Early Detection and Intervention for Patients with Delirium Admitted to the Department of Internal Medicine: Lessons from a Pilot Initiative

Ron Oliven[a, b, d]   Meital Rotfeld[a]   Sharon Gino-Moor[b, d]   Elad Schiff[b, d]
Majed Odeh[b, d]   Efrat Gil[c, d]

[a]Geriatric Unit, Bnai Zion Medical Center, Haifa, Israel; [b]Department of Medicine, Bnai Zion Medical Center, Haifa, Israel; [c]Geriatric Service, Clalit Health Services, Haifa and West Galilee, Haifa, Israel; [d]Rappaport School of Medicine, Technion Institute of Technology, Haifa, Israel

Abstract

Introduction: Older patients who arrive to the emergency room with delirium have a worse prognosis than others. Early detection and treatment of this problem has been shown to improve outcome. We have launched a project at our hospital to improve the care of patients who arrive delirious to the medical emergency room. The present article describes lessons that can be learned from this pilot initiative. *Methods:* All patients older than 70 years admitted to the department of internal medicine were screened for delirium in the emergency room using the 4AT screening tool. Data of patients with a 4AT score ≥5 (or with incomplete score) were transferred to the geriatric unit of the hospital. On the ward, the presence of delirium was confirmed by a geriatric nurse that validated that the patient could walk with support and ordered mobilization and physiotherapy (M&P). *Results:* Over the 2 and a half years (10 quarters) allocated for the pilot project, 1,078 medical patients with delirium were included in this survey. In 59.3%, the diagnosis of delirium could be confirmed only after admission. Due to budgetary constraints, only 54.7% received the allocated specific intervention – early M&P. Since it was decided that randomization was not appropriate for our initiative, we found that patients who received M&P had lower (better) 4AT scores on admission, and lower mortality. No significant difference was found between the patients who received M&P and the others in length of hospitalization and discharge to nursing homes. Retrospective comparison of the two groups did not enable to determine whether M&P was given to the patients for whom it was most effective. *Conclusions:* It is often not possible to verify in the emergency room that the cognitive decline is indeed new, that is, is due to delirium, and measures must be taken to verify this point as soon as possible after admission. Due to numerous constraints, the availability of early M&P is often insufficient. Whenever resources are scarce and randomization is avoided, adequate criteria should be found for allocating existing dedicated staff to patients for whom early mobilization is likely to be most beneficial.

© 2021 The Author(s)
Published by S. Karger AG, Basel

Correspondence to:
Ron Oliven, oliven@technion.ac.il

Introduction

Delirium, often referred to as new-onset confusional state, is characterized by acute deterioration in mental functions. The incidence of delirium varies depending on the group of patients investigated and reaches about a third of internal medicine patients older than 70 years [1, 2]. It is associated with increased mortality, prolonged hospital stay, and worse treatment outcome [1, 2]. Severity and clinical picture are variable, but common to all patients is that delirium has an acute onset with tendency to fluctuate, a course that distinguishes it from dementia [3, 4]. Delirium in geriatric medical patients is usually precipitated by an infectious disease, side effect of drugs and other acute illnesses, often on the background of pre-existing mild or moderate dementia, depression and other predisposing chronic conditions [1–4].

Whenever possible, prevention of delirium is obviously the best strategy [5]. However, for patients arriving delirious to the emergency room (ER), recognition of this condition, along with prompt diagnosis and treatment of the precipitating condition(s) is crucial [6–8]. Failure to detect delirium in the acute setting has been shown to be associated with worse outcome [8]. For this purpose, simple and short, bedside delirium detection tools have been developed, the best known and adequately validated being the Confusion Assessment Method – CAM [9] and the 4AT [10–13]. Nevertheless, based on clinical documentation, only a third or less of delirium cases are recognized on admission [7], and delirium screening, particularly outside ICUs, requires considerable improvement. Also, a large number of prevention and management measures have been advocated and validated [14, 15], often grouped under easy-to-remember mnemonics like DELIRIUM [1] or ABCDEF [16]. Unfortunately, once a multidimensional approach has been initiated to address and treat reversible factors, there are almost no measures to improve delirium per se. Pharmacological agents failed to change the natural course of delirium [1], and early mobilization is the main intervention shown to shorten its duration and improve the mental state of the patients [17–19].

Attempting to improve the management of patients arriving with delirium to the ER and admitted to the medical department, a new initiative has been launched as a pilot project in our hospital. The presence of delirium was screened in the ER in all patients older than 70 years. Nurses of the geriatric unit validated the diagnosis of delirium in the wards. In addition to the patient-targeted individual multicomponent care required for the management of delirium, the geriatric nurses selected the patients suitable for early mobilization and physiotherapy (M&P). Trained personnel was allocated specifically for this purpose (medical students and nurses), in addition to physiotherapists. Unfortunately, due to budgetary constraints, not all suitable patients received the recommended early M&P plan. Also, since both early diagnosis and mobilization were considered essential, patient randomization was avoided. The present article describes our findings and lessons that can be learned from our pilot initiative.

Methods

Towards the end of 2017, the 4AT screening tool for delirium detection was installed in the computerized patient sheet of the ER at Bnai-Zion Medical Center, a mid-size municipal hospital affiliated with the faculty of medicine. After appropriate instructions to all ER and on-call physicians and a short pilot period, the initiative was launched starting in January 2018. All patients older than 70 years who arrived at the medical ER and were admitted to one of the wards or units of the department of internal medicine were screened for delirium using the 4AT screening tool.

In order to complete the patients' admission procedure, the admitting physician was required to complete the four 4AT items: (1) alertness (4 points if the patient is clearly abnormal – drowsy and/or agitated); (2) abbreviated mental test (AMT4: age, date of birth, place and current year, 1 point for 1 mistake, 2 if more); (3) attention (months or days backwards test, 1 point if <7 months or refuses to start, 2 points if untestable); and (4) the deterioration in mental state is acute or fluctuating (4 points). Scoring was calculated and stored automatically once the physician marked the appropriate circles on the computer screen.

Unaccompanied patients, for whom the 4AT 4th item could not be completed (presence of acute onset and fluctuating course), were defined as incomplete score and were re-assessed later on by a geriatric nurse (see below). Since we focused in the present project on patients with delirium, only patients with acute change in mental state (yes = 4 points for the 4th 4AT question) were included. Accordingly, all patients had a final 4AT score between 5 and 12, scores considered as indicating with high probability the presence of delirium. The data of all patients with a 4AT score ≥5 (or with incomplete score) were automatically transferred to the computers of the geriatric unit of the hospital.

One to 3 days after admission to the hospital, a geriatric nurse went to these patients to verify that the change in mental state observed in the ER was new. Exclusion of chronic stable dementia (as opposed to delirium superimposed on dementia) was required mainly for patients for whom this information could not be obtained in the ER. It was verified primarily by obtaining relevant information from family members. In addition, the initial follow-up while the patient had already received treatment made it possible to observe changes in their mental state. Once the presence of delirium was verified, the geriatric nurse entered her findings in a pre-constructed delirium file and ordered M&P reserved specifically for patients with delirium. The role of the physiotherapist was

Table 1. Patient's characteristics and selected diagnoses on admission

	Early M&P (*n* = 587)	No M&P (*n* = 488)	*p* value
Age, years	84.7±7.0	85.1±7.3	NS
Gender, % males	47.7	38.1	<0.005
Infection, %	52.8	57.3	NS
TIA/CVA, %	21.7	18.8	NS
Malignancy, %	10.2	12.0	NS
Diabetes mellitus, %	27.1	29.9	NS
Hypertension, %	50.6	47.9	NS
Ischemic heart disease, %	46.4	44.4	NS

M&P, physiotherapy and mobilization; NS, not significant.

Table 2. Comparison of the 4AT scores in the two groups

	Early M&P (*n* = 587)	No M&P (*n* = 488	*p* value
Alertness	1.40±1.91	1.76±1.99	<0.005
Orientation (AMT4)	1.71±0.63	1.83±1.02	<0.02
Attention	1.72±0.56	1.86±1.02	<0.005
Acute deterioration in mental status	4	4	
Total 4AT score	8.79±2.18	9.26±2.28	<0.0005

Mean ± SD. AMT4, abbreviated mental test, 4 items (age, date of birth, place, and current year).

first and foremost to get the patient out of the bed or chair, and walk him repeatedly, as early and as often as possible, depending on the medical condition, as well as to guide family members and personal caregivers to do the same. These actions were independent of the regular in-house physiotherapy for other needs (including respiratory physiotherapy, etc.) that were ordered, if necessary, by the attending physician.

Once a patient was included in the delirium intervention project, relevant information was transferred automatically from his medical records to a dedicated excel file. It contained, in addition to age and gender, the main admission diagnosis and all additional diagnoses, the scoring of the 4AT parameters, information entered by the geriatric nurses and the physiotherapists, the length of hospital stay, and if the patient arrived from and/or was discharged to a nursing home. The data presented in this retrospective survey was obtained from these files.

All data are presented as mean ± SD. The Shapiro-Wilk normality test was used to test normal distribution of continuous data. As all our continuous data was normally distributed, unpaired 2-tailed *t* test was used to compare continuous variables, and Pearson's χ² test was used to compare binary variables of patients who did and did not receive physiotherapy. *p* < 0.05 was considered as statistically significant.

Results

The initiative described (delirium detection and intervention) took place over 10 quarters – from January 1, 2018, to June 30, 2020. For many patients, no clear answer was obtained in the ER as to whether the observed cognitive decline was new, relative to the patient's previous mental condition. This information was completed by the geriatric nurses on the wards, and we found that the presence of delirium was determined already in the ER in only 40.7% of all patients finally diagnosed with delirium on arrival. After excluding patients for whom physiotherapy

was not recommended due to their medical condition, patients who were not ambulatory and patients who were hospitalized for <3 days, the total number of delirium patients included was 1,075. M&P was ordered for all patients diagnosed with delirium and found suitable for this treatment, but the personnel participating in the project was limited. Therefore, and due to the varying prevalence of patients with delirium, there often were not enough staff available for all M&P treatments recommended. In these situations, the nurses of the geriatric unit had to decide to whom to assign the M&P treatments. This dissynchrony between the number of patients and physiotherapists at any given time ultimately resulted in only 54.6% of patients with delirium receiving M&P treatments. On the average, treated delirium patients received 4.0 ± 2.3 sessions of M&P.

Trying to determine the factors that led to the allocation of our resources among the patients and the effect of M&P, we compared the two groups, with and without M&P treatments. Table 1 shows the age, gender, and disease data of the patients. For the purpose of comparison, we chose 6 common diagnoses with high prevalence in our cohort. As seen in the table, there was no difference in age and the prevalence of the diseases assessed between the two groups. In contrast, the percentage of men among the treated patients was significantly higher than in the untreated group (47.7 vs. 38.1%, *p* < 0.005).

The 4AT parameters in the two groups are presented in Table 2. Since the project was aimed at patients with delirium, and patients with chronic stable dementia were excluded, all patients included received 4 points on the fourth item. Accordingly, the first 3 parameters provided an overall assessment of the patients' coherence on admission. We found that the 4AT score and each of its

Oliven/Rotfeld/Gino-Moor/Schiff/Odeh/Gil

Table 3. Comparison of length of stay and discharge data in the two groups

	Early M&P (n = 587)	No M&P (n = 488)	p value
Duration of hospitalization, days	7.8.0±5.6	7.5±5.4	NS
Admission from nursing home, %	15.7	16.4	NS
Deceased, %	11.1	16.6	<0.002
Discharge to nursing home, %	22.3	24.8	NS
Discharge from home to nursing home, %	12.6	13.5	NS

components were lower (= better) in patients who received treatment compared to the others, and the difference in the total 4AT score between the groups was highly significant.

The difference between the two groups was evident not only in differences in the 4AT score but also in cognitive background data. Most of the patients had already some degree of dementia before the acute event that led to their hospitalization. However, 27.1% of the patients who received M&P were reported to have been normally coherent before their current illness, as compared to only 20.8% of the other group (p < 0.01).

As shown in Table 3, about 16% of the patients in each group arrived from a nursing home. The percentage of patients who died during the hospital stay was significantly higher in the group who did not receive M&P. On the other hand, other parameters that could serve as indicating a beneficial effect of early M&P, like length of hospitalization or discharge to nursing homes were not significantly different in the two groups.

Discussion

The present article presents results of the pilot program of an initiative to improve early diagnosis of delirium in the ER in order to initiate adequate management, including early M&P, in medical patients. Two main conclusions can be drawn from this first part of the initiative we have taken.

First, it turned out that the ability to diagnose delirium in "real life" in the ER is limited due to the lack of information on what the chronic underlying mental state was in many patients before admission. The presence of acute change and fluctuating course is required for the diagnosis of delirium, as opposed to stable chronic dementia, in any algorithm, including CAM [9] and 4AT [11]. However, in our cohort, this information was not accessible in more than half of the patients prior to admission to the department of medicine. Only after contacting appropriate family members or caregivers, and sometimes after observing an improvement in the first 1–2 days of hospitalization, could it be determined that the cognitive decline observed in the ER was indeed new, an expression of delirium, including delirium superimposed on dementia. The lesson from this finding is that additional measures should be taken in the ER or immediately at the beginning of hospitalization to improve and hasten the acquisition of information that the patient's cognitive decline observed upon arrival at the hospital is not chronic, that is, not solely dementia.

The management of delirium requires a multidisciplinary, holistic approach that addresses its multifactorial causation and potential precipitating factors [7]. Most of the required tasks ought to be performed by the medical and nursing staff treating the patient, who have undergone specific training for the treatment of patients with delirium. Early M&P is exceptional in that it requires additional, usually extra-departmental staff, which is often not available to all patients in need to the required extent. At the beginning and during the initiative described, the medical and nursing staff received lectures to refresh their knowledge about the management of delirium, and this part of the intervention was performed the same way in all patients. However, we realized well before starting the initiative that we did not have sufficient resources to provide early and continuous M&P for all our patients with delirium. Nevertheless, we decided that it would not be ethical to perform randomization, thereby preventing physiotherapy from some of the patients: early M&P may contribute not only to improving delirium [6], but also for averting falls [15], reducing muscle atrophy [17], and reorientation. We left therefore the assignment of dedicated physiotherapy at the discretion and professionalism of the geriatric nurses and physiotherapists, based on availability, suitability, and patient's cooperation.

It was therefore not surprising to find that in the retrospective comparison of the patients who received the designated early M&P (54.6%) with the others who did not, we found significant differences between the groups.

Although no difference was found in the main diagnoses and age, for an unknown reason the percentage of men was higher among the treated patients. More importantly, it was quite clear that the staff favored, whenever the availability of M&P was insufficient, patients in a better mental state, as reflected in their lower/better 4AT score and lower prevalence of preceding dementia. This is likely to be the reason for the higher mortality among patients not selected for treatment, who were probably a priori in worse clinical condition. On the other hand, the lack of effect of M&P on the length of hospital stay and referral to nursing homes is more complex. These parameters are often used to determine treatment effectiveness, but both are influenced by multiple factors: The duration of hospitalization depends on multiple medical and social aspects, and often patients with better rehabilitation and recovery potential are delayed longer in the hospital to improve their prognosis. Also, in Israel many seniors with severe functional impairment, including dementia, are cared for by family members in a shared home, or by live-in caregivers. On the other hand, nursing homes may include also long-term rehabilitation facilities and assisted living residencies for elderly who choose not to live independently. Therefore, examining the effectiveness of M&P using these metrics is too simplistic. The length of time required for reversal of delirium and a suitable assessment of the patients' condition before discharge may be more appropriate parameters.

We believe that proof of effectiveness for most of the actions advocated as essential for reversing delirium [1, 7, 8, 14–16] is either no longer required or cannot be assessed unless randomization is applied. On the other hand, there is insufficient information for which medical patients presenting with delirium early M&P is most valuable. Since budgetary sources are often limited, the second conclusion from our pilot initiative is that the goal of investigation should be modified: more adequate parameters should be looked for, and the research should focus on the selection of patients with delirium that will benefit most from obtainable early M&P, as well as the duration of M&P required to observe a beneficial effect.

In conclusion, this initial phase of the initiative to improve treatment of patients with delirium admitted to medical wards indicated that adequate means should be allocated to expedite the acquisition of the information if the patient's cognitive decline observed upon arrival to the hospital is new. In addition, whenever the required resources for M&P are insufficient, criteria should be established for allocating dedicated staff to patients for whom early mobilization is likely to be most beneficial.

Statement of Ethics

Conflict of Interest Statement

Funding Sources

Author Contributions

References

1 Marcantonio ER. Delirium in hospitalized older adults. N Engl J Med. 2017 Oct;377(15):1456–66.

2 Hshieh TT, Inouye SK, Oh ES. Delirium in the Elderly. Psychiatr Clin North Am. 2018 Mar;41(1):1–17.

3 Jackson TA, MacLullich AM, Gladman JR, Lord JM, Sheehan B. Undiagnosed long-term cognitive impairment in acutely hospitalised older medical patients with delirium: a prospective cohort study. Age Ageing. 2016 Jul;45(4):493–9.

4 Morandi A, McCurley J, Vasilevskis EE, Fick DM, Bellelli G, Lee P, et al. Tools to detect delirium superimposed on dementia: a systematic review. J Am Geriatr Soc. 2012 Nov;60(11):2005–13.

5 Oh ES, Fong TG, Hshieh TT, Inouye SK. Delirium in Older Persons: advances in diagnosis and treatment. JAMA. 2017 Sep;318(12):1161–74.

6 Hshieh TT, Yang T, Gartaganis SL, Yue J, Inouye SK. Hospital Elder Life Program: systematic review and meta-analysis of effectiveness. Am J Geriatr Psychiatry. 2018 Oct;26(10):1015–33.

7 Inouye SK. Joining forces against delirium - from organ-system care to whole-human care. N Engl J Med. 2020 Feb;382(6):499–501.

8 Zoremba N, Coburn M. Acute Confusional States in Hospital. Dtsch Arztebl Int. 2019 Feb;116(7):101–6.

9 Marcantonio ER, Ngo LH, O'Connor M, Jones RN, Crane PK, Metzger ED, et al. 3D-CAM: derivation and validation of a 3-minute diagnostic interview for CAM-defined delirium: a cross-sectional diagnostic test study. Ann Intern Med. 2014 Oct;161(8):554–61.

10 Bellelli G, Morandi A, Davis DH, Mazzola P, Turco R, Gentile S, et al. Validation of the 4AT, a new instrument for rapid delirium screening: a study in 234 hospitalised older people. Age Ageing. 2014 Jul;43(4):496–502.

11 MacLullich AM, Shenkin SD, Goodacre S, Godfrey M, Hanley J, Stíobhairt A, et al. The 4 'A's test for detecting delirium in acute medical patients: a diagnostic accuracy study. Health Technol Assess. 2019 Aug;23(40):1–194.

12 Richardson SJ, Davis DH, Bellelli G, Hasemann W, Meagher D, Kreisel SH, et al. Detecting delirium superimposed on dementia: diagnostic accuracy of a simple combined arousal and attention testing procedure. Int Psychogeriatr. 2017 Oct;29(10):1585–93.

13 O'Sullivan D, Brady N, Manning E, O'Shea E, O'Grady S, O 'Regan N, et al. Validation of the 6-Item Cognitive Impairment Test and the 4AT test for combined delirium and dementia screening in older Emergency Department attendees. Age Ageing. 2018 Jan;47(1):61–8.

14 Young J, Murthy L, Westby M, Akunne A, O'Mahony R; Guideline Development Group. Diagnosis, prevention, and management of delirium: summary of NICE guidance. BMJ. 2010 Jul;341:c3704.

15 Hshieh TT, Yue J, Oh E, Puelle M, Dowal S, Travison T, et al. Effectiveness of multicomponent nonpharmacological delirium interventions: a meta-analysis. JAMA Intern Med. 2015 Apr;175(4):512–20.

16 Mart MF, Brummel NE, Ely EW. The ABCDEF bundle for the respiratory therapist. Respir Care. 2019 Dec;64(12):1561–73.

17 Kress JP, Hall JB. ICU-acquired weakness and recovery from critical illness. N Engl J Med. 2014 24;370(17):1626–35.

18 American Geriatrics Society Expert Panel on Postoperative Delirium in Older Adults. American Geriatrics Society abstracted clinical practice guideline for postoperative delirium in older adults. J Am Geriatr Soc. 2015 Jan;63(1):142–50.

19 Schaller SJ, Scheffenbichler FT, Bose S, Mazwi N, Deng H, Krebs F, et al. Influence of the initial level of consciousness on early, goal-directed mobilization: a post hoc analysis. Intensive Care Med. 2019 Feb;45(2):201–10.