Introduction

Because of a decrease in the fertility rate and progress in medical science and technology, the elderly population in Taiwan increased to over 7% in 1993, and by December 2008, the proportion of the elderly population had increased to 10.21%, with the aging index increasing to 56.65\(^1\). The increase in life expectancy and chronic disease has resulted in a major change in population structure, and problems in the medical treatment system which cannot be ignored. As the population ages, chronic disease includes a multiple of different ailments. The use of medical resources increases year by year, and this also includes greater use of emergency medical care.

The elderly often cannot easily express their feelings, and emergency medical resources could be abused. Elderly emergency patients often present with non-typical conditions of a particular illness and may actually require emergency medical care, even though it is difficult for these patients to describe their symptoms\(^2\). The Health Insurance Bureau statistics in 2007 stated that emergency medical costs for patients older than 65 years accounted for 30.73% of the total costs for health care. Emergency medical costs for patients older than 65 years amounted to 40.8% in Taiwan\(^3\). Admission rates for the elderly are higher than for young men, and elderly patients require an ambulance 4.4 times more often than young men, with 5.6 times the admission rate, 5.5 times the length of stay in the intensive care unit (ICU) and 6.1 times the need

**SUMMARY**

**Background:** In Taiwan, the study of emergency medical services for elderly patients is inadequate. Although in recent years there has been more discussion of emergency care, there has been no comprehensive review. In other countries, elderly services have been examined for some years now, but the situation is different in Taiwan. Therefore, this study was performed in a district teaching hospital in Hsinchu County, and the emergency medical treatment of patients aged older than 65 years and its impact were analyzed.

**Methods:** In this study, we used retrospective data from a hospital in Hsinchu City between January and December 2008. We selected 9,692 patients aged older than 65 years and excluded missing data.

**Results:** The elderly patients’ emergency condition, symptoms and diagnoses were found to be uncertain. As they tended to be triage levels 2–3, which is very serious, it meant that the elderly patient’s status was complicated and emergency medical personnel often could not quickly judge what constituted appropriate treatment within a short time.

**Conclusion:** This study’s primary goal was to investigate the most common clinical signs and symptoms of the various diseases most common in elderly patients, who presented to the emergency service, and the care of these patients in Hsinchu County to facilitate a more efficient and useful emergency medical service.


**Key Words:** aged, delivery of health care, diagnosis, emergency medical services
for a detailed check-up. Apart from the stress of the transfer to the emergency department, the patient is often in discomfort because of conditions associated with age, and they are often hard of hearing, absent-minded and have various chronic diseases. This can cause the physician difficulty in obtaining detailed disease information and can also lead to delays in diagnosis and treatment. The domestic emergency service should be well prepared for elderly patients so as to decrease the response time for their medical treatment.

In Taiwan, there is inadequate study into the provision of emergency medical services for the elderly. Foreign countries have been evaluating elderly emergency care for some years now, but these are not entirely applicable to the service in Taiwan. Therefore, this research analyzed the utilization of emergency medical care by patients older than 65 years and its impact factor in a district teaching hospital in Hsinchu, Taiwan.

Materials and Methods

In this study, we used retrospective data from a hospital in the city of Hsinchu from January to December, 2008. We included 9,692 patients aged older than 65 years and excluded missing data.

Methods of measurement and data collection

The objective of this study was to examine the characteristics of emergency care for the elderly. The independent variables included demographic variables (sex, age), department (internal medicine, surgery, gynecology, ophthalmology, and ear, nose and throat [ENT]), triage category, treatment date, date discharged from hospital, the route to hospital (escort, ambulance, other hospital, nursing home, self, outpatient, other), and the diagnosis of disease using the major diagnostic codes from the International Classification of Disease, 9th revision.

Statistical analysis

These analyses were performed with SPSS version 13.0 (SPSS Inc., Chicago, IL, USA). Data were analyzed by descriptive statistics, the χ² test, and independent Student’s t test. We used the χ² test to analyze the correlation between sex and other variables. The independent Student’s t test was used to analyze the correlation between sex and the duration of stay in the emergency department. A p value < 0.05 was considered statistically significant.

Results

There were 77,027 emergency department admissions between January and December, 2008, and the elderly accounted for 9,692 (12.6%). The study sample was 50.9% male (n = 4,935) and 49.1% female (n = 4,757). The mean age was 77.3 years, with the oldest being 102 years. Regarding marital status, 59.8% were married (n = 5,793), 40.0% single (n = 3,874) and 0.2% other (n = 25); Disease history included hypertension in 68.0% of the patients (n = 3,919), heart disease in 39.1% (n = 2,254) and diabetes in 35.5% (n = 2,048) (Table 1).

In 2008, the average stay of the elderly patient in the emergency department was 6.9 hours. Most patients (78.2%) were in internal medicine, followed by 20.5% in surgery. Most patients (84.7%) were escorted to the emergency department and triaged to category 2 (49.3%) or 3 (44.7%). In addition, the largest number of patients (n = 921) was treated in February, with 918 in March and 696 in June (Figure). Diagnosis was analyzed by the major diagnostic codes from the International Classification of Disease, 9th revision. The three primary diagnoses were symptoms, signs and ill-defined conditions (21.2%), diseases of the circulatory system (13.4%), and injury and poisoning (12.7%) (Table 2).

Sex differences

Table 3 shows highly significant differences between the sexes in length of stay, medical department, the route to hospital, triage category, and the results of diagnosis, and these are discussed below.

Emergency department stay

The length of stay in the emergency department was 7.2 ± 10.8 hours for males and 6.5 ± 9.8 hours for females, and is significantly longer for males than females (t = −3.3, p < 0.01).

Triage category

Elderly patients were mainly in the middle level of emergency (triage category 2 and 3). In males, 6.2% (n = 307) were triage category 1, 49.9% (n = 2,463) triage category 2, 43.3% (n = 2,137) triage category 3, 0.6% (n = 28) triage category 4; in females, 4.6% (n = 219) were triage category 1, 48.7% (n = 2,318) triage category 2, 46.1%
There were significant differences in triage category by sex ($\chi^2 = 16.8, p < 0.01$), with category 2 in males (49.9%) significantly higher than in females (48.7%).
For males, 4,033 (81.7%) were escorted to the emergency department, 403 (8.2%) were taken by ambulance and 379 (7.7%) were self-referred; for females, 4,175 (87.8%) were escorted to the emergency department, 304 (6.4%) were taken by ambulance, and 187 (3.9%) were self-referred. There was a significantly higher proportion of females (87.8%) than males (81.7%) escorted to hospital.

**Outcomes**

The main outcomes of emergency medical treatment for patients were hospitalization and hospital discharge. For male patients, 1,354 (27.4%) were hospitalized and 3,256 (66.0%) were discharged home; for females, 1,128 (23.7%) were hospitalized and 3,417 (71.8%) were discharged home. The \( \chi^2 \) test showed statistically significant differences, with a higher proportion of males hospitalized compared with females.
Medical diagnoses

Table 4 shows sex differences in diagnosis in the emergency department. For males, the top five diagnoses were symptoms, signs and ill-defined conditions in 946 patients (19.2%), diseases of the circulatory system in 664 (13.5%), injury and poisoning in 657 (13.3%), digestive system disease in 618 (12.5%), and respiratory illness in 518 (11.5%). For females, the top five diagnoses were symptoms, signs and ill-defined conditions in 1,108 patients (23.3%), diseases of the circulatory system in 632 (13.3%), injury and poisoning in 568 (12.0%), diseases of the digestive system in 492 (10.4%), and endocrine, nutritional and metabolic diseases and immunity disorders in 472 (9.9%). The proportion of females with symptoms, signs and ill-defined conditions was significantly higher than for male patients.

Discussion

The change in population structure with an aging society, and the need for medical treatment for the elderly should be evaluated, as it is often difficult to make a diagnosis in the elderly patient because of multiple diseases and non-typical symptoms. Disease complications increase the medical resources required for treatment. Several studies have reported that emergency medical service usage is higher among the elderly than among young men3,4, and elderly patients account for 12–24% of emergency department visits. Emergency medical treatment for the elderly is important, and because of the multiple diseases of the elderly patient, specific emergency medical treatment protocols for the elderly patient are required with an increase in appropriately trained personnel7.

Regarding the view that elderly patients abuse the emergency services, many studies found that the elderly patient’s clinical presentation is more complicated3,4,7 and the elderly patient is usually at triage level 1–3, with <1% at level 4. Therefore, the elderly patient really needs emergency medical care and is not abusing it. Emergency medical personnel should provide professional medical treatment, care and service, rather than neglect the needs of the elderly patient. One study found that the elderly patient was detained for an average of 6–7 hours in the emergency department7, and it has been pointed out that this was because they required a more comprehensive check-up and medical

<table>
<thead>
<tr>
<th>Items</th>
<th>Female</th>
<th>Male</th>
<th>( \chi^2 )</th>
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<tr>
<td>Symptoms, signs and ill-defined conditions</td>
<td>1,108 (23.3)</td>
<td>946 (19.2)</td>
<td>167.5†</td>
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<td>Diseases of the circulatory system</td>
<td>632 (13.3)</td>
<td>664 (13.5)</td>
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<tr>
<td>Injury and poisoning</td>
<td>568 (12.0)</td>
<td>657 (13.3)</td>
<td></td>
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<tr>
<td>Diseases of the digestive system</td>
<td>492 (10.4)</td>
<td>568 (11.5)</td>
<td></td>
</tr>
<tr>
<td>Disease of the respiratory system</td>
<td>346 (7.3)</td>
<td>618 (12.5)</td>
<td></td>
</tr>
<tr>
<td>Endocrine, nutritional and metabolic diseases, and immunity disorders</td>
<td>472 (9.9)</td>
<td>362 (7.4)</td>
<td></td>
</tr>
<tr>
<td>Diseases of the genitourinary system</td>
<td>277 (5.8)</td>
<td>314 (6.4)</td>
<td></td>
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<tr>
<td>Malignant neoplasm</td>
<td>204 (4.3)</td>
<td>276 (5.6)</td>
<td></td>
</tr>
<tr>
<td>Diseases of the sense organs</td>
<td>190 (4.0)</td>
<td>142 (2.9)</td>
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<td>Diseases of the musculoskeletal system and connective tissue</td>
<td>169 (3.6)</td>
<td>133 (2.7)</td>
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<td>Diseases of skin and subcutaneous tissue</td>
<td>100 (2.1)</td>
<td>111 (2.3)</td>
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<tr>
<td>Mental disorders</td>
<td>99 (2.1)</td>
<td>42 (0.9)</td>
<td></td>
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<tr>
<td>Diseases of the nervous system (except meningitis)</td>
<td>34 (0.7)</td>
<td>39 (0.8)</td>
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<tr>
<td>Infectious and parasitic diseases and late effects of infectious and parasitic diseases</td>
<td>33 (0.7)</td>
<td>35 (0.7)</td>
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<tr>
<td>Other reasons for contact with health services</td>
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<td>15 (0.3)</td>
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<td>Other neoplasms</td>
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<td>3 (0.1)</td>
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<tr>
<td>Complications of pregnancy, childbirth and the puerperium</td>
<td>1 (0.0)</td>
<td>0 (0.0)</td>
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<td>Congenital anomalies</td>
<td>4 (0.1)</td>
<td>0 (0.0)</td>
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<tr>
<td>Total</td>
<td>4,747</td>
<td>4,925</td>
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*Data are presented as n (%); †p < 0.001; ‡missing data, n = 20.
care, resulting in a 40.8% increase in costs for the elderly patient\(^3,8\). Another study stated that elderly patients were the greatest users of ambulances, but our study indicated that most elderly patients were escorted to the emergency department, mostly by family, and that ambulance use came in second place to this\(^3,4,8\). As Taiwan is crowded, elderly patients may live near a hospital, and Taiwan's emergency medical service is not as developed as in Western countries. Thus when there is an emergency, the elderly patient can be escorted to the emergency department by family and arrive more quickly than if he/she had waited for an ambulance. Therefore, use of the ambulance service is lower than in Western countries. However, Chou et al.\(^7\) stated that the ambulance is still the main choice in Taiwan for the elderly.

This study showed that the elderly patient’s emergency condition, symptoms and diagnosis are uncertain. Triage level 2–3 is very serious, meaning that when the elderly patient is seeking medical advice, the emergency medical personnel cannot give a quick diagnosis because the disease is often complicated. Yeh et al.\(^6\) pointed out that disease diagnosis in the elderly emergency patient often cannot be specified and given an International Classification of Disease code. It is difficult for emergency medical personnel to give an accurate diagnosis in a limited time and to provide a complete diverse medical service, with follow-up medical treatment and even transfer to another hospital. All these points should be considered in future provision of emergency medical care for the elderly.

This study stratified the sample population according to sex. The results showed that more elderly male patients than elderly female patients used the emergency medical service. This finding might reflect that women are more conscientious of their health than men, thus requiring lower usage of the emergency medical service. Most men are prone to disregard their health condition and will only seek medical advice when they cannot tolerate the disease any more, thus seeking medical treatment more frequently via the emergency medical service. This study also showed that patients who are triaged to the more severe categories are predominantly male and more likely to be associated with surgery. Although both groups were mostly escorted to the emergency department, male patients used the ambulance more frequently than female patients. In Hsinchu County, it was found that male patients utilizing the emergency service were mostly surgical or trauma patients, and this may be attributable to the occupation and lifestyle, which also warrants further investigation.

In conclusion, this study showed that in an emergency department in the year 2008, elderly patients: (1) tended to be triaged to more severe categories; (2) had long average treatment time; (3) were mostly escorted to hospital; (4) had more nonspecific and complex clinical symptoms and signs; and (5) were mainly discharged or admitted to hospital after the emergency department visit. How to rapidly and efficiently examine and treat elderly patients presenting with complex and nonspecific signs and symptoms is the task of the emergency medical service in Taiwan in future.

References

1. Department of Household Registration, Ministry of Interior, Taiwan. Table on the Elderly Population Count in Recent Years in Taiwan. Available at: http://sowf.moi.gov.tw/04/07/1/1-03.htm [Data accessed: 22 October 2008]