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UNRECOGNIZED INCIDENT DELIRIUM IN OLDER EMERGENCY DEPARTMENT PATIENTS

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☐ **Abstract—Background: It is documented that health professionals from various settings fail to detect > 50% of delirium cases. Objective: This study aimed to describe the proportion of unrecognized incident delirium in five emergency departments (EDs). Secondary objectives were to compare the two groups (recognized/unrecognized) and assess the impact of unrecognized delirium at 60 days regarding 1) unplanned consultations and 2) functional and cognitive decline. Method: This is a sub-analysis of a multicenter prospective cohort study. Independent patients aged ≥ 65 years who tested negative for delirium on the initial interview with an ED stay ≥ 8 h were enrolled. Patients were assessed twice daily using the Confusion Assessment Method (CAM) and the Delirium Index up to 24 h into hospital admission. Medical records were reviewed to assess whether delirium was recognized or not. Results: The main study reported a positive CAM in 68 patients. Three patients' medical files were incomplete, leaving a sample of 65 patients. Delirium was recognized in 15.4% of our participants. These patients were older (p = 0.03) and female (p = 0.01) but were otherwise similar to those with unrecognized delirium. Delirium Index scores were higher in patients with recognized delirium (p = 0.01) and they experienced a more important functional decline at 60 days (p = 0.02). No association was found between delirium recognition and health care services utilization or decline in cognitive function. Conclusions: This study confirms reports of high rates of missed or unrecognized delirium (84.6%) in ED patients compared to routine structured screening using the CAM performed by a research assistant. Patients with recognized delirium were older women with a greater severity of symptoms and experienced a more**

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significant functional decline at 60 days.

☐ Keywords—delirium; detection; older adults; emergency department

INTRODUCTION

Older patients currently represent more than one-quarter of emergency department (ED) visits (1–3). Population projections consistently forecast growth in this group of patients aged 65 years and older. It is therefore important that we adapt ED health care services and environment, given older patients' documented need for more complex care and resources (4,5). Several recommendations and guidelines aiming to improve emergency care for older patients have been published (6,7). However, the current situation of ED overcrowding and significant waiting times could have serious consequences on seniors, including the onset of delirium.

Delirium is characterized by an acute onset and fluctuating course of a disturbance in consciousness, attention, orientation, memory, thought, perception, and behavior (8). It is reported that delirium, which often has multifactorial causes, could be triggered by a prolonged exposure to the ED environment in older patients (9,10). Previous studies conducted in various settings (including EDs and acute care hospitals) revealed that health professionals (HPs) fail to recognize delirium in more than half of cases (11–16). Unrecognized delirium can have serious consequences for older patients, their families, and for the health care system in general (17–33).

Prior prospective studies have examined the use of various screening instruments to detect prevalent delirium in the ED, but prospective ED studies assessing the recognition of incident delirium (the development of delirium during a patient's ED stay) and the potential implications of unrecognized cases are lacking (11,34–37). Identification of incident delirium in older patients is key to prompt management of its underlying causes and the rapid implementation of targeted interventions aimed at reducing the severity and duration of delirium, thus limiting its consequences. The present study aimed to describe the proportion of unrecognized incident delirium in five Canadian EDs by HPs. Secondary objectives were to compare the two groups and to assess the impact of unrecognized delirium within 60 days of the initial ED visit regarding 1) unplanned consultations, 2) functional decline, and 3) cognitive decline.

MATERIALS AND METHODS

Study Design and Setting

This is a planned sub-study of the INDEED (Incidence and Impact Measurement of Delirium Induced by ED Stay) project (33). A prospective cohort of patients was recruited within five EDs (two university-affiliated level I trauma centers, one university-affiliated hospital, and two regional hospitals) across the province of Québec (Hôpital de l'Enfant-Jésus, CHUL, Hôpital du Sacré-Cœur de Montréal, Centre Hospitalier Régional de Lanaudière, Centre Hospitalier Régional de Trois-Rivières) during two phases (between March and July 2015 and between February and May 2016).

Selection of Participants

Consecutive patients were included if they 1) were aged ≥ 65 years; 2) had an ED stay of at least 8 hours; 3) were admitted to any hospital ward; and 4) were independent or semi-independent, which was defined as being able to perform five of seven activities of daily living (ADLs). Patients were excluded for the following reasons: 1) had an unstable medical condition that could lead to intensive care; 2) presented to the ED with delirium or had a delirium detected within 8 hours of arrival; 3) were unable to consent or speak French or English; 4) were living in a long-term care facility; or 5) had a history of psychiatric disorders. An 8-hours cutoff was used as upcoming provincial guidelines from the Direction Nationale des Urgences will be recommending an ED length of stay of < 8 h for older adults. This cohort was restricted to inpatients, as it was not feasible to follow outpatients.

Data Collection and Processing

Trained research assistants (RAs) identified potential study participants using the ED patient tracking software. After obtaining informed consent, they conducted the first in-person interview. Participants were then assessed twice a day (with at least 6 hours in between assessments) during their ED stay and for up to 24 hours on the hospital ward. RAs also conducted phone interviews with the study participants at 60 days (± 7 days) following their ED visit. ED and ward nurses and doctors were blinded to the study's objectives in order to avoid influencing their practice. Each RA received extensive standardized training, which included a group session and personalized field training, RAs were provided with a detailed training manual and received ongoing support and supervision by an experienced research nurse and study coordinator for the study duration. Inter-rater reliability was assessed at the coordinating site on 12% of the main cohort, where two RAs would simultaneously evaluate patients using the Confusion Assessment Method (CAM), and a perfect agreement was obtained regarding the incidence of delirium (33).

The Comité d'éthique du CHU de Québec - Université Laval acted as the centralized research ethics board and approved this study (project no. MP-20-2015-2130).

Outcome Measures

Sociodemographic data were collected upon initial interview. Patient ED length of stay (LOS) was measured from the time of triage up to when patients were transferred to a hospital ward. Hospital LOS was calculated from triage up to hospital discharge. Information regarding comorbidities (Charlson Comorbidity Index), and illness severity (Acute Physiological and Chronic Health Evaluation II [APACHE II]) were collected. Patients' level of frailty was also assessed using the Clinical Frailty Scale (38–40).

Patients' cognitive status was evaluated in-person using the Telephone Interview for Cognitive Status-modified (TICS-m) at the index ED visit and at the 60-day post-ED visit telephone follow-up in order to detect any change in cognitive function after hospitalization (41,42). A TICS-m score $\leq$ 27 indicates possible cognitive impairment. Patient baseline functional status was measured during the initial interview using the Older Americans Resources and Services scale (OARS) (43). This 28-point scale is used to quantify patients' ability to perform seven ADLs and seven instrumental activities of daily living (IADLs). Patients were considered independent or semi-independent if they were able to perform five of seven ADLs without any help. The OARS was also administered at the 60-day phone follow-up to determine if there was a functional decline following the patient's initial hospitalization. Questions regarding the participants' unplanned hospital/ED visit following their hospitalization were also asked during the 60-day follow-up.

The CAM, which has been extensively validated, was used as the gold standard test for delirium (44–46). The RAs first administered the CAM during the initial interview and patients with a positive CAM were excluded from the study. Given the fluctuating course of delirium, RAs administered the CAM to the study participants twice a day (6-hours interval) for the duration of their ED stay and for up to 24 h after their admission to a hospital ward. RAs did not calculate and interpret the results of the follow-up CAMs. During the data analysis phase, the CAM was calculated and scored via the sensitive (SENS) method. The CAM is positive according to the SENS method if the following is present: 1) acute onset or fluctuation and 2) inattention, plus either 3) disorganized thinking or 4) altered level of consciousness (47). The Delirium Index was also administered to measure the severity of delirium in our patients (48). This scale assesses the following seven domains of delirium: level of attention, disorganized thinking, level of consciousness, disorientation, memory, perception, and motor disturbances. The Delirium Index allows delirium severity to be graded from 0 to a maximum score of 21.

In keeping with CAM administration standards, additional information was collected by questioning the nurse and the patient's family or close friends, when available. All medical notes (including from nurses, emergency physicians, and consultants) were reviewed daily by the RAs, and at the end of the study by a trained research nurse, who also reviewed discharge summaries and hospital stay medical notes. The research nurse assessed whether a suspicion or diagnosis of delirium or acute confusion was reported in the patients' medical files by looking for the following keywords: *delirium*, *delirious*, *confusion*, or *acute confusion*. The main outcome measure was the proportion of patients with unrecognized delirium. Patients with a positive CAM, as administered by our research team, with no note of delirium or acute confusion reported in their medical files, were considered as "unrecognized."

Primary Data Analysis

Descriptive statistics were used to describe the proportion of unrecognized delirium in patients' medical files. Patient characteristics and measured outcomes were computed and compared between the two groups of patients (recognized vs. unrecognized delirium). Continuous characteristics variables were compared using *t*-tests and categorical characteristics were compared using χ^2 tests. Considering most normality tests will be underpowered in our sample of 10 patients with recognized delirium, and that the *t*-test is mostly robust to non-normality, as long as the distribution is symmetric, we simply checked histograms per groups. No extreme asymmetry was apparent. Progression of the TICS-m and OARS measurements between the index visit and 60-day follow-up in recognized and unrecognized cases were modeled using repeated measures regression models with a compound symmetry correlation structure. All analyses were performed using SAS, version 9.4 (SAS Institute, Inc., Cary, NC).

RESULTS

A total of 5581 patients were screened during the two phases of the main study and 652 patients were recruited. Of those, 68 (10.43%) patients had at least one positive CAM as administrated by RA and were included in this sub-study. A perfect inter-rater agreement was obtained for the CAM (κ = 1.0). The medical files of 3 patients were incomplete, leaving us with a cohort of 65 patients who developed incident delirium (Table 1 shows participants' characteristics). Follow-up data are available for 38 patients (5 refusals, 19 lost to follow-up, 3 deceased), 3 of which were unable to complete the TICS-m by telephone.

Table 1. Description of the Study Sample (n = 65)

Characteristics	Data
Female, n (%)	34 (52%)
Age, years, mean (SD)	80.1 (8.7)
Length of stay, hours, mean (SD)	
ED	43.8 (24.1)
Hospital	308.5 (228.6)
Charlson Comorbidity Index score, mean (SD) (n = 62)	2.5 (2.5)
APACHE II, mean (SD) (n = 64)	10.7 (5.6)
CFS, mean (SD) (n = 63)	4.1 (1.2)
TICS-m, mean (SD) (n = 64)	27.8 (6.6)
Delirium Index, mean (SD) (n = 61)	4.8 (2.9)
OARS, mean (SD)	24.2 (2.7)
Living arrangement, n (%) (n = 64)	
Home alone without help	11 (17.2)
Home with family (spouse or relatives)	31 (48.4)
Apartment for independent/semi-autonomous seniors	20 (31.3)
Home alone with help (private or public)	2 (3.1)

APACHE = Acute Physiology and Chronic Health Evaluation; CFS = Clinical Frailty Scale; ED = emergency department; OARS = Older Americans' Resources and Services; SD = standard deviation; TICS-m = telephone Interview for Cognitive Status-modified.

After a thorough review of our patients' medical charts by a research nurse, we found that only 10 of 65 (15.4%) incident cases with a positive CAM were recognized by any HP. Table 2 presents comparisons of recognized and unrecognized cases. Both groups were similar with regard to their mean comorbidity score (Charlson Comorbidity Index), severity of illness score (APACHE), initial cognitive status (TICS-m), initial functional status (OARS), and frailty. The two groups differed in age, as the group with recognized delirium was older ($p = 0.03$) and were women ($p = 0.01$). Their Delirium Index scores also differed ($p = 0.01$) with recognized cases having a higher score. Further investigation revealed that two components of the scale differed between the groups: memory ($p = 0.04$) and disorientation, which approaches statistical significance ($p = 0.06$). No difference was found for any other components of the Delirium Index. ED and hospital LOS were similar between groups. Positive CAM occurred after an average of 46.6 hours of hospital stay for patients with unrecognized delirium (mean ED LOS 44.3 hours) and after 43.5 hours for patients with recognized delirium (mean ED LOS 41.6 hours), and therefore, during their ED stay or very shortly following their admission to a hospital ward.

A 60-day post-discharge phone interview was conducted by our RAs. A repeated measure model was constructed on our 65 participants and our results show no significant difference in the TICS-m score between groups over time ($p = 0.28$). We also compared the functional status of patients with recognized and unrecognized delirium. The model showed a significant difference by time effect ($p = 0.0086$), recognized vs. unrecognized delirium effect ($p = 0.003$), and a time by group interaction ($p = 0.009$). These results indicate that those with a recognized delirium suffered from a more severe decline in function than patients with unrecognized delirium. There was no significant difference in the proportion of patients with unrecognized delirium who returned to the hospital within 60 days (47% compared to a 40% return for patients with recognized delirium, $p = 0.78$).

DISCUSSION

Our results show that HPs fail to recognize most cases of delirium that occur in the ED environment. In fact, 84.6% of patients with a positive CAM as assessed by our RAs

Table 2. Patient Characteristics According to Delirium Recognition (n = 65)

	At Hospital			60-Day Follow-Up		
Characteristic	Unrecognized Delirium (n = 55)	Recognized Delirium (n = 10)	*p* Value	Unrecognized Delirium (n = 30)	Recognized Delirium (n = 5)	*p* Value
Female, n (%)	25 (73.5)	9 (26.5)	0.01	—	—	—
Male, n (%)	30 (96.8)	1 (3.2)	—	—	—	—
Age, years, mean (SD)	79.1 (8.7)	85.7 (6.9)	0.03	—	—	—
ED length of stay, h, mean (SD)	44.3 (25.2)	41.6 (17.5)	0.75	—	—	—
Hospital length of stay, h, mean (SD)	307.9 (238.3)	311.7 (175.4)	0.96	—	—	—
Charlson Comorbidity Index score, mean (SD)	2.6 (2.6)	1.7 (2.1)	0.30	—	—	—
APACHE II, mean (SD)	11.1 (5.8)	8.3 (3.8)	0.18	—	—	—
CFS, mean (SD)	4.0 (1.2)	4.6 (1.3)	0.23	—	—	—
DI, mean (SD)	4.4 (2.6)	7.0 (3.5)	0.01	—	—	—
TICS-m, mean (SD)	28.3 (6.6)	25.0 (6.4)	0.16	26.4 (6.9)	27.8 (9.9)	0.73
OARS, mean (SD)	24.4 (2.8)	23.1 (1.5)	0.15	22.1 (4.6)	16.4 (5.5)	0.02
Unplanned hospital returns, n (%)	—	—	—	14 (40)	2 (5.7)	0.78

APACHE = Acute Physiology and Chronic Health Evaluation; CFS = Clinical Frailty Scale; DI = Delirium Index; ED = emergency department; OARS = Older Americans' Resources and Services; SD = standard deviation; TICS-m = Telephone Interview for Cognitive Status-modified.

were not reported in the patients' medical records. Those patients were sent to a hospital ward and potentially discharged home without appropriate care and follow-up for the complications they developed during their ED stay.

We also found that patients with recognized delirium suffer from a more severe functional decline 60 days after their hospital discharge. This, coupled with the significant difference we found between groups regarding the Delirium Index scores, suggests that only those with the most severe symptoms (and thus more obvious cases) were recognized and reported in the medical file, especially when patients experienced symptoms such as loss of memory and disorientation. The difference found between groups regarding those symptoms is interesting because we originally thought that patients who showed more obvious physical signs of delirium, such as altered level of consciousness or with motor disturbances (agitated or hypoactive), would have been easier to identify. We were unable to demonstrate a difference in TICS-m scores and in unplanned return ED visits between the two groups. This, however, is most probably due to the high number of patients lost to follow-up at the 60-day phone interview.

Previous studies revealed that HPs fail to detect delirium in more than half of cases (11–16). Hustey et al. determined in 2000 that only 30% of patients with impaired mental status were documented by ED HPs, and similar results were obtained in 2002 (34,49). Another study has shown that as much as 90% of undiagnosed admitted delirious patients are also unrecognized by HPs on hospital wards (50). Our results show that the recognition rate of incident delirium in independent/semi-independent patients in the ED has not improved over time and strengthens the need for ED HPs to better identify and document delirium so that patients receive appropriate care, referrals, or follow-up plans with their regular health care provider to address impairment.

A previous small Québec study using routine screening and diagnostic tools has shown a high rate of prevalent (10%) and missed delirium (50%) upon patient arrival at the ED (11). However, to our knowledge, this is the first provincial study that evaluated the documentation rate of incident delirium in the ED.

Limitations

This study has limitations. First, our cohort included independent older patients with no pre-existing psychological/cognitive conditions and, therefore, represents only a subset of the population usually seen in the ED. The high number of patients lost to follow-up at 60 days prevented us from obtaining statistically significant results regarding a possible decline in cognition and a possible link between unplanned return to the ED and unrecognized delirium.

Furthermore, the diagnosis of delirium was not made by a geriatrician and therefore our results could include "false-positive" patients. However, the CAM's administration by trained non-physician interviewers has been tested extensively. In fact, Monette et al. compared CAM administration by a lay interviewer to a CAM administered by a geriatrician, and their results show good inter-observer agreement ($\kappa = 0.91$) (40). Sensitivity (0.86), specificity (1.00), positive predictive value (1.00), and negative predictive value (0.97) also showed that the CAM, even when administered by non-physicians, is reliable to identify patients with delirium (44). An additional limitation is that results may have been impacted by test–retest bias and test fatigue among participants.

It could be argued that HPs may have recognized delirium but failed to document this in the chart, which was previously reported in other studies (51,52). However, given that an experienced research nurse reviewed all charts in detail, we are confident that patients with no documentation of delirium had no changes in their care to mitigate the delirium, or any additional resources added to their discharge plans (such as additional follow-up and referrals that could be linked to delirium). Any "missed" recognized delirium failed to impact patient care.

Our study highlights the need for adapted detection tools to be integrated in the usual practice of ED HPs. A possible solution to avoid this under-recognition issue could be the implementation of shorter adapted tools that are more practical for use in the busy ED environment. However, results from a 2017 Emergency Department Delirium Initiative Trial show that, even when using a screening algorithm and risk warning cards, HPs' rate of delirium detection did not improve significantly (53). Therefore, it seems that the lack of adapted tools is not the sole problem. Another interesting solution could be the introduction of patient self-assessments. In fact, a study by Tong et al. tested the reliability of a serious game aimed to detect delirium in older patients presenting to the ED (54). This self-assessment practice, however, needs to be further studied.

CONCLUSIONS

Our study showed that a high number of patients with a positive CAM for delirium are left unrecognized by HPs. In addition, HPs only recognize the most serious cases, with memory loss or disorientation. Of note, patients with unrecognized delirium experience a greater loss of function at 60 days compared to those where delirium was recognized, but the cause of this functional decline is unclear. One could hypothesize that delirious

patients could be unable to correctly follow post-discharge instruction and to actively participate in their recovery. Delirium recognition and reporting rates remain unacceptably low, despite a decade of efforts to improve this. Implementation of new protocols to identify delirium are urgently needed in clinical practice in order for its underlying causes to be identified and treated, and for patients to receive appropriate post-ED follow-up and care after their delirium episode.

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ARTICLE SUMMARY

1. Why is this topic important?

Delirium has been shown to negatively impact several patient outcomes. Despite a number of existing recommendations and guidelines aiming to improve emergency care for older patients, this condition is often left undetected by health professionals (HPs). Better identification of incident delirium in older patients is therefore key to prompt management of its underlying causes and the rapid implementation of targeted interventions aimed at reducing the severity and duration of delirium, thus limiting its consequences.

2. What does this study attempt to show?

This study aimed to describe the proportion of unrecognized incident delirium in five emergency departments (EDs) by HPs. Secondary objectives were to compare two groups (recognized vs. unrecognized delirium) and assess the impact of unrecognized delirium at 60 days regarding unplanned consultations and functional and cognitive decline.

3. What are the key findings?

Our results confirm that the rate of delirium reporting in medical files remain unacceptably low (15.4%), despite a decade of efforts to improve care for older patients in the ED. HPs recognized delirium in older patients who showed more severe symptoms and those patients had a more important loss in function at 60 days post-ED visit.

4. How is patient care impacted?

Delirium recognition and reporting rates remains unacceptably low, despite a decade of efforts to improve this. Implementation of protocols to identify delirium are urgently needed in order for patients to receive appropriate follow-up and care after their delirium episode.