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Detection of delirium in the acute hospital

SIR—Delirium remains a common, serious and under-recognised problem affecting older hospitalised patients. Despite being associated with poor longer-term outcomes, including death and institutionalisation [1], delirium remains disproportionately ignored relative to impact [2], and poor recognition remains the greatest obstacle to improved care and research [3]. It is 'missed' in up to two-thirds of cases [1]. Under detection of delirium may occur for a number of reasons; symptoms are heterogeneous and transient [1], and diagnosis is subjective relying on clinical skills in the absence of a diagnostic 'test' [2].

There is conflicting data on whether correct diagnosis is associated with demographic factors (male gender and older age [4]) or ethnicity [5]. Poorer English and education may decrease detection [6]. 'Hypoactive' delirium [7] with its less dramatic presentation and psychiatric co-morbidity may impede correct diagnosis, possibly through incorrect attribution of a psychiatric diagnosis [8, 9].

There is little published UK data, and previous work is limited by small numbers and under-reporting of co-morbid conditions [1]. We aimed to identify the patient characteristics associated with a correct detection of delirium in older patients with unplanned acute medical admissions.

Methods

Subjects were recruited from a large north London general hospital (serving a primary care trust (PCT) population of almost 1.5 million) over 6 months (4th June 2007 to 4th December 2007). All patients aged over 70 with unplanned acute admission to the Medical Acute Admissions Unit (MAAU) were eligible. The MAAU takes all medical admissions direct from the accident emergency department and general practitioners (GPs), except those requiring urgent coronary artery procedures, acute stroke patients and those admitted to surgical specialities. Participants were excluded if they were admitted for <48 h or did not speak sufficient English for assessment with the Confusion Assessment Method (CAM) [10].

All patients were assessed within 72 h of admission by an old age psychiatrist or specialist registrar. Subjects were screened with the CAM which has high sensitivity and specificity for the detection of delirium and discriminates between delirium and dementia. It can be completed in <5 min and consists of nine operationalised criteria for delirium from the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R) [10]. All assessors used the same standardised version that maximises sensitivity [11].

The primary outcome was the correct detection and documentation in nursing or medical notes of delirium by the medical team (compared to detection by the study team using the CAM) within the first 72 h of admission. Pseudonyms acceptable for delirium were 'acute confusional state', 'acute confusion' and 'delirious'. 'Confused' and 'disorientated' were not accepted for diagnosis of delirium in the main analysis, although we subsequently conducted a sensitivity analysis, accepting more approximate terms as evidence of detection.

We then compared patients with detected and non-detected delirium in relation to a number of clinical and demographic characteristics (see Table 1). These included: demographics, whether the admitting team had attempted

Table 1. Characteristics of patients with detected and undetected delirium

Study variable	Undetected delirium n = 79 (72%)	Detected delirium n = 31 (28%)	Test statistic	P value
Demographic and social factors				
Male gender	31 (39%)	13 (42%)		
Female gender	48 (61%)	18 (58%)	X^2 = 2.24	0.691
Age (mean)	85.5	87.5	t = −1.10	0.275
Ethnicity[a]				
White British	70 (88.6%)	29 (93.5%)		
Black British	2 (2.5%)	0 (0%)		
Asian British	5 (6.3%)	1 (3.2%)	X^2 = 1.27	0.734
Years of education (mean)	10.2	10.4	t = −0.39	0.702
Place of residence				
Nursing home or residential	34 (43%)	9 (29%)		
Independent	44 (56%)	22 (71%)	X^2 = 2.37	0.305
Clinical factors				
Documented psychiatric diagnosis				
Yes	25 (32.5%)	9 (29%)		
No	52 (67.5%)	22 (71%)	X^2 = 0.12	0.728
Diagnosis of dementia prior to admission[a]				
Yes	38 (48.7%)	16 (52%)		
No	38 (48.7%)	15 (48%)	X^2 = 0.83	0.659
Incontinence (prior to admission)				
None	42 (54.5%)	22 (71%)		
Urine	11 (14.3%)	4 (12.9%)		
Urinary catheter on admission	4 (5.2%)	2 (6.5%)		
Double	20 (26 %)	3 (9.7%)	X^2 = 3.80	0.069
AMTS noted by admitting team				
Yes	27 (35.5%)	17 (55%)		
No	49 (64.5%)	14 (45%)	X^2 = 4.134	0.127
Charlson score				
≥5	15 (19%)	1 (3%)		
≤4	64 (81%)	30 (97%)	X^2 = 4.45	**0.035**
Glasgow coma score (median)	13	14	Z = −0.02	0.165
APACHE (median)	13	15	Z = −0.67	0.946
C-reactive protein (mg/l, median)	82	92	Z = −1.40	0.165
White cell count ($\times 10^9$/l, median)	11.8	11.2	Z = −0.84	0.841
Platelets ($\times 10^9$/l, mean)	314.8	261.1	t = 2.31	**0.023**
Albumin (g/l, mean)	36.6	37.4	t = −0.71	0.479
Marked agitation[b]				
Yes	5 (8%)	4 (18%)		
No	60 (92%)	18 (82%)	X^2 = 1.950	0.163
Principle admission diagnosis				
Urinary tract infection	7 (9%)	9 (29%)	X^2 = 6.964	**0.008**
Pneumonia	19 (25%)	8 (26%)	X^2 = 0.015	0.902
Chronic obstructive airway disease	3 (4%)	1 (3%)	X^2 = 0.028	0.867
Acute cardiac syndrome	4 (5%)	1 (3%)	X^2 = 0.194	0.660

Bold P values above indicate characteristics which were significantly different (P <0.05) in patients with undetected delirium compared to those with detected delirium.
[a]Data missing on three subjects.
[b]Item from CAM.

screening for cognitive impairment using the Abbreviated Mental Test Score (AMTS) [12], the severity of acute illness (using the Acute Physiology And Chronic Health Evaluation (APACHE) II score [13]) and chronic co-morbidity (calculated using the Charlson Co-Morbidity Index (CCI) [14]), continence, risk of pressure sores (Waterlow score) and the principle cause of admission (obtained from Hospital Episode Statistics using the ICD-10 diagnosis, which were recorded independently by the hospital coding department and categorised according to the Ambulatory Care Sensitive Condition system [15]). We also considered whether routine blood results and whether the individual 'agitation' item of the CAM predicted correct diagnosis of delirium.

We sought verbal consent from participants or, if they lacked capacity, verbal assent from family carers or their key nurse. Screening for cognitive impairment, dementia and delirium should be a routine clinical practise [16]. The exclusion of patients unable to give consent or without a relative to give assent may have caused selection bias, excluding the patient population we wished to study [17]. The study was approved by the Royal Free Hospital NHS Trust Ethics Committee, and the methodology is described in full in the parent study by Sampson *et al.* [18].

Results

During the study period, 805 eligible patients were admitted, of these, 45 (5.5%) were missed (untraceable or public holidays), 30 (3.7%) refused to participate and 20 (2.5%) had insufficient English. Thus of all admissions, 710 (88.2%) were screened for delirium. The mean age of subjects in the cohort was 83 (range 70–101), and 462 (59%) were female. Using the CAM, 110 (15.5%) of the cohort were delirium cases. Of these, 79 (72%) were not detected by clinical teams. The table compares characteristics of those with and without detected delirium. Patients with undetected delirium were slightly younger (85.5 vs 87.5 years), more likely to be unmarried, live in a nursing or residential home and be of white British ethnicity. Prior psychiatric or dementia diagnoses and assessment with the AMTS by the admitting team were not associated with detection of delirium.

Patients with undetected delirium had higher levels of co-morbidity (CCI) and incontinence, and significantly fewer were admitted with urinary tract infection (UTI). There were no significant differences between the two groups in relation to clinical measures (glasgow coma scale (GCS), APACHE scores, white cell count or albumin). Patients with undetected delirium had lower median C reactive protein (CRP) and platelet levels.

The sensitivity analysis that accepted more approximate terms revealed an improved detection rate of 40% but otherwise the same pattern of results; 27.7% of those with undetected delirium had a CCI score of ≥ 5 compared to 2.3% with detected delirium ($X^2 = 8.89$, $P = 0.002$), and 9.2% with undetected delirium had a UTI compared to 23.3% with detected delirium ($X^2 = 4.03$, $P = 0.045$).

Discussion

We examined data from a large, representative cohort of older people. Our observed point prevalence of delirium in general medical admissions (15.5%) is consistent with previously reported figures of 15–20% [19]. This study observed a higher rate of undiagnosed (72%) delirium compared with previously described non-detection rates of between 33 and 66% [1] despite the fact that we only measured single point prevalence. Our rates are closer to those found by Elie *et al.* [6] who reported a high non-detection rate of 65% within a busy emergency department. This may have occurred because most previous studies were conducted in general medical wards. This study was conducted in a busy acute admissions unit to which patients were rapidly transferred from the emergency department and then onto a 'base ward' (depending on diagnosis). We hypothesise that this rapid transfer of patients, often through at least three settings in 3 days, makes the diagnosis of delirium even more of a challenge. However, given that undocumented delirium was assumed to equate undetected delirium in this study, the observed higher rate of undiagnosed delirium may also reflect poorer documentation standards in busy clinical settings.

Several statistically significant differences between patients with detected and undetected delirium were observed. Patients with undetected delirium had a greater burden of medical co-morbidity on the CCI. It may be that a more extensive history of medical co-morbidity distracted treating medical teams from diagnosing delirium. However, the similar APACHE scores observed for both these groups suggest that this diagnostic clouding was not related to acute physiological changes.

Patients with detected delirium were more likely to present with a urinary tract infection. This could reflect traditional undergraduate teaching on delirium where UTI is a key differential diagnosis. It may also reflect over-diagnosis of UTI in frail, older patients with coincidental asymptomatic bacteriuria [20].

Patients with undetected delirium were more likely to be doubly incontinent prior to admission compared to detected patients, and this approached statistical significance ($P = 0.061$). This may reflect the general frailty of these patients.

We were unable to replicate some findings from previous work. A co-morbid psychiatric history was not more frequent in undetected delirium patients (although it is acknowledged that this may have been under-documented on admission). This was in contrast to previous studies [8,9] where psychiatric co-morbidity impeded correct diagnosis. It is thought that hyperactive forms of delirium are better detected than hypoactive subtypes [7]. However, we found that the presence of marked psychomotor agitation did not improve the diagnosis of delirium. Where the admitting team carried out the AMTS, there was a slightly higher rate of detected delirium (55 vs 35%) but this result was not significant. There was a tendency for subjects with undetected delirium to be older, unmarried and from ethnic minority groups, and this has been found in other studies.

Laboratory findings were not found to be significantly different in detected and undetected delirium groups. Detected patients were observed to have a higher median CRP, but this result was not significant.

Methodological limitations

Our cohort was large, but our study may still have been underpowered to detect differences between the two groups. Our case note review relied on clinical notes where undocumented delirium was equated to undetected delirium. The study design could not accommodate situations where delirium may have been detected but not documented. The robustness of admission diagnoses (such as UTI) extracted from hospital episode statistics and based on ICD-10 coding could also challenged.

Conclusions and clinical implications

We have demonstrated how delirium remains undetected in a typical general hospital, and detection is strongly influenced by the admission diagnosis. Other demographic characteristics may influence the diagnostic process. Detection and management of delirium in acute hospitals is now thought to be an important quality issue [21]. The routinely used test on acute medical admission, the AMTS [12], does not significantly improve delirium detection rates (and it is not designed to do this). We would suggest that only when specific tools for delirium screening, such as the CAM are incorporated into routine practice, as suggested by clinical guidelines will detection improve.

Key points

- Prevalent delirium remains poorly detected in older medical inpatients.
- Prior psychiatric or dementia diagnoses and assessment with the AMTS by the admitting team were not associated with detection of delirium.
- Patients with undetected delirium were more likely to display high levels of medical co-morbidity, incontinence and significantly less likely to have an admission diagnosis of UTI.

Conflicts of interest

There is no conflict of interest to declare.

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A survey of investigations performed prior to permanent pacemaker implantation

SIR—Permanent pacemaker implantation is a highly effective treatment for bradycardia which is most commonly used in older patients, pacemaker recipients in the UK having a mean age of 76 years [1]. However, pacemaker implantation rates in the UK are substantially lower than in most other European countries; currently 468 per million of population compared with the Western European average of 700 per million [2–4]. There is also significant variation in pacemaker implantation rates between different regions of the UK, which persists when differences in population demographics are corrected for [4, 5]. The reasons for the low UK pacing rate and regional variation are not known, but restricted access to investigations has been considered as a possible explanation [6]. However, contemporary data on tests performed prior to pacemaker implantation are lacking. We have recently audited delays to pacemaker implantation in a UK cohort [7] and now describe how patients are identified for pacing and the investigations they undergo prior to device implantation.

Methods

Consecutive patients undergoing first pacemaker implantation for bradycardia indications at a single UK centre from 1 June 2006 to 31 August 2006 were included. Hospital records from referring and implanting centres were reviewed to determine the investigations performed prior to pacemaker implantation. The investigation diagnosing the pacing indication for the purpose of this study was determined by two cardiologists with an interest in pacing and defined as the first investigation that documented a Class I or Class IIa pacing indication according to the joint 2002 American College of Cardiology/American Heart Association/North American Society of Pacing and Electrophysiology guidelines [8] (current at the time of our audit, but now updated [9]). Common pacing indications and recommendation Class are summarised in Table 1. Baseline characteristics and delays from symptom onset to pacemaker implantation have been previously reported for this population [7]. Significant delays from presentation to pacing have been identified, which we have attributed in part to failure to recognise pacing indications [10]; in 33 (35%) of the 95 patients, the first documented Class I or IIa pacing indication did not trigger a pacing referral.

Results

Ninety-five patients were included: 48 were referred for pacing urgently as inpatient transfers (mean age 75.4 years, range 44–95) and 47 were referred electively via outpatient waiting lists (mean age 74.1 years, range 46–97). The decision to refer was made by a consultant. Urgently paced patients had a higher incidence of complete heart block (50% vs 11%, $P < 0.0005$) and lower incidence of second-degree heart block (4% vs 26%, $P = 0.004$). Pacing referrals were made by cardiologists (54), general/elderly care physicians (27), cardiothoracic surgeons (four), accident and emergency physicians (two), general practitioners (two) and other specialities (six). Diagnostic investigations performed in secondary care were determined for all patients, as shown in Figure 1A. Although telemetry was frequently used to monitor cardiac rhythm in inpatients when a diagnosis had already been established by alternative investigations, this was not included as a 'diagnostic' investigation for study purposes. However, telemetry used to investigate the cause of a patient's symptoms (as an alternative to formal 24-h ambulatory recording) was included as a diagnostic investigation. In four cases, the investigation diagnosing the pacing indication could not be accurately ascertained; Figure 1B shows the investigation diagnosing the pacing indication for the remaining 91 individuals.

Standard 12-lead electrocardiograms (ECGs) were performed in all 95 patients, and this was the investigation that first documented the pacing indication for 46 (51%) of the 91 patients for whom the diagnostic test could be reliably determined. However, 75 (79%) of the 95 patients also underwent one or more other specialist diagnostic investigations of heart rhythm, including Holter monitoring 61%, telemetry 32%, event recorders 5%, implantable loop recorders 3%, carotid sinus massage 11%, tilt testing and/or other specialist falls and syncope service investigation 4%.

The initial diagnostic test (which failed to trigger a pacing referral) was the 12-lead ECG in 21 (64%) of the 33 patients with an 'overlooked' pacing indication. Twenty-seven (82%) of patients with overlooked pacing indications had additional specialist tests after documentation of a pacing indication; these individuals often had multiple extra tests. Table 1 shows the initial diagnostic test and subsequent unnecessary investigations that were performed in the patients with overlooked pacing indications.

Case example

An 81-year-old man was admitted as an emergency under the general medical team following an episode of unex-