, 75%) of age was 32 (22, 56). The range is from 0 to 101. Annual attendances are shown in Figure 1. Remarkable increase is recognized in patients' number particularly in 2004. The figure shows significant correlation ($\rho=0.90000$, $P=0.0374$). A total of 1224 (16%) were patients aged over 65 years, with 6386 (84%) by patients aged between 0 and 64 years. The rate of primary emergency patients was 70%, who have treatment as an outpatient without hospitalization, that of secondary emergency patients was 25%, who need hospitalization to have treatment under a single department and that of tertiary emergency patients was 5 %, who need

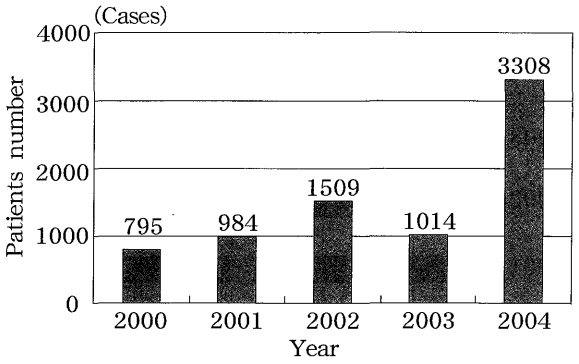

Fig. 1 Annual ED attendances
Annual attendances at ED shows gradual increase year by year. The number of the top of each bar graph shows the real number. The figure shows significant correlation (Spearman's correlation analysis, $\rho=0.9000$, $P=0.0374$).

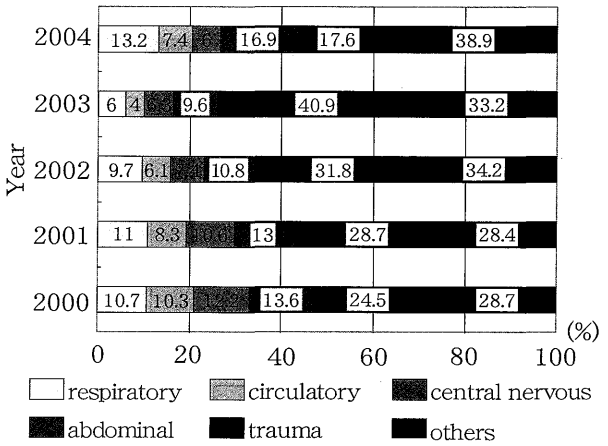

Fig. 2 Annual disease classification of all patients
The annual patients' proportion of the disease was statistically significant (Chi-square test, $P<0.0001$). The sum of patients of both trauma and others accounted for more than half of all patients throughout the years. In 2003, more than 70% of cases were trauma and others. The value is given as a percentage.

hospitalization to have treatment by some departments, respectively.

All the patients were classified into 6 groups according to the diagnosis, (1) Respiratory, (2) Circulatory, (3) Central nervous, (4) Abdominal, (5) Trauma, and (6) Others. Others include various kinds of disease such as otolaryngological, ophthalmologic, dermatologic, and psychiatric diseases. Annual change of the ratio in this classification is shown in Figure 2, which is statistically significant ($P<0.0001$). The sum of patients of both trauma and others accounted for more than half of all patients throughout the entire number of years. In 2003, more than 70% cases were from trauma and others.

The age in each group is described in Table 1. Median (25%, 75%) was 27 (15, 49) in the respiratory group, 66 (53, 76) in circulatory, 51 (27, 67) in central nervous, 33 (22, 56) in abdominal, and 26 (20, 46) in trauma, respectively. It showed statistically significant difference, reciprocally except between respiratory and trauma group using Kruskal-Wallis test with Bonferroni correction ($P<0.05$).

Table 1 Age for Various Disease

Disease	Cases	Age Median (25%, 75%)
respiratory	830	27 (15, 49)
circulatory	538	66 (53, 76)
central nervous	573	51 (27, 67)
abdominal	1048	33 (22, 56)
trauma	1896	26 (20, 46)

Kruskal-Wallis test $P<0.0001$. Multiple comparisons with Bonferroni's correction between all possible pairs of groups except a pair of respiratory and trauma were significant differences.

Figure 3 shows the annual ratio of elderly patients. The elderly people, equal and more than 65 years old, consists of 16.1% in total of all patients. The aged proportion is statistically different on an annual change using a chi-square test ($p=0.00177$). However, the trend in proportions did not show significant difference with using the Cochran-Armitage test ($P=0.0826$).

Figure 4 shows annual change according to the disease classification of the elderly.

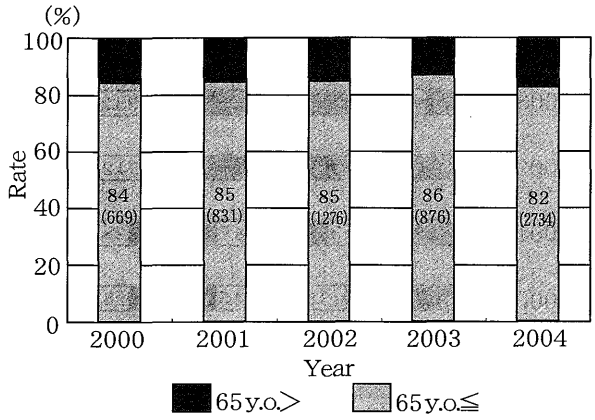

Fig. 3 Annual ratio of elderly patients
Elderly people make up 14-18 % of all patients. The number in parenthesis shows the real number, which increased annually except in 2003. The aged proportion is statistically difference on an annual change using chi- square test (p= 0.00177). However, the trend did not show a significant increase using the Cochran-Armitage test (P=0.0826).

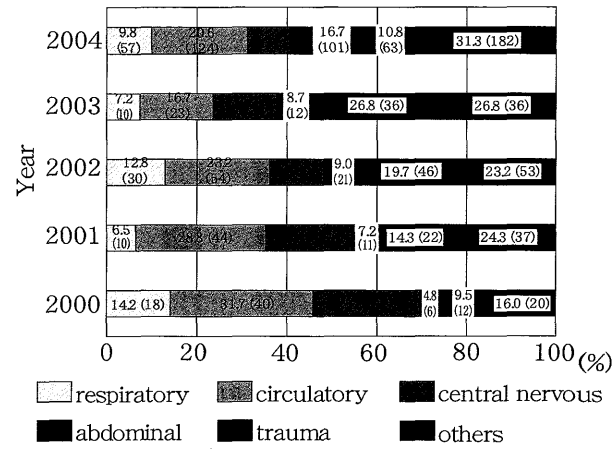

Fig. 4 Annual ratio of various diseases in elderly
The numerical value is the percentage and the value in the parenthesis is the real number. The data from 2003 only accounts for about half of the whole cases in trauma and others group. It seems to show an annual trend of a decrease in circulatory, central nervous, and increase in abdominal group.

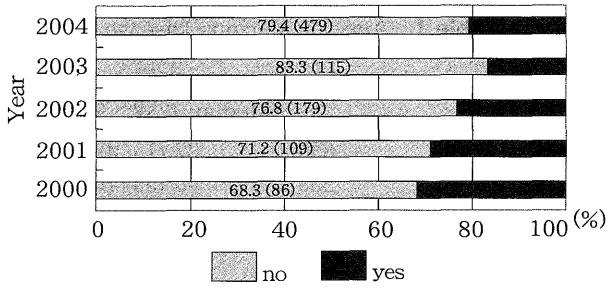

Fig. 5 Annual ratio of circulatory disease in elderly
The numerical value is the percentage and the value in the parenthesis is the real number. It shows a statistically significant decrease using the Cochran-Armitage test (P=0.0015).

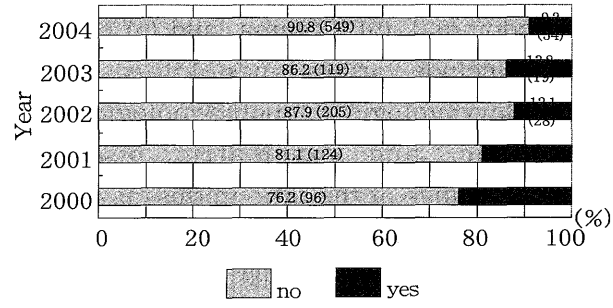

Fig. 6 Annual ratio of central nervous disease in elderly
The numerical value is the percentage and the value in the parenthesis is the real number. It shows a statistically significant decrease using the Cochran- Armitage test (P<0.0001).

The data of 2003 in this figure 4 accounted for about half of the whole cases in trauma and others group, whilst they showed more than half of all the patients throughout the entire period in Figure 2. We examined annual trend of each group in the elderly. They showed no significant difference except in the circulatory, central nervous, and abdominal group. The trend in proportions decreased gradually in circulatory in Figure 5 (P=0.0015) and central nervous group in Figure 6 (P<0.0001) and increased year by year in abdominal group in Figure 7 (P<0.0001) using Cochran-Armitage test.

Table 2 described mortality at the outpatient clinic and rate of hospitalization for

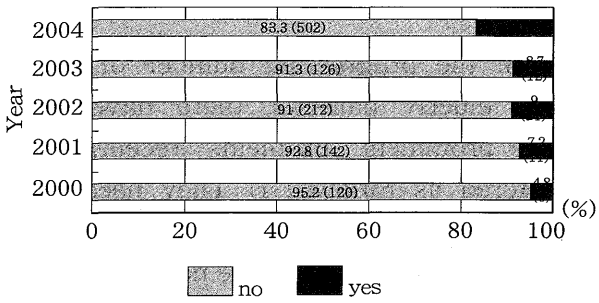

Fig. 7 Annual ratio of abdominal disease in elderly
The numerical value is the percentage and the value in the parenthesis is the real number. It shows a statistically significant increase using the Cochran-Armitage test (P<0.0001).

Table 2 Mortality at Outpatient and Hospitalization

	Mortality (%)		Hospitalization (%)	
	yes	no	yes	no
65 y.o.≦	54 (4)	1170 (96)	570 (46)	654 (54)
65 y.o.>	74 (1)	6312 (99)	1299 (20)	5087 (80)
	Chi-square test P<0.0001		Chi-square test P<0.0001	

the elderly. Death rate of the outpatient was much higher in the elderly patients than in the younger patients (P<0.0001). Admission rate was also much higher in the elderly patients than in the younger patients (P<0.0001).

Discussion

The elderly people have characteristics as follows; 1) they have many complications such as cerebrovascular disease, heart disease, and malignancy. 2) With their aging, their organic functions decline toward senility, dementia, failure of eyesight and motor function, which leads to what is difficult to make the correct diagnosis. Once they developed, their condition took a sudden turn for the worse. 3) There are many elderly people living alone or living only with their spouse, which usually means that they are treated only in the late stages so the symptoms indicate that their status is severe. It needs long hospitalization and the result is necessarily poor[1)5)6)]. Recently published Japanese articles have shown a rising tendency to use emergency transportation for elderly people, particularly for secondary or tertiary emergencies and seriously illness[7)~9)]. They showed elderly patients accounted for about half of all the emergency patients[8)9)]. Paying attention to the classification of the disease, there are more cases recognized with cerebrovascular disease and cardiovascular disease. However, most of them were reported from the rural areas. Our results showed that the elderly accounted for 16% of all emergency cases. The difference even in the same country might be due to the hospital situation, whether the hospital is located in an urban or rural area. A report from Keio University hospital in a metropolitan city, which only described injury cases, the elderly patients accounted for about 20% of cases treated at the hospital[10)]. From the reports of western countries, the rate is generally similar. It has previously been reported that patients aged over 65 years account for about 15% of the ED attendances[2)3)5)6)].

From our results, when the total sum of the emergency patients' is considered, the rate of the geriatrics showed a statistically significant difference using a chi-square test. However, there was no significant increase year by year using the Cochran-Armitage test. This might be reflected in the remarkable increase in the proportion of patients' for 2004. The total number of elderly patients have risen, above all, elderly patients with abdominal disease. Our research indicated that half of the cases are due to trauma and others. Herein, others includes various kinds of diseases such as otolaryngological, ophthalmologic, dermatologic, and psychiatric diseases. Con-

cerning the trauma, a detailed published article has shown the number of the aged trauma patients increased annually[10]. Also it has been shown that elderly patients are predominately female and longer hospitalization is necessary for elderly patients in general. Additionally, trauma in younger patients is usually from traffic accidents and that in the elderly trauma is from other causes. In our results, the age of the trauma group included the younger generation as well.

In Japan, we have a particular system for medical insurance and medical treatment. All Japanese are part of an affiliate insurance system. Every patient can have medical treatment at every hospital. Emergency patients transported by ambulance are basically taken to an emergency hospital unless they have no family doctor. Hospitals involved in emergency treatment are both public and private. With a postgraduate residency program newly set up in 2004 to compensate for the present ramified medicine and to address the needs of an aging society, many hospitals have been trying to improve their ED. Our hospital is no exception. These changes around emergency medicine seem to be quite similar to the situation worldwide. The emergency department of our hospital, in 2005, treated a total of 5,710 patients and a total of 1,809 ambulance accepted patients, of whom 422 (7%) required tertiary medical care. One of the reasons why a project has commenced to establish our hospital emergency center and a critical care center by 2009, is because there has been a rapid increase in the number of emergency patients. From 2004, there have been remarkable personnel reforms implemented regarding emergency physicians as well as other experts in other medical fields, particularly in the area of surgery.

With the progressing number of emergency elderly patients, there have been some prominent problems recently encountered as follows; 1) They need long hospitalization after the elderly emergency patients are admitted to the hospital. This causes a bed-shortage for the tertiary emergency hospital. 2) There are changes in the medical system nationwide. Recently the number of clinics has increased, which is primarily for daytime medical treatment, and the patients have been diverted away from the bigger hospitals. Tendency of nuclear family and increase of a double income household makes home medical care difficult as well. There is a similar situation even in plural households and the elderly in a single household. Provisions for these problems must be made as a national effort.

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(和文抄録)

九州大学病院救急部における高齢者救急患者の現況

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九州大学病院救急部における2000年から2004年の5年間の外来受診記録をもとに高齢者の受診状況を調査した. 5年間の救急患者総数は7610名であり, 年齢の中央値(25%, 75%)は32 (22, 56) である. このうち65歳以上の患者は1224名, 全体の16%であった. 全症例を, (1)呼吸器系, (2)循環器系, (3)中枢神経系, (4)腹部消化器系, (5)外傷系, (6)その他, の6群に分類した. 各群の年齢の中央値はそれぞれ (1) 27 (15, 49), (2) 66 (53, 76), (3) 51 (27, 67), (4) 33 (22, 56), (5) 26 (20, 46) であり, (1), (5)群間を除くすべての群間で有意差を認めた. 高齢者における各疾患群の年次別推移では, 循環器系(P=0.0015), 中枢神経系疾患群 (P<0.0001) で減少傾向を, 腹部消化器系疾患群で増加傾向 (P<0.0001) を認めた. 救急外来における死亡率や入院率の統計結果では, 高齢者のほうが若年者に比べ有意に高率であった (P<0.0001). 近年の高齢救急患者は基礎疾患を有したり, 特殊な生活環境もあって治療に難渋することも少なくない. 診療に際しては細心の注意を払い慎重に臨むべきである.