The Evaluation of Mental Status of Elderly Patients Presenting to Emergency Services and the Comparison Between the Last Diagnosis and Their Complaints

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ABSTRACT:
The evaluation of mental status of elderly patients presenting to emergency services and the comparison between the last diagnosis and their complaints

Introduction: The number of geriatric patients presenting to the emergency department increases every year. In addition, it is known that the mental status of geriatric patients may deteriorate as they age. In the emergency department, one of the main premises of patient management is anamnesis. However, impairments in mental status of geriatric patients decrease the reliability of anamnesis. In this study, we aimed to determine the mental status of elderly patients who presented to the emergency department, the relationship between mental status and patients’ complaints, and last diagnoses and mortality.

Materials and Methods: The study was planned to be prospective. The mental status of geriatric patients who presented to the emergency department was evaluated with a six-question screening test. Complaints, final diagnosis information, hospitalization department, duration of hospitalization, judicial status and mortality information were recorded. Consistency between patients’ complaints and symptoms determined in physician examination was evaluated. Symptom-finding consistency levels based on mental status were compared. Kappa tests for consistency assessments and chi-square test for intergroup comparisons were used.

Findings: The match between patient complaints and final diagnosis of 755 patients was evaluated by two independent specialist physicians. As a result of the six-question screening test, a mismatch between patient complaint and final diagnosis was found in 16.2% of 204 patients with abnormal screening tests (n=33) compared to 0.4% of 551 patients, who had a normal screening test (n=2). Mortality was found to be 9.8% in patients with abnormal test results while it was found to be 2.0% in patients with normal screening tests.

Conclusion: Mental status variance determined in elderly patients appears to be a risk factor in terms of mortality. Complaints in geriatric patients having mental status variance can be deceptive in terms of pointing to the current disease. Exploring this relationship in detail with further studies should be considered, in order to make a significant contribution to the service provided to this patient group.

Keywords: geriatric, emergency services, altered mental status


INTRODUCTION

It is known that elderly patients present to the emergency department more commonly than the normal population and require intensive care more frequently¹. At the present time, approximately 15.0% of all emergency department patients belong to the geriatric age group, and it is estimated that this proportion will rise to 25.0% in the next 30 years²,³. Forty percent of the
ambulatory patients who arrive at the emergency department and 50.0% of the patients presenting to the emergency department and taken into the intensive care unit are geriatric patients. Also, it is known that 64.8% of patients above the age of 75 present to the emergency department at least once a year. In time, emergency departments will become the primary point of hospital admission for these patients.

Geriatric patients have associated diseases such as chronic obstructive pulmonary disease (COPD), diabetes mellitus (DM), hypertension (HTN) as well as physiological changes resulting from advancing age. Polypharmacy is common in these patients and undesirable changes occur in the absorption, dispersion, metabolism and disposal of drugs due to the physiological changes resulting from advanced age. Therefore, it is sometimes difficult to distinguish which reasons for emergency department visits by these patients are related to the previous complaints of existing diseases or a new situation. Also, adding a change in consciousness to this situation makes the definitive diagnosis of patients difficult. Twenty-five percent of the patients presenting to the emergency department for various reasons have some form of mental status change. This situation also increases with age. As such, it may be concluded that the evaluation of mental status changes of elderly patients presenting to the emergency departments is of great significance.

Several tests used in the determination of mental status changes in elderly patients have been defined. The MMSE test is the gold standard test for examination of mental status disorder. Because of the practical difficulties of this test, tests such as the six-questions screening test (SQST) and clock drawing test have been developed that can be administered easier and faster. However, research that reviews the relationship between final diagnosis and initial complaints, incorporating the mental status changes of elderly patients, who have presented to the emergency department has not been performed.

In this study, our aim was to determine the dysfunction of mental status of geriatric patients who presented to the emergency department, to investigate the relationship between mental status changes and mortality, and to specify the effect of mental status on the relationship between the reasons for admission of patients and the final diagnosis of patients by using the SQST.

**MATERIALS AND METHODS**

This study was approved by decision number 1491-90-11/1539-1572 dated 24 May 2011 of the Gulhane Military Medical Academy (GATA) Ethics Committee.

**Case Selection**

In this study, geriatric patients (aged 65 and older) who presented to the emergency department and were able to respond to the tests were evaluated, and their written consents were obtained. Initially, the Glasgow Coma Scale (GCS) for determination of mental status was applied to patients included in the study. Patients with a GCS score of 13 and below were excluded from the study. Then the Six-Question Screening Test for determination of the content of consciousness or cognitive impairment was performed. One point was given for each correct answer, and a total score of 5-6 was accepted as a normal test result, a score of 4 and below was accepted as an abnormal test result. Demographic information, initial complaints, test results, final diagnosis, hospital admissions, and mortality data of patients were recorded. After the end of data collection, registration and examination forms of patients were evaluated by the working group, which consisted of three emergency medicine specialists.

To evaluate mental status changes due to the content of consciousness and cognitive disorder, Callahan et al. developed the six-question screening test (SQST), which we used in this study, and compared the efficiency of the SQST with The Mini-Mental State Examination Test (MMSE). The MMSE test is the gold standard test
for examination of mental status disorder. In the end, they determined the sensitivity of the SQST was 88.7% and specificity was 88.0%. For the reference ranges of the test, the writers proposed that scores below 5 are abnormal and above 5 are normal by giving one point for each correct question.12

**Relationship Between The Initial Complaints and The Final Diagnosis**

a. The main complaints that patients declared during the examination (pain, itching, constipation etc.) and the compatibility of these complaints with the final diagnosis of the patients were investigated by two emergency medicine specialists.

The relationship between complaint and final diagnosis was evaluated as:
- Compatible
- Partially compatible
- Not compatible

b. Also, in the records, an evaluation as to whether there were complaints of foot swelling, and examination findings related to these complaints was carried out.

**Fever:** Fever (A tympanic measurement ≥37.5°C)

**Foot swelling (Pretibial edema):** evaluated as pretibial edema.

Data of these two findings were evaluated as:
- No complaint – No examination finding
- Complaint exists – Examination finding exists
- No complaint – Examination finding exists
- Complaint exists – No examination finding

In conclusion, all complaints declared by patient at the emergency department (pain, itching, constipation etc.), and data for these two complaints (fever, foot swelling) were compared with the results of the SQST.

**Statistical Analysis**

The research data were processed and analyzed by the SPSS for Windows V.15.0 package. Descriptive statistics were shown as a percentage (%) for discrete data and mean±standard deviation for continuous variables. The chi-square test was used for comparisons between the groups with impaired SQST and the groups with normal SQST scores. The Spearman correlation test was used to investigate associations between the SQST and years of education and the SQST and length of stay in hospital. The chi-square test was used to investigate the differences between other variables. Probability values (p)<0.05 were accepted as statistically significant.

**RESULTS**

The data for geriatric patients who presented to the emergency department during the study period are noted here. Two-hundred-and-forty patients were excluded from the study due to imperfect data, the repetition of records or a GCS score of 13 or below. SQST results for the 755 patients included in the study were obtained (Figure 1).

When the gender distribution of the 755 patients was examined, it was seen that the number of male cases was 363 (48.1%) and the number of female cases was 392 (51.9%). Most of the patients (77.4%) were discharged from the hospital, 14.3% were admitted to various clinics and 8.3% were admitted to the intensive care unit. The average age of the patients was 73.14±5.91. The longest hospital stay was 22 days, and the average hospital stay was 1.34±3.00 days. The
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average length of education of the patients was 5.47±4.54 years. Thirty-two of 171 hospitalized patients (18.71%) died. Twenty-one (65.62%) patients who died had been admitted to the intensive care unit initially and another 11 (34.38%) had been admitted to clinical departments other than the intensive care unit. At the end of the evaluation, 86% of patients (n=649) had complaints in accordance with their final diagnosis; 9.4% of patients (n=71) had complaints partially compatible with their final diagnosis and 4.6% (n=35) had complaints non-compatible with their final diagnosis (Table 1).

Comparison of the SQST Results with The Descriptive Information

It was found that the occurrence of abnormal SQST results in patients who did not die was 90.2%, while the occurrence of abnormal SQST results in patients who died was 9.8%. The distinction between them was statistically significant (p<0.001) (Table 1). Abnormality in SQST scores increases with age. A statistically significant but mild positive correlation was found between the SQST and education time (r=0.306, p<0.001). Otherwise, a statistically significant but moderate negative correlation was found between the SQST and length of stay in hospital (r=-0.444, p<0.001). Also, no statistically significant difference between the occurrence of chronic diseases in the patients and SQST results was found.

Relationship Between Presenting Complaints and Final Diagnosis

a. At the end of the evaluation, 86% of the patients (n=649) had complaints in accordance with their final diagnosis; 9.4% of patients (n=71) had complaints partially compatible with their final diagnosis and 4.6% of patients (n=35) had complaints non-compatible with their final diagnosis (Table 2). When the data on the relationship between the patient complaints and the final diagnosis were compared with the SQST results, only 2 of 538 patients with normal test result had complaints non-compatible with their final diagnosis. Also the final diagnoses of 33 of 111 patients with abnormal tests were non-compatible with their final diagnosis (Table 2).

b. The information with respect to fever and pretibial edema was compared with the screening result tests. The data of patients whose fever complaints were consistent or not were compared
with the SQST results. The frequency of SQST abnormalities was found to be 86.7% for the inconsistent patient groups, and 24.6% for the consistent patient groups. The distinction was statistically significant (p<0.001). For pretibial edema, the frequency of SQST abnormality was found to be 76.6% for the inconsistent patient groups, and 22.5% for the consistent patient groups. The distinction was statistically significant (p<0.001) (Table 3).

When data of these two complaints were compared separately, the existence of the complaint was compared with the examination finding and the results of the SQST. While 97.5% of the patients with fever complaints and a normal SQST had fever, 2.5% of the patients had no fever. While 49.0% of patients with the fever complaint and an abnormal SQST had fever, 51.0% of the patients had no fever. The difference between these groups was found to be statistically significant (p<0.001). While 41.7% of patients with foot swelling complaints and a normal SQST had pretibial edema, 58.3% of them had no pretibial edema. While 21.2% of patients with pretibial edema complaints and an abnormal SQST had pretibial edema, 78.8% of them had no pretibial edema. The difference was statistically significant (p<0.001) (Table 4). The comparison that was made between the SQST results and the examination finding results in the groups without complaint was not found to be statistically significant.

**DISCUSSION**

In this study, most of the patients had complaints in accordance with their final diagnosis. According to the SQST, a mismatch between patient complaint and final diagnosis was more frequent in patients with abnormal screening tests results than in those with normal ones. When the examination information of fever and pretibial edema were compared with the screening result tests, the frequency of SQST abnormalities was more frequent for the “complaint inconsistent” patient groups than in the “consistent” patient groups.

The sensitivity of the SQST was determined to be 94% and its specificity to be 85% in a study carried out by Wilber for the determination of mental status variance in elderly patients in emergency services\(^14\). In this study, the results of the SQST were compared with the results of the MMSE. In another study conducted by Wilber it was determined that the sensitivity of the SQST was 63% and specificity was 81%\(^15\). In a study by Christopher\(^16\), comparing the AD8 and SQST with the MMSE, it was determined that the sensitivity of the SQST was 74% and specificity was 77%. In another study, Ramlall et al. reported that using the MMSE as the reference standard for the presence of cognitive impairment, the SQST had a sensitivity of 82.3% and specificity of 71.3%\(^17\). In this study, the MMSE identified 51 while the SQST identified twice the number (114) of participants with a possible cognitive impairment. Compared with the MMSE, the SQST showed good sensitivity and specificity suggesting that it may be a useful screening tool as an alternative to the MMSE\(^17\). In line with these data in the literature it can be considered that the SQST used in this study is efficient for the evaluation of the contents of consciousness. Patients with abnormal SQST scores in this study were then directed to the Geriatrics Polyclinics for monitoring of the mental status disorder.

### Table 4. Comparison of complaints of fever or pretibial edema with SQST-examination findings

<table>
<thead>
<tr>
<th>Complaint</th>
<th>SQST</th>
<th>Examination finding (n, %)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal</td>
<td>Abnormal</td>
<td></td>
</tr>
<tr>
<td>Fever exists</td>
<td>2.5% (n=4)</td>
<td>51.0% (n=25)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Pretibial edema exists</td>
<td>Normal</td>
<td>58.3% (n=14)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Abnormal</td>
<td>78.8% (n=52)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>97.5% (n=159)</td>
<td>49.0% (n=24)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>41.7% (n=10)</td>
<td>21.2% (n=14)</td>
<td></td>
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</tbody>
</table>

In a study evaluating the content of consciousness in emergency service environments using the MMSE, it was found based on the test results that 133 (33.25%) patients had cognitive disorders. It was found that these patients had a score between 23 and 25\(^{16}\). Thirteen (3.25%) patients diagnosed with dementia had a score lower than 23. It was emphasized that disorders in cognitive functions are strongly related to low education level and low socioeconomic status. They determined that increased age, female gender and alcohol consumption accompanied cognitive disorder\(^{16}\). Again in the same study the statistical evaluation of the relationship between chronic diseases such as hypertension, diabetes, smoking, and obesity with cognitive disorder was not found to be significant\(^{18}\). Ramlall et al. reported that lower MMSE scores were significantly associated with increased age and lower education\(^{17}\). In our study, no significant statistical association between gender and abnormal SQST scores and cognitive disorders was obtained. However, it was observed that as patient age increased, the years of education decreased and the frequency of abnormal SQST results increased. There was a positive but mild correlation between years of education and test score. As the years of education increased, the SQST score (normality) increased. In other words, the possibility of abnormal SQST results increases in patients with low education levels.

No study examining the relationship between SQST and hospitalization duration was found in the literature. In addition, no study containing a comparison of mental status assessment and later treatment of patients (discharge, clinic or hospitalization in intensive care units) in elderly patients presenting to an emergency department was found. Our study showed that there was a negative but moderate correlation between SQST abnormality and hospitalization duration. In other words, the length of hospital stay of patients increased as test score decreased. No significant relationship between mental status variation and systemic diseases in elderly patients was found in a study conducted by Holay\(^{18}\). Similarly, in our study no statistically significant relationship between systemic diseases and results of the SQST was found. SQST and results of time of death and length of hospitalization in clinical and intensive care patients were compared, and a statistically significant relationship between mortality and test results was determined\(^{18}\). Thus, the mortality of patients with an abnormal SQST was calculated to be 9.8%, while the mortality of patients with normal test results was calculated at 2.0%. The medical continuity of the patient for the duration of hospitalization was not taken into consideration during the evaluation of these data. Information regarding deaths related to a complication from a new or different disease was outside the scope of this study. In addition, SQST or additional mental status assessment tests were not conducted in these patients during their hospitalization. Therefore, we have no data about mental status changes during their hospitalization period. Nevertheless, it is important that an abnormal SQST determined at the time of presentation to the emergency department is also a finding pointing to the increased risk of mortality. It is proposed that the relationship between SQST and mortality should be examined in a more detailed manner with further studies.

One of the main purposes of this study was to determine the compatibility between initial complaints and the final diagnosis of patients, as a result of diagnostic tests and treatment, and to analyze the relationship between this compatibility and the contents of consciousness. We learned that while the initial complaints of 71 patients (9.4%) were partially in accordance with their final diagnosis, the initial complaints of 31 patients (4.6%) were not in accordance with their final diagnosis. When these data were compared with SQST scores, we noted important results. While the relationship of complaints-final diagnosis of patients with a normal SQST was partially consistent in 2.0% of patients, it was not consistent in 0.4%. In addition, while the relationship of complaints-final diagnosis of patients with an abnormal SQST was partially
consistent in 29.4%, it was not consistent in 16%. In summary, the partial compatible-incompatible ratio between complaints and final diagnoses of patients with an abnormal SQST were significantly increased when compared to patients with a normal test. We believe that future studies should examine this relationship in greater depth and that this investigation would make a major contribution to the service provided to these patient groups.

In addition, the presenting complaints of fever and foot swelling were examined. At the end of the examination, we evaluated whether the examination findings of these complaints existed in records or not. The complaints were compared with the SQST results as consistent and inconsistent. It was found that the consistency of complaints of patients with a normal test was more significant when compared to that of patients with an abnormal test. Another evaluation of the four parameters included in study assessed the existence of a complaint with the examination finding and the results of the SQST. When the data of these four parameters were investigated, it was seen that the accuracy rate of complaints of patients with an abnormal SQST was significantly lower than the accuracy rate in patients with a normal SQST. In patients with no complaints, the accuracy was highly independent of the test results. Moreover, this compliance may not be correct if the patient has a complaint and his/her test is normal. Furthermore, if the patient has no complaint and his/her test is abnormal, we can also say that the patient has no complaint and this patient doesn’t need further evaluation.

CONCLUSION

Consequently, several important conclusions were reached. The disruption of the contents of consciousness of geriatric patients presenting to the emergency department was related to mortality and morbidity. Also, the complaints of patients with the disrupted contents of consciousness were found to be less accurate and the relationship between complaint and final diagnosis was found to be less reliable. Based on these findings, it was determined that there is a need to further study the contents of consciousness of geriatric patients presenting to the emergency department. The evaluation may make a major contribution to diagnosis and treatment, and must be performed routinely as a part of the examination. It was determined that the SQST, one of the tests suitable for assessing contents of consciousness, is practical and applicable in the emergency department.

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