Age and Ageing 1997; 26: 423–427

Causes and prognosis of delirium in elderly patients admitted to a district general hospital

JAMES GEORGE, SHEENA BLEASDALE, STEVEN J. SINGLETON

Department of Medicine for the Elderly, Cumberland Infirmary, Carlisle, CA2 7HY, UK

Address correspondence to: J. George. Fax: (+44) 1228 814812

Abstract

Background: delirium is common and is associated with a high early mortality, but less is known about the longer term prognosis.
Design: case-controlled prospective study.
Methods: all relevant wards were contacted weekly by a research nurse and the nurses were asked to report all patients presenting with confusion. Patients satisfying the American Psychiatric Association's Diagnostic and Statistical Manual III criteria were included. The diagnosis of delirium was confirmed by a consultant physician. Delirious patients were then followed-up throughout their hospital admission to ascertain the cause of their delirium, and assessed for visual and hearing impairment. The patients were assessed again at 6 and 12 months. Control patients, who were in hospital at the same time and on similar wards, but were not confused, were also examined and followed-up.
Results: 171 patients with delirium were identified (78 men and 93 women, mean age 81 years). The commonest cause of delirium was infection (34% of cases), but in 25% there were multiple equally contributory causes. Vision and hearing impairment was significantly more common in patients with delirium [odds ratio (OR) 12.62; confidence intervals (CI) 2.86–114.04, $P < 0.001$). After 1 year, patients presenting with delirium had an increased mortality (OR 2.30; 95% CI 1.25–4.35, $P = 0.006$), an increased institutionalization rate (OR 4.53; 95% CI 1.80–13.56, $P = 0.001$) and an increased likelihood of having been re-admitted (OR 2.05; 95% CI 1.19–3.54, $P = 0.008$).
Conclusion: delirium has a poor long-term prognosis and may be a marker for functional deterioration and decline in elderly people.

Keywords: *delirium, hearing, infection, old age, vision*

Introduction

Delirium (acute confusional state) is a common condition in old age and has a high mortality [1]. If the patient survives the acute stage, the longer-term outlook for delirium is said to be good [2]. However, a recent meta-analysis from psychiatric units and tertiary hospitals, mainly in the USA [3], contradicts this belief and suggests that the long-term prognosis is very poor with a high late, as well as early, mortality and a high likelihood of institutionalization. We report a case-control study of the causes and prognosis of delirium in elderly patients admitted to a typical district general hospital in the UK.

Methods

For 1 year a research nurse (S.B.) was employed to screen and follow-up all elderly patients (over 65 years) admitted to Cumberland Infirmary, Carlisle, with confusion as part of their presenting complaint. Cumberland Infirmary is a 376-bed district general hospital providing all main acute services to a population of approximately 190 000.

All relevant wards were contacted each week and asked to report all patients with confusion. All patients referred were assessed and patients satisfying the American Psychiatric Association's Diagnostic and Statistical Manual III criteria for delirium [4] (Table 1) were included in the study. Patients who were known to be terminally ill were excluded.

The diagnosis of patients with delirium was confirmed by a consultant physician (J.G.). Mental function was assessed using the Abbreviated Mental Test Score [5]. The likely cause of delirium was ascertained using the criteria established by Francis *et al.* [6]—i.e. that

Table 1. American Psychiatric Association's Diagnostic and Statistical Manual III criteria for delirium

A	Clouding of consciousness (reduced clarity of awareness of the environment), with reduced capacity to shift, focus and sustain attention to environmental stimuli
B	At least two of the following:
	1 Perceptual disturbance: misinterpretations, illusions or hallucinations
	2 Speech that is at times incoherent
	3 Disturbance of the sleep-wakefulness cycle, with insomnia or daytime drowsiness
	4 Increased or decreased psychomotor activity
C	Disorientation and memory impairment
D	Clinical features that develop over a short period of time (usually hours to days) and tend to fluctuate over the course of a day
E	Evidence, from the history, physical examination or laboratory tests, of a specific organic factor judged to be aetiologically related to the disturbance

the confusion appeared related to an observed factor which is known to cause confusion and improvement followed either treatment or cessation of the factor responsible. Delirious patients were followed throughout their hospital admission in order to determine the likely cause.

The patients were also examined for visual and hearing impairment as these are thought to be contributory factors [7]. Patients were identified as being visually impaired if their visual acuity was less than 6/18 in the better eye and hearing impaired if unable to hear a whispered voice at 15 cm [8]. All patients with delirium were then followed-up and assessed further at 6 and 12 months.

Control patients who were in hospital at the same time and on the same wards, but had no symptoms of confusion at any time during their hospital admission, were selected and also examined and followed-up.

Results

One hundred and seventy-one patients with delirium were identified and followed-up (78 men and 93 women). The age range was 65-98 (mean 81) years. One hundred and fifty controls were approached, of whom 95 agreed to take part in the study. The controls included 58 women and 37 men, age range 68-92 (mean 80) years.

The identified causes of delirium are given in Table 2 and the controls and patients are compared in Table 3. The control patients had similar medical diagnoses to

Table 2. Causes of delirium in 171 patients[a]

Cause	No. of cases	%
Infection	73	34
Chest	40	-
Urinary	25	-
Other	8	-
Stroke	24	11
Drugs[b]	24	11
Myocardial infarction	11	5
Fractures	10	5
Hip	7	-
Other	3	-
Carcinoma	10	5
Fluid and electrolyte imbalance	9	4
Heart failure	8	4
Diabetes (hypo- or hyperglycaemia)	7	3
Peripheral vascular disease/gangrene	6	3
Alcohol withdrawal	6	3
Gastrointestinal bleed	5	2
Respiratory failure	5	2
Pulmonary embolus	4	2
Anaemia	4	2
Perforation of duodenal ulcer	2	1
Subdural haematoma	2	1
Brain tumour	1	0.5
Miscellaneous	6	3
Total	217	-

[a]42 patients (25%) had two or more equally contributory causes.
[b]Analgesics, hypnotics, sedatives and anti-cholinergic drugs.

the patients with delirium and were closely matched for age and sex. By far the commonest cause of delirium was found to be infection, particularly chest and urinary infections. Forty-two patients (25%) had multiple potential causes of the delirium.

Unfortunately, because of poor patient co-operation, it was only possible to test 89 of the delirium patients for hearing and vision, but there was a significantly higher level of vision and hearing problems in patients with delirium, particularly poor vision and poor hearing in combination [odds ratio (OR) 12.62; confidence intervals (CI) 2.86-114.04, $P<0.001$]. Delirious patients were more likely to die in the ensuing 12 months (OR 2.30; CI 1.25-4.35, $P=0.006$) or be transferred to residential care (OR 4.53; CI 1.80-13.56, $P=0.001$) or to be re-admitted (OR 2.05; CI 1.19-3.54, $P=0.008$). The risk of dying or being transferred to residential care was particularly high in the first 6 months after discharge. Eighty-two percent (33/40) of the patients who were admitted to residential care were admitted within 6 months and 81% (53/65) of patients who died did so within 6 months. In contrast, of the patients who were

Table 3. Characteristics of study population

Variable	Group				
	Control ($n = 95$)	Delirium ($n = 171$)	Significance P	OR	95% CI
Mean age (and standard deviation), years	80 (5.9)	81 (7.0)	NS		
Sex (% female)	61	54	NS		
Medical diagnosis (%)					
Infection	44	40	NS		
Heart disease[a]	10	10	NS		
Hip fracture	5	4	NS		
Stroke	10	14	NS		
Diabetes	8	5	NS		
Carcinoma	6	6	NS		
Length of stay (days)					
Mean	25	27	NS		
25th-75th percentile range	12-27	10-30	NS		
Impairments					
Vision	18/95	42/89	<0.0001	3.82	1.89-7.87
Hearing	19/95	35/89	0.007	2.59	1.28-5.32
Vision and hearing	2/95	19/89	<0.001	12.62	2.86-114.04
Mortality					
In hospital	6 (6%)	19 (11%)	NS		
After 6 months	12 (13%)	53 (31%)	0.001	3.11	1.52-6.77
After 12 months	20 (21%)	65 (38%)	0.006	2.30	1.25-4.35
Discharged to residential care	5 (5%)	20 (12%)	NS		
Transferred to residential care					
Within 6 months	5 (5%)	33 (19%)	0.003	4.30	1.58-14.59
Within 12 months	6 (6%)	40 (23%)	0.001	4.53	1.80-13.56
Re-admitted					
Within 6 months	20 (21%)	58 (34%)	0.038	1.92	1.04-3.66
Within 12 months	36 (38%)	95 (55%)	0.008	2.05	1.19-3.54

[a] Myocardial infarction or congestive cardiac failure.

re-admitted, 61% were re-admitted within 6 months and 39% were re-admitted between 6 and 12 months.

Discussion

These results confirm those of other studies [9] that have found that infection is the commonest cause of delirium in elderly patients. However, many other causes could also be responsible and, in one-quarter of patients, there were multiple possible causes. We found fluid and electrolyte disturbance to be the main cause of delirium in only nine patients (5%), whereas one study [6] suggests that dehydration rivals infection as the commonest cause. Although dehydration was common in our patients, we judged it to be more often a result of the delirium rather than the main cause.

Compared with the controls, patients discharged following an episode of delirium were approximately four times more likely to be institutionalized and twice as likely to have been re-admitted or to have died within a year. This study also highlights the high prevalence of vision and hearing difficulties in patients with delirium [7]. Visual impairment has been found to be an independent risk factor for delirium in elderly people using multivariate analysis [7]. Presumably sensory deprivation makes elderly patients more predisposed to develop delirium. Further research is needed to ascertain if early treatment of visual and hearing problems in elderly people can prevent or delay delirium.

Previous studies of delirium show a higher initial mortality than in this study, as high as 30% [1]. However, earlier studies have tended to include terminal patients, which inflates the mortality rate. Many terminal patients go through a delirious phase just before dying and other recent studies, as well as ours, have excluded terminal patients [10].

A possible criticism of this study is that some patients with delirium admitted to hospital may have been missed; this is a problem with all such studies of delirium [10], as patients with mild transient delirium may not always be detected. However, nurses are reasonably good at recognizing cognitive impairment [11] and it is likely that the cases collected are representative of cases of delirium which come to the attention of a geriatrician or old age psychiatrist working in a district general hospital. A second possible criticism is that the controls were not matched for severity of illness. We did find it difficult to find suitable controls with entirely similar illnesses and yet without delirium. Nevertheless, the control group was representative of the type of ill elderly patient found in a typical district general hospital on geriatric, medical, surgical and orthopaedic wards, and the age distribution, length of stay and mortality rate of the control group were similar to those of the patients with delirium.

A recent meta-analysis of eight studies looking at outcomes in delirium compared with controls [3] also found high mortality rates at 6 months (22%) and high institutionalization rates at 6 months (43.2%). These eight studies, however, were all from specialist centres and mainly in the USA. A possible explanation for the poor prognosis in these studies was that there was a referral filter bias in which tertiary services receive different cases from those normally seen in the general population. It is also difficult to interpret institutional rates in these studies as the community care provision may not be the same as in the UK. Therefore, it is of interest that in our study we found an even higher mortality rate (31%) at 6 months, but a lower (but still significant) institutionalization rate (19%). Our study suggests that the poor long-term prognosis for delirium recently identified by others [3] also applies in the UK, and that referral bias is not a valid alternative explanation for these results. There have been two previous UK studies looking at the prognosis of delirium, but these were from specialist centres and did not include a prolonged follow-up [12, 13].

The reason for the poor long-term prognosis in patients with an episode of delirium is not known. There are at least two possible explanations. The first is that they may be more ill at initial presentation. We think this is unlikely as in our study the control patients had similar lengths of stay and similar hospital mortality. The other, more likely, explanation is that delirium is a marker of underlying mental impairment which may be relatively mild at first. A considerable proportion of patients with delirium (up to 55%) remain confused on follow-up and probably have underlying dementia [14]. Patients with even mild or moderate dementia have a poor prognosis as regards institutionalization and mortality [15].

The results of this study conflict with the commonly held clinical view that delirium in old people is a transient illness with a high immediate mortality, but a good long-term prognosis [2].

Our results suggest that there are important lessons for the practising geriatrician or old-age psychiatrist. We suggest that clinicians should first consider an infective cause for delirium, but should always be aware that there may be other contributory causes. We suggest early treatment of delirious patients with antibiotics, after appropriate investigations and after excluding a drug cause. Patients should be assessed particularly for vision and hearing difficulties. The acute presentation of delirium, but with the background of co-existing disease and likely functional deterioration, does support the usual recommendation that for a 'needs-related service' [16] confusion should strongly feature as an indication for early referral to a geriatrician or psychiatrist of old age.

The results of this study suggest that follow-up needs to continue for at least a year if the intention is to prevent re-admissions, as well as to reduce mortality and prevent institutionalization. Further studies are needed to identify what interventions, if any, can influence the poor long-term outcome of delirium. Delirium in elderly people, like falls [17], may be a marker for subsequent functional deterioration and decline.

Key points

- The commonest cause of delirium in elderly patients is infection, but there may be multiple causes.
- Vision and hearing impairment is strongly associated with delirium in elderly people and may be a contributory factor in its aetiology.
- Delirium in elderly patients has a poor long-term prognosis and may be a marker for subsequent functional deterioration and decline.

References

1. Rabins PV, Folstein MF. Delirium and dementia: diagnostic criteria and fatality rates. Br J Psychiatry 1982; 140: 149-53.

2. Rockwood K. Acute confusion in elderly medical patients. J Am Geriatr Soc 1989; 37: 150-4.

3. Cole MG, Primeau FJ. Prognosis of delirium in elderly hospital patients. Can Med Assoc J 1993; 149: 41-6.

4. American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders, 3rd edition. Washington, DC: American Psychiatric Association, 1980.

5. Jitapunkul S, Pillay I, Ebrahim S. The Abbreviated Mental Test: its use and validity. Age Ageing 1991: 20; 332-6.

6. Francis J, Martin D, Kapoor WN. A prospective study of delirium in hospitalised elderly. JAMA 1990; 263: 1097-101.

7. Inouye SK, Viscoli CM, Horowitz RI, Hurst LD, Tinetti ME. A predictive model for delirium in hospitalised elderly

medical patients based on admission characteristics. Ann Intern Med 1993; 119: 474-81.

8. Macphee GJA, Crowther JA, McAlpine C. A simple screening test for hearing impairment in elderly patients. Age Ageing 1988; 17: 347-51.

9. Rummans TA, Evans JM, Krahn LE, Fleming KC. Delirium in elderly patients: evaluation and management. Mayo Clin Proc 1995; 70: 989-98.

10. Johnson JC, Gottlieb GL, Sullivan E *et al.* Using DSM III criteria to diagnose delirium in elderly general medical patients. J Gerontol 1990; 45: 113-9.

11. Treloar AJ, Macdonald AJD. Recognition of cognitive impairment by day and night nursing staff among acute geriatric patients. J Roy Soc Med 1995; 88: 196-8.

12. Hodkinson M. Mental impairment in the elderly. J Roy Coll Phys Lond 1973; 7: 305-17.

13. Jitapunkul S, Pillay I, Ebrahim S. Delirium in newly admitted elderly patients: a prospective study. Quart J Med 1992; 83: 300; 307-14.

14. Francis J, Kapoor WN. Delirium in hospitalized elderly. J Gen Intern Med 1990; 5: 65-79.

15. O'Connor DW, Pollitt PA, Brook CPB, Reiss BB, Roth M. Does early intervention reduce the number of elderly people with dementia admitted to institutions for longterm care? Br Med J 1991; 302: 871-4.

16. Whittaker JW, Tallis RC. Misplaced geriatric patients: a basis for auditing the service for elderly patients. Health Trends 1992: 24; 15-8.

17. Wild D, Nayak USL, Isaacs B. How dangerous are falls in old people at home? Br Med J 1981; 282: 266-8.

Received 11 December 1996

Harry Holmes, 101 years, First World War veteran, Ypres Salient, © Ian Beesley.