



## Improving Cognitive Evaluation and the Diagnosis of Delirium among Elderly Patients Visiting the Emergency Room

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Author BP participated in the creation of the study's concept and design, and organized and took part in the data collection, carried out statistical analysis, took part in the interpretation of the data, and drafted the manuscript. Author YP participated in the creation of the study's concept and design, provided advice and guidance on statistical issues, took part in the data collection and interpretation of the data, carried out statistical analysis. Author YG participated in the creation of the study's concept and design, supervised the data collection from a medical perspective, and took part in the interpretation of the data. Author AMC participated in the creation of the study's concept and design, and organized and took part in the data collection, carried out statistical analysis, took part in the interpretation of the data, and drafted the manuscript. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/BJMMR/2015/19443

#### Editor(s):

(1) Domenico De Berardis, Department of Mental Health, National Health Service, Psychiatric Service of Diagnosis and Treatment, "G. Mazzini" Hospital, Italy.

#### Reviewers:

(1) Diana Tapia, National Autonomous University of Mexico, Mexico.

(2) Pietro Scicchitano, Cardiology Department, University of Bari, Italy.

(3) Anonymous, Duzce University School of Medicine, Turkey.

Complete Peer review History: <http://sciencedomain.org/review-history/10203>

**Original Research Article**

**Received 10<sup>th</sup> June 2015**

**Accepted 1<sup>st</sup> July 2015**

**Published 16<sup>th</sup> July 2015**

## ABSTRACT

**Introduction:** Delirium is a common problem among elderly patients seen in the emergency department (ED). Under-diagnosis of delirium by the ED team is common and can have serious implications. In a previous study we found poor quality of cognitive assessment and no mention of delirium in the ED of a large teaching hospital in southern Israel in 2003.

**Aim:** To evaluate cognitive assessment and delirium diagnosis two years after adding of a consultant geriatrician to the ED team.

**Methods:** We examined the rate of mental status assessment and the prevalence of delirium in the ED among patients older than 65 years via a retrospective chart review.

**Results:** In a random sample utilizing medical records of 317 older people examined in the ED during 2007-2008, cognitive assessment (full or partial) was performed for 192 of 317 (60.6%) of patients (compared with only 12.5% in 2003), and 12 cases of delirium were specifically diagnosed in the ED (3.8%) compared to none in 2003. The rate of cognitive evaluation for subsequently hospitalized patients was 45% (compared with 59% in 2003).

**Conclusions:** This study indicates a moderate improvement in the rate of cognitive evaluation and the diagnosis of delirium among elderly patients seen in an ED compared with a similar study which was published 5 years ago.

*Keywords: Delirium diagnosis; elderly; emergency department patients; geriatric assessment.*

## 1. INTRODUCTION

Delirium has been defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-4) [1] as cognitive decline with acute onset and fluctuating course, attention deficit and generalized severe disorganization of behavior. It typically involves other cognitive deficits, changes in arousal (hyperactive, hypoactive, or mixed), perceptual deficits, altered sleep-wake cycle, and psychotic features, such as hallucinations and delusions.

The syndrome is common among elderly patients presenting to the emergency department (ED) with a prevalence ranging between 7%-24% [2-14]. The consequence of a missed diagnosis and the resultant delay in treatment of patients with delirium include high morbidity, increased mortality [11], a high rate of both acute hospitalization and any long term care (LTC) admission [11], and higher costs for care [10,13,15-17].

Despite these detrimental effects, there still appears to be a serious problem in diagnosing and treating delirium by ED staff [2,11-13,18].

Our previous study [16] performed in 2003, included a random sample of 319 elderly (65+) patients examined for the prevalence of delirium and the degree of cognitive evaluation in ED of Soroka University Medical Center (an 1100 bed acute care hospital, affiliated with the Ben-Gurion University of the Negev, and located in Southern

Israel). Of the 319 assessed, the relevant cognitive assessment was performed with only 40 (12.5%) patients and no cases of delirium were diagnosed in the medical ED records (0%). In the year following this study a consultant geriatrician was added to the regular staff of the Soroka ED room.

The aim of the current study was to test whether adding the consulting geriatrician to medical ED staff can improve rates of cognitive assessment and diagnosis of delirium in ED.

## 2. MATERIALS AND METHODS

Soroka Hospital is a 1,100 bed acute care hospital, affiliated with the Faculty of Health Sciences of Ben-Gurion University of the Negev, located in southern Israel. Elderly patients (65+) admitted to the internal medicine wing of the ED were assessed by a geriatrician in the ED based on referral from the ED medical staff. Most of elderly patients were tested for delirium by internists of ED.

The design of current study was identical to the previous study [16]. Inclusion criteria and measures were identical and both studies received the requisite IRB approvals. The study population included men and women over 65 years of age who were admitted to the ED between July 2007 and June 2008 and examined by its medical staff. In the previous study we conducted a retrospective review of the medical records of 319 patients over the age of 65 who

were admitted to the ED in the 12-month period between 1 January 2003 and 31 December 2003.

The medical records of the 317 elderly patients were selected at random from those attending the ED. Socio-demographic variables (age, gender, place of residence) and medical variables (ED discharge status, medical diagnosis in ED, department of hospitalization) were recorded. Delirium screening tools were not used as part of the study. In the previous study [16], utilizing the DSM IV diagnostic criteria for delirium, we checked the patients' records for any assessment of attention, orientation, memory deficit, language disturbances, perceptual disturbances or acute onset. We considered the mental status assessment as "adequate" if the ED doctor related to 4–6 of these points, partial if 2–3 points were noted, and "inadequate" if no or one point was noted.

In the current study we used the same parameters as in the previous work and we hypothesized that it could show changes in the existing situation compared to previous state.

As in the previous study, only those patients who presented to the internal medicine wing of the ED (excluding those seen in the gynecologic and pediatric sections) were sampled. Each medical record was checked to see whether cognitive assessment was mentioned.

For patients who were subsequently hospitalized, we examined whether any additional cognitive assessment was performed during hospitalization and the quality of the assessment assessed utilizing the same six parameters mentioned above. The diagnosis of delirium was defined by the noting of Confusion Assessment Method (CAM) criteria in the reviewed medical records: acute beginning of symptoms and inattention and either disorganized thinking or altered level of consciousness [18]. Diagnosis of delirium was made regardless of the cause of admission to ED.

### 2.1 Statistical Analysis

Statistical analysis was performed using SPSS software, version 17 (SPSS, Chicago, IL, USA). Continuous variables are shown as means and standard deviations. Categorical variables are described as frequencies. T-test and Chi-square tests were used to analyze statistically significant differences of continuous and categorical

variables, respectively for comparing previous and current data. Logistic regression model was used to predict the variables affecting cognitive assessment. Two-tailed p values less than 0.05 were considered statistically significant, with a power of 0.8.

### 3. RESULTS

We reviewed a random sample of medical records of 317 elderly patients of more than 65 years age, admitted to ED of Soroka Hospital, located in Southern Israel, during 2007-2008.

Cognitive assessment (partial or full) was performed in 192 out of 317 patients (60.6%); delirium was detected and documented in 12 of 317 cases (3.8%).

The mean age was  $76.9 \pm 7.4$  with a range of 65.1-99.7 years (vs.  $75.3 \pm 7.7$  in 2003). Most patients were women (52.1%) and most of the patients lived in the general community (91.2%). The most frequent medical problem encountered was associated with the cardiovascular system (94/317) and fever (84/317); the least frequent medical problem was associated with the urinary tract (27/317). These results were consistent with those found in the previous study. Most of the patients were hospitalized (75.4%). Detailed comparison of the features of the two study groups-present and previous- can be seen in Table 1.

Compared to the previous study rates of cognitive assessment (adequate and partial) increased from 12.5% to 60.6%, rates of diagnosis of delirium improved from 0% to 3.8% (Table 2). Internists in the ED performed most of the cognitive assessments (85.4%), while the geriatric consultant performed 12.5% of the delirium assessments.

A multivariate regression model was constructed to evaluate the role of confounding factors on cognitive assessment by the ED staff (Table 3).

### 4. DISCUSSION

In the present study we found a significant rise in the overall rate of cognitive evaluation and a small improvement in the ultimate rate of diagnosis of delirium among 317 elderly people examined by ED staff, as compared to our previous study [16]. While our improved results are encouraging, the rate of noting of a formal diagnosis of delirium (3.8%) is still

lower than that reported elsewhere (7-34%) [2-8,11,12,14,19,20].

Previous studies consistently showed that ED doctors identify delirious patients in only 16% to 35% of cases [6,9]. Consequently, the Society for Academic Emergency Medicine's Geriatric Task Force has called for mental status screening to be a standard component of the evaluation of every senior patient presenting to the ED [21].

Inadequate doctors' skills and attitudes, lack of familiarity with brief cognitive screening instruments, lack of privacy and noise in the ED, and general time constraints have been commonly reported as significant issues limiting doctor's performances in this regard [22]. Another factor that makes it difficult to diagnose delirium in the ED is the absence of altered mental status in older ED patients with delirium. As a result, the diagnosis of delirium will be

**Table 1. Characteristics of patients seen in ED and subsequent admission to hospital in two elderly cohorts (65+): 2003 (319 patients) vs. 2008 (317 patients)**

	Year of study and number of patient		
	2003 (n=319)	2008 (n=317)	P value
Age (years) mean SD	75.3±7.7	76.9±7.4	0.007
Gender, female, n (%)	188(58.9)	165(52.1)	0.048
Living in community, n (%)	295(92.5)	289(91.2)	0.250
<b>ED discharge status n (%)</b>			
Home	146(45.8)	78(24.6)	<0.0001
Hospitalized	172(53.9)	239(75.4)	
Death	1(0.3)	0(0)	
<b>Five most frequent problems diagnosed in ED, n of cases</b>			
Cardiovascular	141	94	<0.0001
Pulmonary	55	44	0.145
Gastrointestinal	48	34	0.066
Urinary	43	27	0.030
Fever	27	84	<0.0001
<b>Admission department of hospitalized patients, n (%)</b>			
Internal medicine	145(45.8)	186(58.7)	0.21
Surgery	9(2.8)	22(7.0)	
Neurology	8(2.5)	8(2.5)	
Orthopedics	5(1.6)	10(3.1)	
Neurosurgery	1(0.3)	2(0.6)	
Geriatric department	2(0.6)	10(3.1)	
Other	2(0.6)	1(0.3)	

**Table 2. Incidence of cognitive assessment of elderly (65+) patients assessed in ED two cohorts: 2003 (319 patients) vs. 2008 (317 patients)**

	Cognitive assessment type 2003, n (%)			Cognitive assessment type 2008, n (%)		
	Adequate	Partial	Inadequate	Adequate	Partial	Inadequate
Number of patients*	5(1.6)	35(10.9)	279(87.5)	50(15.8)	142(44.8)	125(39.4)
<b>Points of cognition</b>						
Attention	5	33	0	50	132	0
Orientation	5	29	0	50	135	1
Language	5	16	0	18	1	1
Memory	3	0	0	25	9	0
Perceptual disturbances	0	0	0	27	1	0
Acute onset	2	0	0	49	81	0

\*P<0.0001

**Table 3. Logistic regression model for predicting any cognitive assessment of elderly (65+) patients during ED visit (N=636)**

Variable	Odds ratio	CI 95%	p-value
Age (years)	1.06	1.03-1.09	<0.0001
Fever	2.8	1.69-4.64	<0.0001
Cardiovascular problems	3.05	1.92-4.83	<0.0001
2008 vs. 2003 cohort	12.94	8.15-20.53	<0.0001

missed in most older ED patients unless it inactively sought after using a validated delirium assessment instrument [19].

Additional factors affecting the early recognition of delirium are lack of training of ED personnel and lack of knowledge in the field of geriatrics. Most ED doctors have never completed a geriatrics training rotation and this affects their self-perception relating to their ability to identify and treat cognitively impaired older patients [22].

According to our multivariable analysis (Table 3) the difference in age (patients in the 2008 study had a higher mean age than the patients in the 2003 study), and the greater prevalence of high fever and cardiovascular problems in the 2008 study were associated with an increased chance to undergo adequate or partial cognitive evaluation in the ED, with an Odds Ratio (OR) of 1.06 for age (CI 95% 1.030-1.085, P <0.0001), 2.80 for fever (CI 95% 1.69-4.64, P <0.0001), and 3.05 for cardiovascular problems (CI 95% 1.92-4.83, P <0.0001). These factors have been associated with a high prevalence of delirium in select patient groups in previous reports [2-14,20,24]. On the other hand, belonging to the 2008 cohort in itself raised the chance that a patient would undergo an adequate or partial cognitive assessment with an OR of 12.94 (CI 95% 8.15-20.53, P <0.0001).

The present study used the same study protocol and the same research methodology in the same institution as the previous one. Except for the addition of a geriatrician to the ED team, no other intervention was incorporated to improve cognitive evaluation in the ED or during the subsequent hospitalization. The present study did not include information on the level of education of patients or the ED medical staff.

In both studies most of the medical records were completed by internists in the ED and the medical record format was the same.

Thus, improvement could be explained by the presence of a geriatrician on the ED staff. As a result of having a permanent geriatric consultant in ED, the general staff (both medical and nursing) were exposed to various geriatric tools, such as cognitive assessment or CAM and this exposure may have increased their awareness of the clinical possibility of delirium or at least prompted them to do some kind of cognitive assessment. In addition there may well have been a positive effect generated by the geriatrician available to the primary ED physicians for consultation and advice and the subsequent increased awareness of geriatric syndromes for considering cognitive difficulties and delirium among the elderly patients presented in the ED.

Could the improvement in delirium diagnosis be explained by the direct effect of geriatric evaluation and diagnosis of delirium by the geriatric specialist in ED? We think not, because in most cases (85.4% of assessments) evaluation was carried out by an ED internist. The geriatric consultant was only called upon to see a minority of complex elderly patients presenting to the ED.

As well we do not believe that the change in the effectiveness of cognitive evaluation by the ED staff can be explained by any deliberate program for training the staff in dealing with the elderly through knowledge by workshops or other means because no such program nor specific educational intervention were implemented. However, the growing awareness within both the lay and professional communities regarding typical medical problems of the elderly population may have contributed. The results of the present study highlight the importance of establishing a multidisciplinary team for the evaluation of delirium among elderly patients.

Some demographic differences between the sample in the previous study and the current one were observed. This study's population was somewhat older, with a higher proportion of females than in our previous report. While these differences reflect the aging of the general population in Israel [23], there is no evidence to explain the improvement we observed in the rate of cognitive assessment. Although we note a statistically significant difference in age and gender, we observed no change in clinical significance.

However, more patients in the 2008 group had a fever. This in itself is usually an indication of

infection, which is a risk factor for delirium. [2,12,20,24].

## 5. LIMITATIONS

First, like our previous work, this is a retrospective analysis of random sample of medical records and it is possible that the real rates of cognitive assessment are higher than that reflected in medical charts because of partial recording. Because of the retrospective nature of this study confounders such as co-morbid conditions, socio-economic issues and patient's level of education, which were not recorded in the medical chart, could not be included in the analyses.

Second, both studies did not examine whether there was any relationship between cognitive assessment, severity of illness, and previous co-morbidity.

However, given that in the previous study we used an identical study design, there is a definite indication that there are differences between rates of cognitive assessments shown in two studies.

## 6. CONCLUSION

Two years after adding of a consultant geriatrician to the ED team, we found a significant rise in the overall rate of elements of cognitive evaluation and the rate of a formal diagnosis of delirium among elderly people examined by ED staff, compared to our previous study [16]. The availability of a geriatrician in the ED points to a definite albeit modest benefit for diagnosing and treating elderly patients in the ED.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

Ethics approval was received from the IRB of the Soroka medical center, Beer Sheva, Israel.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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