Clinical significance of delirium subtypes in older people

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Abstract

Objective: to examine the relative frequency and outcome of clinical subtypes of delirium in older hospital patients.
Design: prospective observational study.
Setting: acute geriatric unit in a teaching hospital.
Subjects: 94 patients with delirium from a prospective study of 225 admissions.
Measurements: clinical subtypes of delirium were determined according to predefined criteria. Characteristics examined in these subgroups included illness severity on admission, prior cognitive impairment, mortality, duration of hospital stay and hospital-acquired complications.
Results: of the 94 patients, 20 (21%) had a hyperactive delirium, 27 (29%) had a hypoactive delirium, 40 (43%) had a mixed hypoactive–hyperactive psychomotor pattern and seven (7%) had no psychomotor disturbance. There were significant differences between the four groups in illness severity ($P < 0.05$), length of hospital stay ($P < 0.005$) and frequency of falls ($P < 0.05$). Patients with hypoactive delirium were sicker on admission, had the longest hospital stay and were most likely to develop pressure sores. Patients with hyperactive delirium were most likely to fall in hospital. There were no differences in aetiological factors between the groups.
Conclusion: outcomes of hospitalization differ in different clinical subtypes of delirium.

Keywords: *delirium, falls, hospital care, psychomotor abnormality*

Introduction

Delirium, an organic psychiatric syndrome characterized by an acute onset, prominent disturbance of attention and global cognitive impairment, is a common and serious complication of illness in older people. Delirious patients may exhibit a wide range of abnormal behaviours. Lipowski noted that at least three distinct clinical subtypes of delirium can be identified from the pattern of psychomotor activity and alertness: hyperactive–hyperalert (agitated), hypoactive–hypoalert (somnolent) and mixed [1]. In modern diagnostic criteria, increased and decreased psychomotor disturbances are regarded as equally consistent with a diagnosis of delirium. Nevertheless, some authors restrict the term 'delirium' to patients with psychomotor agitation [2–4].

The aetiology and hence the pathophysiological basis of delirium may differ between subtypes [3]. Patients with metabolic encephalopathy usually have a hypoactive delirium, while alcohol or benzodiazepine withdrawal generally causes an agitated delirium. However, exceptions occur even to these well-established associations [4, 5], and some workers have failed to find any relationship between the aetiology of delirium and the nature of the psychomotor disturbance [6]. There have been few studies on the clinical significance of delirium subtypes. The aim of this study was to examine the frequency and outcome of delirium subtypes in a prospective study of patients admitted to an acute geriatric unit.

Patients and methods

This study is a planned secondary analysis of data from a prospective study of delirium in older hospital patients. Full details of patient selection and of the assessment procedure are available in a separate report [7].

Patients

We studied consecutive patients admitted over 18 months to a 20-bed acute care geriatric unit in a university teaching hospital. The acute geriatric unit targets acutely ill elderly people who are frail and dependent in activities of daily living. Patients who were not admitted to the geriatric unit on the day of admission, patients admitted electively for investigations, rehabilitation or respite care, patients with severe aphasia or deafness, patients who were expected to remain in hospital less than 48 h and patients who were not assessed by a research doctor within 48 h of admission were excluded. Only the first admission of a patient within the study period was included. In all, 225 patients were evaluated within 12 h of admission and throughout their hospital stay for symptoms of delirium as defined in the third edition of the American Psychiatric Association Diagnostic and Statistical Manual (DSM-III) [8].

Clinical evaluation

The initial assessment included a semi-structured interview and administration of the Folstein Mini-Mental State Examination [9]. The assessment instrument used in this study, the delirium assessment scale (DAS), was based on the operational definitions of the DSM-III criteria for delirium proposed by workers at the Hospital of the University of Pennsylvania [10–12]. Information about the previous cognitive and functional status, medical history and the pattern of onset of cognitive impairment was sought from family members, carers and the general practitioner and by inspection of medical and nursing notes.

A diagnosis of dementia was made if there was evidence of cognitive impairment of at least 6 months duration, which was sufficient to interfere with social functioning or if the Blessed dementia rating score was 4 or more [13]. A subjective rating of overall illness severity as mild, moderate or severe was made on initial admission by the study physician [14].

Patients with delirium were assessed daily; other patients were assessed at least every 48 h. Data concerning patient behaviour and hospital-acquired complications were collected using a checklist during daily interviews with nursing and medical staff, including night staff, by review of the medical and nursing notes and during weekly case conferences. The following in-hospital complications were recorded according to standardized criteria: falls, infections, pressure sores and urinary incontinence [7]. Use of psychoactive medication was also documented.

Defining delirium subtypes

In the DAS, increased or decreased psychomotor activity was rated as mild, moderate or severe according to predefined criteria. Psychomotor disturbance personally observed by the clinician or reported by day or night nursing staff. Observed and reported psychomotor disturbance were rated separately in the DAS; the higher of the two ratings on a given day was recorded.

Psychomotor agitation was documented using an adaptation of items 12 ('excitement') and 23 ('motor hyperactivity') of the brief psychiatric rating scale and a checklist of abnormal behaviours adapted from the Cohen–Mansfield agitation inventory [15, 16]. 'Mild agitation' describes patients who appear slightly restless or unusually talkative or who exhibit brief episodes of abnormal behaviours causing little risk or disturbance. 'Moderate agitation' describes patients who react with considerable intensity and pressured speech to attempted interaction or who exhibit prolonged low-risk activity or occasional high-risk activity. 'Severe agitation' was applied when patients overreacted to most stimuli, were restless and impulsive and could not control the intensity of psychomotor activity or had frequent episodes of high-risk abnormal behaviours.

'Psychomotor hypoactivity' was documented with an adaptation of the motor retardation item (item 13) of the brief psychiatric rating scale [15]. 'Mild retardation' was defined by the presence of noticeable slowing of speech or actions compared to most people. 'Moderate psychomotor retardation' was used if patients showed a large reduction or slowness of movement or speech. Patients with severe retardation were very apathetic or withdrawn and did not move or speak spontaneously.

Delirium subtypes were defined before the study according to the criteria defined below. During the development of the assessment instrument, we noted that mild agitation or retardation, but not more severe psychomotor symptoms, were common in patients without delirium. Also, in a reliability study, most disagreement between examiners concerned the presence or absence of mild psychomotor disturbance; inter-rater agreement for the presence or absence of moderate or severe psychomotor disturbance was greater than 95%. Therefore, in this report, 'hyperactive' delirium is applied to any patient with moderate or severe hyperactivity within the first 48 h of delirium, and patients with moderate or severe hypoactivity during this period are described as having 'hypoactive' delirium. Patients with both hypoactivity and hyperactivity of moderate severity are considered to have 'mixed' delirium, while patients without either psychomotor disturbance during this period are considered to have 'neither'.

Defining aetiological factors

We followed the example of Francis and colleagues, with some modifications, in determining the aetiology of delirium [17]. Diagnosis of a possible aetiological link between a disturbance and delirium was made if: (i) the disturbance was known to be associated with delirium; (ii) definite evidence of the disturbance was

Table 1. Characteristics of patients according to subtype of delirium

	Value, by delirium subtype			
	Retarded (*n* = 27)	Agitated (*n* = 20)	Mixed (*n* = 40)	Neither (*n* = 7)
Mean age, years (and SD)	83 (5)	82 (4)	82 (4)	84 (7)
Illness severity, no.(and %) of patients[a]				
Mild	3 (11)	4 (20)	6 (15)	4 (57)
Moderate	7 (26)	10 (50)	16 (40)	2 (29)
Severe	17 (61)	6 (30)	18 (45)	1 (14)
No. (and %) of deaths	6 (21)	3 (15)	6 (16)	0 (0)
Length of stay, geometric mean (and 95% CI)[b]	27 (7–107)	11 (2–53)	22 (6–87)	16 (7–34)
No. (and %) of complications[d]				
Urinary incontinence	15/22 (68)	11/17 (65)	19/33 (58)	3/6 (50)
Falls[a]	3 (11)	8 (40)	7 (18)	1 (14)
Pressure sore	3/23 (13)	0/18 (0)	3/36 (8)	0/7 (0)
No. (and %) taking medications				
Neuroleptics[c]	1 (4)	12 (60)	8 (20)	0 (0)
Benzodiazepines	1 (4)	4 (20)	6 (15)	2 (29)

[a]$P < 0.05$; [b]$P < 0.005$; [c]$P < 0.001$.
[d]Patients with frequent incontinence or a catheter on admission and patients with a pressure sore on admission are excluded from calculations of the incidence rates for those complications.
SD, standard deviation; CI, confidence interval.

present on physical examination or investigation; or (iii) the time course of the disturbance was consistent with that of mental status change. Patients might have more than one possible cause for delirium. Aetiological factors were classified into infections, fluid and electrolyte disturbance, metabolic disturbance, cardio-respiratory, drug toxicity, intracranial disease, withdrawal syndrome, and 'others'.

Statistics

The four groups were compared with regard to age, severity of illness, prevalence of dementia, length of hospital stay, in-hospital mortality and frequency of in-hospital falls, pressure sores, infections and urinary incontinence. Comparisons between the group of patients with hypoactive delirium and those with hyperactive delirium were planned *a priori*. χ^2 tests were used to analyse categorical data and one-way analysis of variance or *t*-tests for length of stay.

Results

Of the 225 patients studied, 94 (42%) developed DSM-III delirium. Of these, 40 (43%) had a mixed psychomotor pattern, 27 (29%) had hypoactive delirium, 20 (21%) had hyperactive delirium and seven (7%) had no psychomotor abnormality. Severe psychomotor disturbance was present in seven (35%) of 20 hyperactive patients and in three (11%) of 27 hypoactive patients; severe agitation was noted in 11 (28%) and severe retardation in three (8%) of the 40 patients with a mixed delirium.

There were significant differences between the four groups in illness severity ($P < 0.05$), length of hospital stay ($P < 0.005$), use of neuroleptic agents ($P < 0.001$) and the frequency of falls ($P < 0.05$; Table 1). Mortality rates did not differ between the groups. Patients with hypoactive delirium stayed longer in hospital and had more severe illness than patients with agitated delirium; patients with hyperactive delirium were more likely to receive neuroleptic medications ($P < 0.001$ for all differences).

Neuroleptic agents used to treat delirium were thioridazine (16 patients; median dose 20 mg/day, range 10–75 mg) and haloperidol (four patients; median dose 5 mg/day, range 2.5–10 mg). Parenteral neuroleptics were used for only one patient.

Aetiological factors in the different subtypes of delirium are shown in Table 2. A single aetiological factor was identified in 32 (37%) of the patients with

Table 2. Aetiological factors in patients with delirium

	No. (and %) of patients, by delirium subtype			
Disturbance	Retarded (*n* = 27)	Agitated (*n* = 20)	Mixed (*n* = 40)	Neither (*n* = 7)
Infection	9 (33)	10 (50)	12 (30)	2 (29)
Cardio-respiratory	7 (26)	4 (20)	16 (40)	3 (43)
Fluid/electrolyte	10 (37)	4 (20)	13 (33)	1 (14)
Metabolic	8 (30)	1 (5)	2 (5)	1 (14)
Intracranial	4 (15)	2 (10)	4 (10)	1 (14)
Drug toxicity	2 (7)	6 (30)	6 (15)	0 (0)
Withdrawal	0 (0)	3 (15)	2 (5)	0 (0)
Other	5 (18)	1 (5)	3 (8)	0 (0)

delirium. However, in most patients there were two or more disorders implicated in the development of the delirium. There were no significant differences in aetiological factors between the groups, although medication toxicity and withdrawal syndromes occurred predominantly in patients with hyperactive delirium and metabolic disturbance mainly in patients with hypoactive delirium.

Discussion

In this study, mixed delirium was the most common subtype, and purely hyperactive delirium accounted for only one-fifth of cases. Our study population was highly selected, comprising patients selected for admission to an acute geriatric unit because of physical or mental frailty. Nevertheless, these results are in accordance with the findings of surveys in general hospital wards [18, 19]. In contrast, agitated delirium predominates in studies of admissions to psychiatric hospitals or of psychiatric referrals [20, 21].

Koponen and Riekkinen noted that hypoactive patients admitted to a psychiatric hospital had more severe cognitive impairment on admission than hyperactive patients, even though the type of delirium did not influence the duration of hospitalization [21]. Liptzin and Levkoff noted increased duration of hospitalization and increased mortality in hypoactive patients, even though the differences between subtypes were not statistically significant [18].

In our study, hypoactive delirium was associated with a significantly prolonged hospital stay compared with hyperactive delirium, despite the fact that more of the agitated patients were noted to have severe psychomotor disturbance. Our data suggest two explanations for this finding: first, retarded patients were most likely to be diagnosed as severely ill on admission; secondly, the type of in-hospital complications also differed according to subtype. Hypoactive patients were most likely to develop pressure sores or hospital-acquired infections. Falls were most likely in patients with hyperactive delirium; agitated behaviour and the consequent use of sedatives may have contributed to this finding. Physical restraints are not used in our unit, but Francis and colleagues also noted the frequent occurrence of falls despite the use of restraints in many agitated patients [17]. The screening programme for delirium in this study ensured early detection and investigation of delirium. Hence, the relatively better outcome of agitated patients cannot be accounted for by earlier diagnosis and investigation.

Although our numbers are small and differences between the groups were not statistically significant, it was noteworthy that both patients with alcohol withdrawal, but none of the patients with delirium related to metabolic disturbance, developed a purely

hyperactive delirium. There was no clear link between infection, the commonest aetiological factor, and any particular subtype. Ross and colleagues reported similar findings in a study of 58 delirious inpatients [19].

There is no consensus on how to define the delirium subtypes. Ross and colleagues used analogue scales of alertness and of related symptoms together with a global classification of patients as 'somnolent' or 'activated' [19]. Liptzin and Levkoff defined specific symptoms from their delirium symptom interview as 'hypoactive' or 'hyperactive': patients with four or more hypoactive symptoms at any time during their hospital stay were said to have hypoactive delirium while patients with three or more hyperactive symptoms were defined as having hyperactive delirium [18].

In this study, we classified patients on the basis of the general rating of psychomotor activity and alertness during the first 48 h of delirium. This time span was chosen chiefly because symptoms of delirium tend to be most florid immediately after presentation [1]. Patients with longer hospital stays might be more likely to exhibit symptoms of psychomotor disturbance because of the increased time for observation [18]; our approach eliminates any possibility that the relationship between psychomotor disturbance and duration of hospital stay is artefactual.

Our findings, and those of other studies, support the clinical utility of differentiating delirium subtypes. Patients with agitated delirium are most likely to attract medical and nursing attention, while those who are quietly delirious may appear to be model patients. Consequently, 'severe delirium' is often used to describe patients with the most florid behavioural problems [22]. However, our study, like that of Liptzin and Levkoff, has found that patients with a quiet hypoactive delirium—who are easily missed unless cognitive decline is carefully sought—actually have a worse outcome. Different subtypes are associated with particular in-hospital complications which may be preventable. Perhaps a better understanding of the pathophysiology of delirium subtypes may lead to the development of specific treatments [3]. Some authors have reported that hypoactive delirious patients benefit from treatment with psycho-stimulants [23, 24]. There are some data indicating that hypoactive delirious patients benefit from neuroleptic treatment [25]. Confirmation of these findings in larger, better designed studies is required. Also, further research is necessary to clarify the classification of delirium subtypes and to examine the role of specific aetiological factors.

Key points
- A mixed hyperactive–hypoactive psychomotor pattern is the most common type of delirium in older hospital patients.

- Patients with hyperactive delirium are more likely to fall in hospital.
- Patients with hypoactive delirium tend to be sicker and are most likely to develop pressure sores.

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