Introduction

In 2006, Woo et al.\(^1\) stressed the importance of an accurate diagnosis in the emergency department (ED), stating that an accurate initial diagnosis allows for appropriate treatment and prognosis from a psychiatrist’s viewpoint. Warner and Peabody\(^2\) indicated that it can be assumed that the inpatient discharge diagnoses are more accurate, given the longer durations of direct observation and ready access to laboratories and regular examinations. Rufino et al.\(^3\) found a poor correlation between the diagnosis in the ED and the longitudinal follow-up during the first episode of illness.

Previous studies have shown that a number of factors can impact service quality, notably, the professional competence of specialists in an ED setting\(^4–6\). Determining how to increase the accuracy rate of admission diagnoses in the ED is always an important issue for the attending physicians. Patients who do not have typical symptoms or obvious signs, particularly the elderly, are hard to accurately diagnose,

Does Having More Admission Diagnoses Increase the Accuracy Rate for Elderly Patients in the Emergency Department?

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SUMMARY

Background: Increasing the accuracy rate of diagnosis at admission to the emergency department is always an important issue for emergency physicians. Those patients, particularly the elderly, who do not have typical symptoms or obvious ailments, are quite difficult to accurately diagnose, which influences their subsequent treatment and final outcomes.

Methods: This study was a retrospective chart review of 1,611 patients, from January 1, 2003 to May 31, 2003. All received emergency medical services at the emergency department and were admitted to the hospital before finally being discharged.

Results: In our study, there were significant differences among the elderly group (\(\geq 65\) years) regarding sex distribution and length of stay compared with the non-elderly group (\(< 65\) years) (\(p < 0.01\)). The length of hospital stay for the elderly group was longer than that for the non-elderly group (10.91 ± 11.30 days vs. 8.14 ± 7.28 days).

Conclusion: There was not a significant enough difference between the elderly and non-elderly groups to prove that the number of diagnoses for patients at admission or at discharge increased with patient age. The elderly group had much longer stays than the non-elderly group, regardless of the number of diagnoses at admission or discharge. Patients who had more diagnoses also had a significantly longer length of stay. [International Journal of Gerontology 2010; 4(1): 9–15]

Key Words: accuracy rate, admission diagnosis, elderly, length of stay

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which affects the subsequent treatment and final outcomes. An accurate diagnosis takes into consideration many factors mentioned in many previous papers, such as age, medical history, predictive scores, comorbidity, and physicians’ skills. Two previous studies found that the mortality rate in an elderly group was almost twice that of a younger group, which indicates that more accurate emergency admission diagnoses are needed. Mortality may be caused by the decreased physiologic reserve that accompanies aging; this fact, in combination with a higher incidence of preexisting medical problems in the geriatric patient makes an accurate diagnosis more difficult for physicians.

Rapid and correct diagnoses can reduce the length of hospitalization. Other research found an older group had longer hospital stays compared with non-elderly trauma patients in 111 trauma centers in the United States and Canada. A case presenting with general complaints does not help ED physicians, who at these times will give a more uncertain diagnosis to avoid a specific misdiagnosis.

This study analyzed the difference between the elderly and non-elderly groups with regard to the International Classification of Diseases, Ninth Revision concordance rate between emergency admission and inpatient discharge diagnosis. This study evaluated the length of stay (LOS) by stratifying the numbers of emergency admission and inpatient discharge diagnoses during patient visits.

Materials and Methods

This study was conducted as a retrospective chart review of 1,611 patients who were treated from January 1, 2003 to May 31, 2003. All of these patients received emergency medical services at the ED and were admitted into the wards and eventually discharged. These patients were diagnosed for admission by ED physicians. The determination of discharge was by medical specialists in different divisions according to the records in the International Classification of Diseases, Ninth Revision. All patients were received and treated at Mackey Memorial Hospital, a 2,060-bed medical center in northern Taiwan. All of the ED physicians, staff and nurses had received qualified training. Variables collected were LOS, sex, age, admission diagnosis code numbers, and discharge diagnosis code numbers. To be admitted, a patient had to meet one or more of the following criteria: (1) being an imminent danger to self; (2) being a danger to others; or (3) being gravely disabled.

Patients studied were divided into two groups: an elderly group and a non-elderly group. The elderly group consisted of patients aged ≥65 years, and the non-elderly group consisted of patients aged <65 years. The accuracy rate of the diagnoses was the proportion in accordance with the International Classification of Diseases, Ninth Revision codes, which were the same for both the admission and discharge diagnoses. All other cases were recognized as a mismatched diagnosis.

Statistical analysis was conducted using SPSS version 12.0 software (SPSS Inc., Chicago, IL, USA). Fisher exact tests and χ² tests were performed for categorical variables. Independent sample t tests were used for continuous variables. A p value of <0.05 was considered statistically significant.

Results

Information from a total of 1,611 visits was collected retrospectively from the ED during 2003 to reference the records of patients who were admitted and discharged after a hospital visit. Of these patients, 1,318 and 293 were assigned to the non-elderly group and the elderly group, respectively, and the total average age was 33.96 ± 26.58 years.

In our study, there was a significant difference between the elderly group regarding sex distribution and LOS compared with the non-elderly group (p = <0.001 and 0.001, respectively). The sex distribution was 673 males and 938 females for the entire sample population (41.8% and 58.2%, respectively), with 540 males and 778 females in the non-elderly group (mean age, 24.61 ± 19.26 years), and 133 males and 160 females in the elderly group (mean age, 76.05 ± 7.17 years). The LOS for the elderly group was longer compared with the non-elderly group (10.91 ± 11.3 days vs. 8.14 ± 7.28 days). There was no significant difference in the vari-ances of the ER diagnosis accuracy rate (p = 0.63), admission diagnosis numbers (p = 0.30), and discharge diagnosis numbers (p = 0.41) (Table 1).

Figure 1 shows that there was no increase in the concordance percentile between the admission diagnosis and discharge diagnosis with regard to the increase in age. Among the 1,611 patients, most LOS were less than 2 weeks and ranged from only 3 to 8 days.
Table 1. *Age distribution stratified by diagnosis accuracy, sex, rush-hour status, triage level and doctor’s experience*

<table>
<thead>
<tr>
<th>Variances</th>
<th>Age groups</th>
<th>F test</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-elderly (n=1,318)</td>
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<tr>
<td></td>
<td>Elderly (n=293)</td>
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<tr>
<td>Age (yr)</td>
<td>24.61 ± 19.26 (33.96 ± 26.58)</td>
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<td></td>
<td>76.05 ± 7.17</td>
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<tr>
<td>Concordance</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Match*</td>
<td>506</td>
<td>117</td>
<td></td>
</tr>
<tr>
<td>Mismatch</td>
<td>812</td>
<td>176</td>
<td>0.24</td>
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<tr>
<td>Sex</td>
<td></td>
<td></td>
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<tr>
<td>Male</td>
<td>540</td>
<td>133</td>
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<tr>
<td>Female</td>
<td>778</td>
<td>160</td>
<td>25.24 †</td>
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<tr>
<td>Length of stay (d)</td>
<td>8.14 ± 7.28</td>
<td>10.91 ± 11.32</td>
<td>27.73 †</td>
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<tr>
<td>No. of diagnoses at emergency admission</td>
<td>1.79 ± 1.01</td>
<td>1.86 ± 1.12</td>
<td>1.06</td>
</tr>
<tr>
<td>No. of diagnoses at inpatient discharge</td>
<td>3.65 ± 2.98</td>
<td>3.81 ± 3.08</td>
<td>0.69</td>
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*The same International Classification of Diseases, Ninth Revision codes for both the admission and discharge diagnoses. All other cases are recognized as a mismatch diagnosis; †p < 0.01.

Figure 1. Concordance percentile comparing the diagnosis at admission with the diagnosis at discharge in different age groups.

Figure 2. Length of stay (LOS) for 1,611 patients (most were between 3 and 8 days).

(Figure 2). Patients aged 80–89 years and those 90 years and older had higher numbers of diagnoses at discharge than did other patients, but the difference was not significant (p = 0.11). When the numbers of diagnoses were analyzed according to decades of age, the numbers of diagnoses from admitted patients aged 80–89 years and those 90 years and older were nearly twice those of the other age groups (p = 0.81). The patients with the highest number of diagnoses at discharge compared with at admission were those aged ≥90 years (Figure 3).

Figure 4 shows that the elderly group had a significantly higher LOS than did the non-elderly group (p < 0.01) when stratified by the numbers of diagnoses at discharge, which was less than 13. However, this did not appear relevant if the number was more than 13; this applied to only a few cases (Figure 4). Both the elderly and the non-elderly groups had significantly higher LOS (p < 0.01) when stratified by admission diagnosis numbers (Table 2).

The elderly had a significantly higher LOS than the non-elderly (p < 0.01) no matter how the LOS was
Figure 3. Admission (Adm) and discharge (Dis) diagnosis numbers in different age groups.

Figure 4. Numbers of discharge diagnoses and length of stay (LOS) for elderly and non-elderly groups.

Table 2. Numbers of admission diagnoses and length of stay (LOS) for elderly and non-elderly groups

<table>
<thead>
<tr>
<th>No. of diagnoses</th>
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<th>Non-elderly (n = 1,318)</th>
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<td></td>
<td>n</td>
<td>Mean</td>
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<tr>
<td>1</td>
<td>147</td>
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<td>2</td>
<td>85</td>
<td>12.79</td>
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<td>5</td>
<td>15</td>
<td>19.20</td>
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*p < 0.01. SD = standard deviation; CI = confidence interval.

Discussion

In Taiwan, the geriatric population comprised almost 10% of the total population in 2008, and this percentage is progressively growing.21,22. The proportion admitted into hospitals tended to increase with age.23,24. The elderly group has a significantly longer LOS than the
Table 3. Numbers of admission diagnoses and mismatch rate with discharge diagnoses

<table>
<thead>
<tr>
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<th>Non-elderly (n=1,318)</th>
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<td>3</td>
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<td>4</td>
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<td>5</td>
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SD = standard deviation; CI = confidence interval.

Patients with higher numbers of diagnoses have significantly higher LOS. This may be because more time is needed to clarify the causes of an illness. The more complicated the disease, the more time the physicians need to exclude the other possible diseases. This retrospective study in an inpatient setting suggests that medical comorbidity is common, and physicians should search for initially unrecognizable illnesses.

There is no statistically significant difference to prove that the admission or discharge diagnosis numbers are increasing according to age. It could be that physician depends on a patient’s symptoms and a physical evaluation, but does not depend on patient age. The higher admission diagnosis numbers cannot elevate the accuracy rate in the elderly and non-elderly groups, and the reason for this remains to be ascertained. The complexity of diseases can confuse the physicians’ determinations in their primary evaluations. If the clinical presence of an illness changes quickly, the complications could lead to a misdiagnosis by a physician. In our study, the mismatch diagnosis rate is 60–70%, even with an emergency specialist making the diagnosis.

The accuracy of diagnoses depends on the skills and experience of emergency physicians. Senior physicians are able to make quicker and more correct diagnoses than junior physicians. This study did not collect data regarding the experience levels of the doctors, which may have introduced some bias in the accuracy rate. However, even for differently qualified physicians, the training programs practiced systematically by hospitals participating in our study are assumed to lead to a similar capability to make a diagnosis, which may decrease the differences in the accuracy rate.

Elderly patients often present with atypical symptoms, which can lead to difficulties in diagnosis. In our study, the difficulties of correct diagnosis arose in both the elderly and non-elderly groups.

This study had several limitations. First, it was retrospective in nature and included only those patients who required admission for treatment through hospitalization. A previous study showed a median LOS of 6 days for patients admitted acutely via the ED, and this LOS was shorter because the admission was under a general medical service. Moloney et al. indicated that the median LOS for acute general medical admissions was shorter when the patient was admitted for gastroenteric medical services rather than for other medical divisions.
Second, the findings may be applicable only to a voluntary population, because we did not exclude the patients who were admitted involuntarily and chose to leave their inpatient settings. Finally, utilizing admission and discharge diagnoses from a routine administrative database is likely to lead to underreporting. Coding was done with a version of International Classification of Diseases, Ninth Revision medical information technology, which does not always capture sufficient clinical detail. Moreover, complex clinical documentation, inexperienced coding personnel, and illegible handwritten medical record entries all contribute to inaccurate classifications. In addition, the reimbursement system for medical care may lead to a patient being given a diagnosis for personal financial reasons. Thus, the prevalence of disorders may not be fully captured by the methods utilized in this study.

Future studies need to include patients under the control of a comparable group of participating physicians to facilitate the accuracy of the statistics. In this study, we did not analyze the severity of the diseases, which may affect the accuracy of the diagnoses if major organs were involved. For those diseases triaged, a more complicated situation made accurate diagnosis more difficult.

In summary, our results suggest that elderly patients have longer LOS in hospitals than the non-elderly patients. It is not acceptable that emergency physicians are unable to make a number of diagnoses, thus reducing the possibility of misdiagnosis, when facing a complicated disease. Furthermore, our results highlight that the accuracy of diagnoses would be improved by additional information on the patients’ clinical situation (i.e., information on examinations). Finally, clinicians should be alert when a patient presents with a medical comorbidity, as medical complexity may influence the accuracy of diagnoses.

To sum up, reliable diagnoses are essential for the proper selection of treatment, and further studies exploring ways to improve diagnostic stability in an emergency setting are warranted.

References