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Pain and delirium in people with dementia in the acute general hospital setting

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Abstract

Background: Pain and delirium are common in people with dementia admitted to hospitals. These are often under-diagnosed and under-treated. Pain is implicated as a cause of delirium but this association has not been investigated in this setting.
Objective: To investigate the relationship between pain and delirium in people with dementia, on admission and throughout a hospital admission.
Design: Exploratory secondary analysis of observational prospective longitudinal cohort data.
Setting: Two acute hospitals in the UK.
Methodology: Two-hundred and thirty participants aged ≥70 years were assessed for dementia severity, delirium ((Confusion Assessment Method (CAM), pain (Pain Assessment in Advanced Dementia (PAINAD)) scale and prescription of analgesics. Logistic and linear regressions explored the relationship between pain and delirium using cross-sectional data.
Results: Pain at rest developed in 49%, and pain during activity for 26% of participants during their inpatient stay. Incident delirium developed in 15%, of participants, and 42% remained delirious for at least two assessments. Of the 35% of participants who were delirious and unable to self-report pain, 33% of these participants experienced pain at rest, and 56 experienced pain during activity. The odds of being delirious were 3.26 times higher in participants experiencing pain at rest (95% Confidence Interval 1.03–10.25, $P = 0.044$).
Conclusion: An association between pain at rest and delirium was found, suggesting pain may be a risk factor for delirium. Since pain and delirium were found to persist and develop during an inpatient stay, regular pain and delirium assessments are required to manage pain and delirium effectively.

Keywords: *pain, delirium, dementia, general hospital, older people*

Introduction

Dementia is a chronic neurodegenerative syndrome with multiple causes, typically characterised by progressive cognitive change including amnesic and executive deficits and functional decline [1]. Approximately 40% of people admitted to an acute hospital have dementia [2].

People with dementia are six times more likely to be admitted to hospital with a delirium [3], and delirium is associated with an increased risk of death, or further admission in the next 12-months [4]. Delirium is a neuropsychiatric syndrome characterised by an acute change in cognition, attentional deficits and altered arousal [5], and affects 11–42% of older people in medical inpatient settings [6]. Delirium can be very

distressing for the person with dementia and their family [7], and independently predicts several adverse outcomes [8]. Delirium is under-diagnosed, and up to 75% of cases are undetected in acute hospitals [9].

There are multiple predisposing and precipitating factors for delirium including age, cognitive impairment, sensory losses and acute illness [10], environmental factors [11] and metabolic disturbance [12]. The National Audit of Dementia Care in General Hospitals (Third Round) conducted by the Royal College of Psychiatrists (2017) [13] emphasises that pain and delirium are under-assessed in people with dementia.

People with dementia may experience difficulty verbalising pain [14] and this is commonly under-detected and under-treated [15]. Poor pain detection and management impair recovery and increase functional decline [16]. The UK National Audit of Dementia Care in General Hospitals (2017) [13] found pain and delirium are not routinely assessed in people with dementia.

There is consistent evidence that effective pain management reduces the risk of delirium [10]. However, to our knowledge, no previous studies have investigated the relationship between pain and delirium in people with dementia in the acute hospital setting.

Aim

To investigate the association between pain and delirium in people with dementia, on admission and throughout their stay in an acute hospital.

Methods

Study design

Exploratory secondary analysis of data from a prospective longitudinal study investigating Behavioural and Psychological Symptoms in Dementia (BPSD) and pain in people with dementia in the acute hospital [17]. Detailed methodology for the study from previous analyses of this cohort are published elsewhere [18–20]. Ethical approval was obtained from the Central London Research Ethics Committee 3 (reference 10/HO716/79).

Setting

Recruitment took place in two acute hospitals in Greater London between April 2011 and March 2012. Patients were admitted via a medical acute admissions unit before being transferred to an older care ward or a general medical ward (total of 20 wards).

Consent

Consent processes were guided by the UK Mental Capacity Act [21]. All patients underwent a capacity assessment. Those with capacity were asked to complete a consent form. When participants lacked capacity, agreement was requested from a personal consultee (informal carer). In the absence of a personal consultee, a professional consultee was used [18].

Participants and procedure

All patients under the care of geriatricians were assessed within 72 h of admission. Patients who fulfilled the following criteria were approached to participate in the study:

- Aged 70 years or above with an unplanned acute medical admission.
- Abbreviated Mental Test Score (AMTS; Hodkinson, 1972) [22] of ≤7/10.
- Able to give informed consent or agreement to participate provided by a personal or professional consultee.

Prior to giving consent, patients were screened for delirium using the Confusion Assessment Method (CAM) [23]. Researchers received a structured training programme [24] prior to using the CAM which included an assessment of their ability to use the tool, and were initially supervised by a clinical nurse specialist. Delirium was present if the participant had (1) acute onset of confusion plus a fluctuating course of any of the following (2) inattention, and (3) disorganised thinking and/or (4) altered level of consciousness. The CAM has a sensitivity of 94% and specificity of 89% [25]. Those who were not delirious were approached to participate. If they agreed, they completed a Mini-Mental State Examination (MMSE) [26]. Patients who screened positive for delirium were reassessed 48 h later and if this resolved, then completed the MMSE [26]. If delirium persisted, patients were excluded as it was not possible to make a clear diagnosis of underlying dementia. Patients with a pre-existing documented dementia diagnosis in their medical records were eligible to participate, regardless of the CAM score.

If the patient did not have a pre-existing diagnosis, the researchers completed a structured clinical assessment to assess for dementia, based on operationalised DSM-IV [27] criteria, structured case notes review, discussion with family and the clinical team.

Patients were excluded if they indicated verbally or non-verbally that they did not wish to participate, were moribund, or non-English speaking.

Assessments

Demographic characteristics (age, gender, ethnicity, marital status, analgesics prescribed and comorbidity using Charlson comorbidity index [28] were collected from hospital notes. Dementia severity using the Functional Assessment Staging Tool (FAST) [29] and BPSD using the Behave-AD [30] were assessed by observation, discussions with informal carers or staff and hospital records. Data were collected for all assessments during the first assessment and then every 4 (±1) days until discharge, death, or fit for discharge and 'awaiting placement' in a care home.

Due to a change in protocol, follow-up data for delirium were collected every 4 days at Site 2 for all participants. However, for Site 1, delirium data were only collected at

follow-up assessments if the participant screened positive for delirium at the first assessment (data continued to be collected until the participant was no longer delirious). Follow-up data were collected for pain at each assessment for both sites.

Pain

Firstly, we used the Gold Standard of self-report by asking the patient if they were in pain. We then used the observational Pain Assessment in Advanced Dementia (PAINAD scale [31], which has been used in acute settings, has sensitivity and clinical utility and has strong psychometric properties [31]. It comprises five domains (breathing, negative vocalization, facial expression, body language and consolability), each domain scored on a severity scale of 0–2 during movement and during rest (maximum score of 10). Scores ≥ 2 indicate the presence of pain [32].

Delirium

The CAM [25] was used to assess the presence of delirium. Delirium severity was calculated by rating each delirium symptom as absent (0), mild (1) and marked (2). Thus the total score ranges from 0 (no delirium) to 19 (marked delirium) [33].

Analgesia

Participants' medical records were reviewed at each assessment and all prescribed analgesics recorded.

Exploratory secondary data analysis

Two logistic regressions were conducted with pain as the predictor (at rest and during movement) and delirium as the outcome. To assess whether there was a dose–response relationship between pain severity and delirium severity, two linear regressions were conducted with pain at rest and during activity, and a continuous variable of delirium severity as the outcome. Descriptive statistics and the prevalence of analgesic prescription (not necessarily administered), delirium, and pain at the first assessment and longitudinally were computed. Odds ratios were calculated to examine the association between analgesia prescribing and the presence of delirium. All analyses were adjusted for potential confounders (age, dementia severity, BPSD and Charlson comorbidity scores) as described in a previous peer-reviewed publication [17].

This study is part of The Impact of Acute Hospitalisation on People with Dementia: The Behaviour and Pain (BepAID Study (jointly funded by the Alzheimer's Society and BUPA foundation (Grant reference number: 131).

Results

We recruited 230 participants into the study. Demographic and clinical features of the cohort are given in Table 1. Further information about the cohort and the recruitment process is reported in previous publications [17, 19, 34]. The median length of admission was 12 days (range, 2–72; interquartile range [IQR] 7–23) with a median of three study assessments per participant (range, 1–20; IQR 2–5). Patients were assessed within three days of admission (mean 1.87 days, SD 1.06 days).

Table 1. Cohort characteristics.

	(*n* = 230)	Total %
Gender		
Female	151	65.7
Male	79	34.3
Ethnicity		
White British	175	76.1
Black Caribbean	15	6.5
Other	40	17.4
FAST		
3–5	86	37.4
6a–6c	39	16.9
6d–6e	74	32.2
7a–f	31	13.5
Age		
75–84	85	36.9
85–94	118	51.3
95+	27	11.7
Place of residence		
Home/Sheltered	145	66.2
Residential Home	26	11.9
Nursing Home	39	17.8
Other	9	4.1
Reason for admission		
Infection—Lungs/Skin/Viral	79	34.5
Infection—UTI/Blocked Catheter	36	15.7
Fall/Fracture/Pain	31	13.5
Cardiac	22	9.6
Other	61	26.6
Delirium at first assessment		
Yes	26	11.4
No	201	88.6
Self-reported pain at first assessment		
Yes	54	23.9
No	146	63.8
Unable	29	12.7

[a]Data derived from original study [17].

Prevalence of delirium and pain at the first assessment

Table 2 shows the prevalence of delirium and pain on the first study assessment. Using the cut-off ≥2 on the PAINAD, 22/229 (10%) experienced 'pain' at rest, and 96/229 (42%) experienced pain during activity (Table 2). Of the 198/227 participants who were able to answer the question, 53 (27%) reported they were in pain.

Delirium was found in 26/227 participants (11%), of these, 9 (35%) were unable to respond to the self-report pain question (Table 2). Pain at rest was found in 3/9 (33%) and pain during movement in 5/9 (56%).

Longitudinal description of delirium and pain

Follow-up data on delirium were routinely collected at Site 2 (n = 113) or at Site 1 if the participant was delirious (Appendix 1 in the Supplementary data on the journal website http://www.ageing.oxfordjournals.org/). Of the 14 participants at Site 2 who were delirious throughout all assessments, prevalence of delirium was highest at the first assessments (n = 10, 8.9%). For three participants, delirium was not present until the second assessments (4 days after the first assessment) and for one participant, delirium was not present until the fourth assessment (12 days after the first assessment).

Pain at rest was experienced by 43/230 (19%) participants at some point during their admission. Those experiencing pain at rest had a median length of stay of 15 days (IQR 9–29), compared to those without pain who had a median length of stay of 11 days (IQR 7–22). For 22/43 participants (51%), pain at rest was present on the first assessment. However, for 21/43 of participants (49%) pain started after the first assessment. 15/43 (35%) participants started to experience pain at rest on either assessments 2 or 3 (8−12 days after the first assessment), and the remaining 6/43 (14%) participants started to experience pain at rest on assessments 4, 7 and 11 (16–44 days after admission).

Of the 131 participants who had pain on activity during admission, 96 participants (73%) were assessed as having pain on their first assessment. For 34/131 (26%) participants pain started during their hospital admission. Pain during activity was present until assessment 11 (44 days). Those experiencing pain on activity had a median length of stay of 13 days (IQR 8–29), compared to those without pain on activity who had a median length of stay of 11 days (IQR 6–21). The proportion of patients with pain at rest did not decline and the proportion with pain during activity increased as would be expected, while the prevalence of delirium declined (Appendix 1 in the Supplementary data on the journal website http://www.ageing.oxfordjournals.org/).

Table 2. Delirium, self-report pain, and PAINAD pain prevalence at the first assessment.

Delirium[a]	n	PAINAD ≥ 2 n (%)			
		Rest		Activity	
		No	Yes	No	Yes
No	201	185 (92)	15 (8)	119 (59)	81 (40)
Self-reported pain					
Yes	46	37 (80)	9 (20)	11 (24)	35 (76)
No	135	134 (99)	1 (1)	103 (76)	32 (24)
Unable[b]	19	14 (70)	5 (25)	5 (25)	14 (70)
Yes	26	19 (73)	7 (27)	11 (42)	15 (58)
Self-reported pain					
Yes	7	4 (57)	3 (43)	1 (14)	6 (86)
No	10	9 (90)	1 (10)	6 (60)	4 (40)
Unable	9	6 (67)	3 (33)	4 (44)	5 (56)

[a]There are three missing delirium data.
[b]There is 1 PAINAD ≥ 2 assessment missing for patients unable to respond to the self-reported pain question.

Association between pain and delirium at the first assessment

The odds of being delirious were 3.26 times higher in participants experiencing pain at rest (95% CI 1.03–10.25, P = 0.044). There was no significant association between delirium and experiencing pain during activity (Table 3).

There was no evidence of a dose–response relationship between the severity of pain (at either rest or during activity, respectively) and the severity of delirium (at rest mean difference = 0.001, CI −0.99 to 0.99, P = 0.998; during activity mean difference = 0.332 CI −0.26 to 0.919, P = 0.267).

Analgesia and delirium at the first assessment

Analgesics were prescribed to 172/230 participants during their admission (75%). Of these, 20/172 (12%) were delirious at the first assessment, compared to 6/58 (10%) participants who were not prescribed analgesics and who were delirious at the first assessment. The odds ratio of being delirious at the first assessment for participants on analgesics compared to those not on analgesics was 1.14 (95% CI 0.43–2.19) indicating no difference in delirium between the two groups (P = 0.798). More detailed information regarding types of analgesia prescribed has previously been reported [17].

Discussion

In our cohort of acute hospital inpatients with dementia, 15% developed delirium during their admission, and pain during activity was persistent. The odds of being delirious were over three times higher in people with dementia experiencing pain at rest. One third of patients with delirium were unable to report whether they were in pain at the first

Table 3. Association between pain and delirium presence, and pain and delirium severity.

Any pain (≥2 PAINAD)		n (%)	Delirium		Delirium presence			Delirium severity			
			Not present	Present	[a]Odds ratio	95% CI	P-value	[a]Mean difference	SE	95% CI	P-value
Rest	No	204	185 (91)	19 (9)	3.26	1.03 to 10.25	0.044	0.001	0.51	−0.99 to 0.99	0.998
	Yes	22	15 (68)	7 (32)							
Activity	No	130	119 (92)	11 (8)	1.61	0.63 to 4.16	0.322	0.332	0.298	−0.26 to 0.919	0.267
	Yes	96	81 (84)	15 (16)							

[a]Adjust for age, comorbidity, dementia severity, BPSD.

assessment. Over half of those with delirium and unable to report pain experienced pain during activity. Nearly three-quarters of patients without delirium and unable to self-report experienced pain during activity. Therefore, regular (gold standard self-report and observational) assessments are needed to detect and thus manage pain and delirium effectively.

This is the first study to prospectively investigate the relationship between pain and delirium, and our results reflect those of similar research conducted in different settings. On days when people with dementia experienced pain greater than their average level, they experienced more delirium symptoms [35]. Pain has been identified as a predisposing risk factor for delirium in long-term care residents with dementia [36]. The association between pain and delirium has also been reported in older adults without dementia [10].

Analgesia had no effect on the presence of delirium, perhaps because medication was recorded 'as prescribed' and we do not know if it was actually received by patients.

The study benefits from primary data collection using repeated observations throughout the hospital admission (other than delirium for Site 1), by trained researchers. In our analysis, we controlled for a range of possible confounders influencing the association between pain (at rest and during activity) and delirium (presence and severity).

The prevalence of delirium (11.4%) was lower than has previously been reported [37]; a limitation of this study was the use of point prevalence to detect delirium; thus, our findings may have underestimated delirium due to the fluctuating nature of the condition. The longitudinal data for delirium prevalence were limited by the fact that follow-up data were not collected for delirium if the person was not delirious at the first assessment at Site 1, as this was not the objective of the original study [17].

Although we report longitudinal data, the analyses were conducted at cross-sectional time points, therefore we cannot explore a causal relationship between pain and delirium. Residual confounding may have occurred, since we did not collect data on variables known to be associated with delirium, such as fever, malnutrition and dehydration [36]. Despite the advantages of the PAINAD, observational pain tools have been criticised, since they may be detecting other unmet needs and distress rather than specifically pain [38]. Future research should collect longitudinal data with an adequate sample size to definitively study the association between pain and delirium.

Conclusion

Our findings suggest people with dementia experiencing pain at rest may be more likely to be delirious and can experience pain for a substantial part of their stay in hospital without being able to communicate this pain. Delirium and pain are manageable, but both are associated with numerous adverse outcomes including increased length of stay in hospital, mortality [10] and institutionalisation [35]. It is important for hospital staff to identify patients at risk of delirium; it may be preventable and effective pain management may contribute to this [10]. The National Audit of Dementia Care in General Hospitals (Royal College of Psychiatrists, 2017) [13] recommends structured pain and delirium assessments should be routinely conducted and properly recorded for people with dementia.

Key points

- This is the first study to our knowledge to explore associations, cross-sectional and longitudinal, between pain and delirium in people with dementia in the acute hospital setting.
- The odds of being delirious were three times higher in participants experiencing pain at rest.
- Pain and delirium in people with dementia persist and develop during an inpatient stay.
- The odds of being delirious were not significantly different for participants prescribed analgesics.
- Regular pain and delirium assessments are needed for people with dementia in the acute setting.

Supplementary data

Supplementary data mentioned in the text are available to subscribers in *Age and Ageing* online.

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Conflict of interest

None declared.

References

Additional references are available to subscribers in *Age and Ageing* online.

1. Bayer A. Chapter 52—presentation and clinical management of dementia. In: Woodhouse HMFR, ed. Brocklehurst's Textbook of Geriatric Medicine and Gerontology. Philadelphia: W. B. Saunders, 2010;392–401.
2. Blanchard MR, Jones L, Tookman A, King M. Dementia in the acute hospital: prospective cohort study of prevalence and mortality. Br J Psychiatry 2009; 195: 61–6.
3. Goldberg SE, Gladman JR, Bradshaw LE, Jones RG, Harwood RH. The diagnosis, prevalence and outcome of delirium in a cohort of older people with mental health problems on general hospital wards. Int J Geriatr Psychiatry 2014; 29: 32–40.
4. Dyer A, Nabeel S, Collins R. Dementia in the acute hospital: the prevalence and clinical outcomes of acutely unwell patients with dementia. QJM 2016; 110: 33–7.
5. Dyck CH, Alessi CA, Balkin S, Siegal AP, Horwitz RI. Clarifying confusion: the confusion assessment method: a new method for detection of delirium. Ann Int Med 1990; 113: 941–8.
6. Siddiqi N, House AO, Holmes JD. Occurrence and outcome of delirium in medical in-patients: a systematic literature review. Age Ageing 2006; 35: 350–64.
7. Alzheimer's Society. *Delirium- Alzheimer's Society*. [26th October 2017]; Available from: https://www.alzheimers.org.uk/info/20029/daily_living/370/delirium.
8. Young J, Inouye SK. Delirium in older people. BMJ 2007; 334: 842–6.
9. Rousseau F, Cole M, Primeau F, McCusker J, Bellavance F. Prevalence and detection of delirium in elderly emergency department patients. Can Med Assoc J 2000; 163: 977–81.
10. Schreier AM. Nursing care, delirium, and pain management for the hospitalized older adult. Pain Manag Nurs 2010; 11: 177–85.
11. Cole MG, Voyer P, Vu M. Environmental factors predict the severity of delirium symptoms in long-term care residents with and without delirium. J Am Geriatr Soc 2013; 61: 502–11.
12. Wakefield B, Culp K, Milisen K. Delirium in elderly patients: an overview of the state of the science. J Gerontol Nurs 2001; 27: 12–20.
13. Royal College of Psychiatrists. National Audit of Dementia Care in General Hospitals 2016–2017: Third round of audit report. London: Royal College of Psychiatrists, 2017.
14. Herr K, Pickering G, Gibson S, Benedetti F, Lautenbacher S. Pain in dementia. Pain 2009; 145: 276–8.
15. Miu D, Chan K. Under-detection of pain in elderly nursing home residents with moderate to severe dementia. J Clin Gerontol Geriatr 2014; 5: 23–7.
16. Husebo B, Ballard C, Aarsland D. Pain treatment of agitation in patients with dementia: a systematic review. Int J Geriatr Psychiatry 2011; 26: 1012–8.
17. White N, Lord K, Leurent B. Pain, agitation, and behavioural problems in people with dementia admitted to general hospital wards: a longitudinal cohort study. Pain 2015; 156: 675.
18. Jones L, Blanchard MR, Sampson EL. Study protocol: the behaviour and pain in dementia study (BePAID). BMC Geriatr 2011; 11: 61.
19. Leurent B, Lord K, Scott S, Jones L, Sampson EL. The management of behavioural and psychological symptoms of dementia in the acute general medical hospital: a longitudinal cohort study. Int J Geriatr Psychiatry 2017; 32: 297–305.
20. Vickerstaff V, White N. Psychometric evaluation of the Cohen−Mansfield agitation inventory in an acute general hospital setting. Int J Geriatr Psychiatry 2018; 33: e158–65.
21. The Mental Capacity Act. 2005; Available from: http://www.legislation.gov.uk/ukpga/2005/9/contents.
22. Hodkinson H. Evaluation of a mental test score for assessment of mental impairment in the elderly. Age Ageing 1972; 1: 233–8.
23. Inouye SK, Westendorp RG, Saczynski JS. Delirium in elderly people. The Lancet 2014; 383: 911–22.
24. Inouye SK. The Confusion Assessment Method (CAM): training manual and coding guide. New Haven: Yale University School of Medicine, 2003.
25. Fearing MA, Sternberg EJ, Inouye SK. The confusion assessment method: a systematic review of current usage. J Am Geriatr Soc 2008; 56: 823–30.
26. Folstein MF, Folstein SE, McHugh PR. Mini-mental state': a practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res 1975; 12: 189–98.
27. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. Washington DC: American Psychiatric Association, 1994.
28. Charlson ME. Studies of prognosis. J Gen Intern Med 1987; 2: 359–61.
29. Reisberg B. Functional assessment staging (FAST). Psychopharmacol Bull 1988; 24: 653–9.
30. Borenstein J, Salob SP, Ferris SH. Behavioral symptoms in Alzheimer's disease: phenomenology and treatment. J Clin Psychiatry 1987; 48: 9–15.

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