Prevalence and detection of delirium in elderly emergency department patients

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Abstract

Background: Delirium is a complex medical disorder associated with high morbidity and mortality among elderly patients. The goals of our study were to determine the prevalence of delirium in emergency department (ED) patients aged 65 years and over and to determine the sensitivity and specificity of a conventional clinical assessment by an ED physician for the detection of delirium in the same population.

Methods: All elderly patients presenting to the ED in a primary acute care, university-affiliated hospital who were triaged to the observation room on a stretcher because of the severity of their illness were screened for delirium by a research psychiatrist using the Mini-Mental State Examination and the Confusion Assessment Method. The diagnosis of "delirium" or an equivalent term by the ED physician was determined by 2 methods: completion of a mental status checklist by the ED physician and chart review. The prevalence of delirium and the sensitivity and specificity of the ED physician's clinical assessment were calculated with their 95% confidence intervals. The demographic and clinical characteristics of patients with detected delirium and those with undetected delirium were compared.

Results: A sample of 447 patients was screened. The prevalence of delirium was 9.6% (95% confidence interval 6.9%–12.4%). The sensitivity of the detection of delirium by the ED physician was 35.3% and the specificity, 98.5%. Most patients with delirium had neurologic or pulmonary diseases, and most patients with detected delirium had neurologic diseases.

Interpretation: Despite the relatively high prevalence of delirium in elderly ED patients, the sensitivity of a conventional clinical assessment for this condition is low. There is a need to improve the detection of delirium by ED physicians.

Delirium is an acute disturbance of consciousness, with changes in cognitive functioning, inattention, perceptual disturbances and fluctuation of symptoms during the course of the day.[1] In elderly patients, delirium is associated with longer hospital stays, increased mortality and an increased rate of institutional care.[2] It is often reversible if the underlying cause is identified and treated.[3] Unfortunately, delirium is underdetected in elderly hospital patients[4–6] despite a prevalence on admission of 10%–16%.[7,8] The emergency department (ED) may be a strategic place to detect this disorder and initiate clinical management.

There are few studies that examine delirium in elderly ED patients. Wofford and colleagues,[9] in a retrospective chart review, found a prevalence of 5% of delirium in ED patients but did not use strict criteria to define cases of delirium. Naughton and coworkers,[10] with a limited number of patients (n = 188) but using the Confusion Assessment Method (CAM), reported a prevalence of 10%. Similarly, in a larger population of 385 patients, Lewis and colleagues[11] reported a prevalence of 10% using the CAM. They also estimated the detection rate of delirium by ED physicians based on chart review to be only 17%.

Research

Recherche

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There are 3 limitations to these studies. First, the ED protocol for patient selection according to illness severity was not well-defined. Second, other variables that could play a role in detection such as medication, principal diagnosis and residence were not examined. Finally, the apparently low rate of detection of delirium may be because ED physicians do not record this diagnosis, and direct questioning of ED physicians may increase the rate of detection.

Thus, the 2 goals of our study were to determine the prevalence of delirium in elderly ED patients in a larger population that was better defined and to determine the sensitivity and specificity of the conventional clinical assessment by an ED physician, both by chart review and by direct questioning of the ED physician.

Methods

This study was carried out at St. Mary's Hospital Center, Montreal, a community-based, university-affiliated hospital. All patients aged 65 years and older who were screened for eligibility had presented consecutively at the ED from Monday to Friday, between midnight and 3 pm, during a 4-month period and had been triaged by a nurse according to Wilson's system[12] to the observation room on a stretcher. Wilson's triage system is based on 4 levels of severity: immediate (attention within minutes), urgent (attention within 30 minutes), semi-urgent (attention within 2 hours) and nonurgent (attention in more than 2 hours). The particular time of presentation was chosen because most patients presenting after midnight were held overnight in the ED and could be assessed in the morning. The research staff worked from 8 am to 6 pm to permit the evaluation of patients presenting until 3 pm. All patients able to communicate in French or English and for whom consent could be obtained were enrolled. Critically ill patients (unconscious, with unstable cardiorespiratory status or severe trauma) were excluded. This study was approved by the hospital research ethics committee.

First, eligible patients were approached and the Short Portable Mental Status Questionnaire (SPMSQ) was administered. The SPMSQ is a 10-item questionnaire that evaluates orientation, memory and concentration with good sensitivity and specificity for detecting cognitive impairment.[13] It was used for screening patients' capacity to give informed consent. Patients with 4 or fewer errors in the SPMSQ were directly asked for consent. For patients with more than 4 errors, consent was obtained from family or from a caregiver. Demographic data were then gathered (age, sex, marital status, residence and level of education). Second, the Mini-Mental State Examination (MMSE) and the CAM were used by either of 2 research psychiatrists (M.E. and F.R.) to detect and diagnose delirium, blind to the emergency physician's assessment. Third, attending ED physicians, blind to the investigators' evaluations, were asked to complete a mental status checklist (Appendix I) and a clinical severity of illness scale[14] for all of the delirious patients identified by the research investigators, and for a one-third random sample of the nondelirious patients also identified by the research investigators. The ED physicians were not aware of whether they were being asked to fill out these forms for delirious or nondelirious patients. In other respects, they completed their evaluation in the usual manner. Finally, the emergency medical records of patients with delirium and of nondelirious patients were systematically reviewed in the weeks following the initial evaluation. The record review was carried out by one of the researchers blind to the results of the screening. The reviewer looked at the diagnoses of the ED physician for the term delirium or an acceptable synonym (acute or new confusional state, acute mental status change, toxic psychosis, metabolic encephalopathy or acute organic brain syndrome). The discharge disposition from the ED, that is, whether patients were discharged home or admitted to hospital, the principal diagnosis and the number of medications were also recorded to monitor ED physicians' management of these patients.

As stated earlier, the two instruments used to detect and diagnose delirium were the MMSE[15] and the CAM.[16] The MMSE is a well-known practical instrument composed of 11 items that can be used to grade cognitive status and, in this study, complete the CAM. The test-retest reliability is reported to be 0.89.[15]

The CAM is a semi-structured instrument that can distinguish between delirium and other kinds of cognitive impairment. It has been validated in previous studies and has been shown to have a sensitivity and specificity for detecting delirium of more than 90% compared with the diagnosis of trained psychiatrists.[16] The CAM was used as the "gold standard" for the detection of delirium. Using the same approach as Lewis and colleagues,[11] patients with 5 of 5 DSM-IV[1] criteria for delirium (disturbance of consciousness, reduced ability to focus or shift attention, a change in cognition or perceptual disturbances not due to dementia, the disturbance develops over a short period and tends to fluctuate during the day) were diagnosed with definite delirium, and patients who had 4 of 5 criteria were diagnosed with probable delirium. Patients diagnosed with probable delirium were also considered to have delirium in order to avoid overlooking patients with a partial, but clinically significant, syndrome. Interrater reliability, monitored

Table 1: Prevalence of delirium in 447 elderly emergency department patients according to demographic variables

Demographic variables	No. of patients	No. (and %) of patients with delirium	*p* value
Age, yr			0.16
65–74	157	13 (8.3)	
75–84	195	16 (8.2)	
≥ 85	95	14 (14.7)	
Sex			0.67
Male	184	19 (10.3)	
Female	263	24 (9.1)	
Language			0.43
English	334	30 (9.0)	
French	113	13 (11.5)	
Marital status			0.18
Currently married	189	14 (7.4)	
Other	258	29 (11.2)	
Residence			0.002
Home alone	166	12 (7.2)	
Home with others	230	19 (8.3)	
Nursing home	51	12 (23.5)	
Level of education, yr			0.006
0–6	86	16 (18.6)	
7–12	250	20 (8.0)	
≥ 13	111	7 (6.3)	

before and during the study, showed an agreement of over 90% for both the MMSE and the CAM.

The clinical severity of illness scale[14] and a mental status checklist (Appendix 1) were filled out by the attending ED physician. The severity scale, with a score from 1 (not ill) to 9 (moribund), uses clinical judgement to classify a patient's severity of illness. Because the rapid evaluation required in the ED setting may lead some physicians not to record observed mental disorders, the ED physicians were asked to complete a checklist indicating any mental disorders observed.

The association of delirium with the demographic variables was assessed by the *t*-test for continuous variables and by the χ^2 test for categorical variables. The discharge dispositions of patients with detected cases of delirium versus those with undetected delirium were compared by means of χ^2 analysis. The severity of illness and the number of medications prescribed were compared for patients with and without delirium using the *t*-test.

The sensitivity and specificity of the conventional clinical assessment by the ED physician in detecting delirium (according to checklist, chart review and both combined) were calculated using the result from the CAM as the gold standard.

Results

A total of 978 patients aged 65 years and over presented to the ED from October 1995 to January 1996, from Monday to Friday, and were eligible for this study; 600 (61.3%) arrived between midnight and 3 pm; 70 could not be reached (very short stay in the ED) and 53 were too critically ill to be assessed. Therefore, 477 of 600 patients (79.5%) were approached to participate in this study. Thirty refused to participate and 447 were assessed.

Forty-three cases of delirium were diagnosed with the CAM by a research psychiatrist; 28 cases were definite and 15 probable. The prevalence of delirium was 9.6% (95% confidence interval 6.9%–12.4%).

The prevalence was significantly higher in patients living in nursing homes ($p = 0.002$) and in patients with fewer than 7 years of schooling ($p = 0.006$) (Table 1). These results did not change when adjusted for age and sex. The mean severity of illness, available for 160 patients, was significantly higher in the delirious group (mean 5.0, standard deviation [SD] 1.4, $n = 31$) than in the nondelirious group (mean 3.9, SD 1.6, $n = 129$) ($p = 0.0003$). There were no significant differences with respect to the mean number of medications prescribed (mean 3.8, SD 2.8, $n = 43$ for delirious v. mean 3.7, SD 2.4, $n = 177$ for nondelirious) or primary diagnosis.

The emergency department medical records were reviewed for delirious patients and 177 randomly chosen patients without delirium. The mental status checklist and severity of illness scale were completed for 79% (34/43) of delirious patients and 74% (131/177) of the nondelirious

Table 3: Characteristics of patients with detected versus undetected delirium

Characteristics	No. (and %) of patients with delirium (*n = 43*)		*p* value
	Detected* (*n = 15*)	Undetected (*n = 28*)	
Age, yr			0.93
65–74	4 (27)	9 (32)	
75–84	6 (40)	10 (36)	
≥ 85	5 (33)	9 (32)	
Sex			0.69
Male	6 (40)	13 (46)	
Female	9 (60)	15 (54)	
Language			0.08
English	13 (87)	17 (61)	
French	2 (13)	11 (39)	
Marital status			0.94
Currently married	5 (33)	9 (32)	
Other	10 (67)	19 (68)	
Residence			0.97
Home alone	4 (27)	8 (29)	
Home with others	7 (46)	12 (43)	
Nursing home	4 (27)	8 (29)	
Level of education, yr			0.39
0–6	7 (47)	9 (32)	
7–12	7 (47)	13 (46)	
≥ 13	1 (6)	6 (22)	
Discharged from ED	3 (20)	8 (29)	0.54
Probable cases of delirium	6 (40)	9 (32)	0.61
Severity of illness,† mean (and SD)	5.4 (1.4)	5.0 (1.5)	0.48

Note: SD = standard deviation.
*Patients detected using ED chart review or mental status checklist, or both.
†Severity of illness was not recorded for 5 patients in the group with detected delirium and for 7 in the group with undetected delirium.

Table 2: Detection rate of delirium by ED chart review or mental status checklist*

Detection method	Patients with delirium (*n = 34*)		Patients without delirium (*n = 131*)	
	Detected	Sensitivity (95% CI), %	Detected	Specificity (95% CI), %
ED chart review	8	23.5 (9.3–37.8)	0	100
Mental status checklist	7	20.6 (7.0–34.2)	2	98.5 (96.4–100)
Either ED chart review or mental status checklist	12†	35.3 (19.2–51.4)	2	98.5 (96.4–100)

Note: ED = emergency department.
*$N = 165$ patients for whom both the chart review and mental status checklist were completed.
†Delirium was detected in 3 additional patients by both methods.

group. ED physicians did not complete the mental status checklist or severity of illness scale for 9 delirious patients and 46 nondelirious patients because they had ended their shift at the time these patients were evaluated by the investigators and, thus, could not be reached. The number of patients with detected delirium (15) and the sensitivity and specificity of detection by chart review or mental status checklist, or both, are illustrated in Table 2. The sensitivity of each method was low, and even when the results were combined, sensitivity reached only 35.3%. The specificity was very high (98.5%–100%). The demographic and clinical characteristics of patients with detected and undetected delirium are illustrated in Table 3. There were no significant differences. However, in comparison with patients with undetected delirium, patients with detected delirium were more likely to be English-speaking, had less education and were less likely to be discharged from the ED. Twenty percent of the patients with detected delirium were discharged from the ED compared with 29% of the patients with undetected cases. The medical diagnoses of patients with detected and undetected delirium are illustrated in Table 4. The most frequent primary diagnoses for the 43 delirious patients were neurologic disorders (13 with dementia or cerebrovascular accident), respiratory disorders (10 with pneumonia or chronic obstructive pulmonary disease exacerbation), trauma or fall (3) and cardiovascular disorders (3 with myocardial infarction or angina). Patients with detected delirium were more likely to have a neurologic diagnosis than those with undetected delirium. Finally, of the 15 detected cases, the actual term "delirium" was used for only 9 cases; in the other 6 cases, an equivalent term such as acute confusion or new confusion was used.

Interpretation

Our study found a prevalence of delirium in elderly emergency department patients similar to that in previous studies.[10,11] In reality the prevalence may even be higher because we excluded critically ill patients who are at higher risk for delirium. Moreover, since delirium is a fluctuating condition and may present with hypoactive symptoms in elderly patients,[17] we may have missed some cases. The prevalence was higher in less educated and institutionalized patients. These 2 factors have been related to dementia,[3] and because dementia is an important risk factor for the development of delirium,[18] these associations may be indirect. Unfortunately, we did not assess this patient population systematically for dementia. In addition, we found an association between the severity of illness and delirium that has also been reported previously.[18]

The sensitivity of a conventional clinical assessment according to chart review was low at 23.5%. When the cases detected using the mental status checklist were added, 35.3% of cases were detected. This increase in detection with the checklist, without substantial loss of specificity, may show that ED physicians are sometimes aware of delirium but do not chart it. It is also possible that the checklist in itself made them think about the presence of this condition.

As mentioned in the Results, of the 15 patients with detected delirium, the term "delirium" was used for 9. It is possible that there are misconceptions about the definition of delirium and that the hyperactive, agitated patient is still seen as the typical patient with delirium.[19] Thus, ED physicians may be hesitant to use this diagnosis for hypoactive patients.

Table 4: Primary medical diagnoses of patients with and without delirium

	Group; no. (and %) of patients		
	With delirium (*n = 43*)		
Diagnosis	Detected* (*n = 15*)	Undetected (*n = 28*)	Without delirium (*n = 177*)
Cardiovascular disease	2 (13)	1 (4)	45 (25)
Pulmonary disease	2 (13)	8 (28)	30 (17)
Neurologic disease	6 (40)	7 (25)	22 (12)
Endocrine disease	1 (7)	1 (4)	2 (1)
Infectious disease	–	2 (7)	6 (3)
Gastrointestinal disease	–	–	15 (8)
Genitourinary disease	1 (7)	1 (4)	10 (6)
Metabolic imbalances	1 (7)	2 (7)	3 (2)
Hemato-oncologic disease	1 (7)	1 (4)	4 (2)
Medication toxicity	–	1 (4)	2 (1)
Alcohol toxicity	–	2 (7)	3 (2)
Trauma/fall	1 (7)	2 (7)	25 (14)
Psychiatric disease	–	–	6 (3)
Rheumatologic disease	–	–	4 (2)

*Patients detected using ED chart review or mental status checklist, or both.

There was a greater rate of hospital admission of patients with detected delirium than of patients with undetected delirium. This difference may have occurred by chance, because the severity of disease did not seem to account for this difference. Nevertheless, 29% of patients with this serious condition were discharged and may have been at greater risk of severe complications in view of the high mortality associated with delirium.

There was a higher rate of detection of delirium in patients with neurologic disorders. This difference may again have been because of chance, but perhaps these types of disorders led the ED physicians to pay more attention to mental status. The low numbers involved prevent further interpretation of these results.

Studies that considered the detection and treatment of delirium in hospital patients have indicated limited benefit for these interventions.[20,21] The study by Cole and coworkers[20] is a randomized trial of systematic detection and treatment for delirium, and that by Rockwood and colleagues[21] is a study of the impact of an educational intervention also for the detection and treatment of delirium. In both studies, detection occurred within 24 hours of admission and treatment was initiated later. This could represent quite a delay from the initial ED presentation. Earlier detection of delirium in the ED could improve the benefits of treatment and the prognosis. Further studies are needed to understand how this frequent disorder can be better detected by the ED physician.

Competing interests: None declared.

Contributors: All authors contributed to the study design. Drs. Élie and Rousseau carried out the study. Drs. Élie, Rousseau, Cole and McCusker and Mr. Bellavance analyzed the data. Drs. Élie, Rousseau, Cole and McCusker wrote up the results.

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Appendix 1: Checklist for mental status of patient

Check all that apply:

- ☐ Cognitive impairment
- ☐ Depression
- ☐ Psychosis
- ☐ Delirium
- ☐ Dementia
- ☐ Other psychiatric condition: (specify): _____
- ☐ No mental disorder