**Title: Hospital outcomes of older people with cognitive impairment: an integrative review**

**Running title: Hospital outcomes in cognitively impaired patients**

**Authors:** Carole Fogg1,2,3, Peter Griffiths2,4, Paul Meredith1,2, Jackie Bridges2,4

1 Research and Innovation, Portsmouth Hospitals NHS Trust

2 National Institute of Health Research Collaboration for Leadership in Applied Health Research and Care, Wessex

3 School of Health Sciences and Social Work, Faculty of Science, University of Portsmouth

4 Faculty of Health Sciences, University of Southampton

**Corresponding author:** Carole Fogg, Research and Innovation, Queen Alexandra Hospital, Cosham, Hampshire. PO6 3LY [carole.fogg@port.ac.uk](mailto:carole.fogg@port.ac.uk)

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**ABSTRACT**

**Objectives**

To summarise existing knowledge of outcomes of older hospital patients with cognitive impairment, including the type and frequency of outcomes reported, and the additional risk experienced by this patient group.

**Methods**

Integrative literature review. Healthcare literature databases, reports and policy documents on key websites were systematically searched. Papers describing the outcomes of older people with cognitive impairment during hospitalisation and at discharge were analysed and summarised using integrative methods.

**Results**

104 articles were included. A range of outcomes were identified, including those occurring during hospitalisation and at discharge. Older people with a dementia diagnosis were at higher risk from death in hospital, nursing home admission, long lengths of stay, as well as intermediate outcomes such as delirium, falls, dehydration, reduction in nutritional status, decline in physical and cognitive function, and new infections in hospital. Fewer studies examined the relationship of all-cause cognitive impairment with outcomes. Patient and carer experiences of hospital admission were often poor. Few studies collected data relating to hospital environment, .g. ward type or staffing levels, and acuity of illness was rarely described.

**Conclusions**

Older people with cognitive impairment have a higher risk of a variety of negative outcomes in hospital. Prevalent intermediate outcomes suggest changes in care processes are required to ensure maintenance of fundamental care provision and greater attention to patient safety in this vulnerable group. More research is required to understand the most appropriate ways of doing this, and how changes in these care processes are best implemented to improve hospital outcomes.

**Keywords:** Cognitive dysfunction, dementia, patient admission, older people, outcomes, integrative review

**Keypoints:**

* People with cognitive impairment have higher hospital mortality, a higher incidence of delirium and longer hospital stays than patients with no cognitive impairment. In addition, intermediate outcomes such as dehydration, reduction in nutritional status, pain, decline in physical and cognitive function, and new infections in hospital may contribute to poorer final hospital outcomes, but have been less well described than in patients with a formal dementia diagnosis.
* It is important to identify whether older people in hospital have cognitive impairment or an existing diagnosis of dementia, to be aware of their increased susceptibility to adverse events in the hospital environment, and to provide appropriate surveillance for intermediate outcomes to prompt preventative action.
* Further studies of outcomes for people with cognitive impairment in hospital should consider the care environment, such as ward type, staffing and episodes of being located outside their designated ward (‘outlying’), as these factors may also influence outcomes.
* Development and use of core outcome sets for people with cognitive impairment is essential to fully understand and describe the patient journey both to evaluate day-to-day care, and for use in observational or interventional research.

**1 INTRODUCTION**

Between 25%-40% of older people admitted to acute hospitals have been diagnosed with dementia, (e.g. Alzheimer’s disease, dementia syndrome according to Diagnostic and Statistical Manual of Mental Disorders (DSM) IV etc), or have evident cognitive impairment due to undiagnosed dementia or another cause. [[1](#_ENREF_1), [2](#_ENREF_2)] People with dementia occupy approximately 25% of hospital beds in the UK, stay up to six times longer than other older patients, and have a greater risk of dying in hospital; however outcomes for people with any cause of cognitive impairment (CI) are less well described. [[3](#_ENREF_3), [4](#_ENREF_4)] Poor hospital outcomes, e.g. death or new discharge to a residential home, may occur following a series of less frequently reported outcomes which patients with CI may be more likely to experience in hospital. These intermediate outcomes may be an appropriate focus of attention to target nursing and other care and treatment, as, to reduce these outcomes, we must first understand how and why these patients deteriorate in hospital and identify the specific risk factors at patient and hospital level. Knowing how day-to-day clinical and wellbeing outcomes for patients with CI differ from those with no CI during hospitalisation could help us identify specific areas of prevention or care which could improve the journey, and therefore the final outcome, for these patients.

Dementia is significantly underdiagnosed in the community, and delirium and CI often pass undetected in hospital. [[5](#_ENREF_5), [6](#_ENREF_6)] A full diagnostic assessment for dementia during an acute hospital admission for all older people is neither appropriate nor feasible. However, simple cognition screening tests can be used to detect CI, e.g. the Abbreviated Mental Test Score for cognitive function or the Confusion Assessment Method for delirium. [[7-9](#_ENREF_7)] Studies of acutely hospitalised older people using systematically applied screening tests for CI have highlighted that a significant proportion do not have a dementia diagnosis, but patients with CI experience rates of hospital outcomes, e.g. mortality, more similar to those of patients with dementia than patients with no CI. [[10](#_ENREF_10), [11](#_ENREF_11)] Greater understanding of the outcomes of older people with various causes of CI should inform how we can improve care for the whole population at risk. There are currently no published reviews in this area.

This review aims to summarise existing available evidence about the outcomes of older patients with cognitive impairment admitted to hospital. Specifically, to establish which outcomes have been investigated, the additional risk of outcomes in people with CI, and factors that may influence outcomes.

**2 METHODS**

**2.1 Integrative review method**

Integrative review methodology enables inclusion of a broad range of study designs and non-research literature, e.g. audits and theoretical perspectives. [[12](#_ENREF_12), [13](#_ENREF_13)] The method summarises findings with mixed narrative and tabular presentation, identifies common themes in study results and highlights inconsistencies, without numerical synthesis.

**2.2 Data sources and search strategy**

MEDLINE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO and EMBASE, AgeInfo and the Cochrane Library were searched. Terms used (e.g. medical subject headings) to describe the population included: (1) demographic group: “Aged, hospitalised”, “aged hospital patient”, aged, geriatric, senior; (2) clinical group: “cognition disorders”, dementia, “Alzheimer’s disease”, “cognitive impairment”, “cogniti\* impair\*”, “cognitive defect” “delirium/dementia/amnestic, cognitive disorders”, “frontotemporal dementia”, “dementia vascular”, “dementia, multi-infarction”, “Lewy body dementia”, “dementia, senile”; (3) health service use group: “hospital admission”, hospital\*. (See supplementary material). Additional evidence was retrieved by reviewing reference lists, forward citation searches and searching websites of organisations focussing on the care of older people, e.g. Age UK, British Geriatrics Society, Royal College of Nursing, Alzheimer’s Society, Alzheimer’s UK.

**2.3 Criteria for inclusion of evidence**

Studies included were those which investigated: (i) outcomes of older people with CI with a hospital admission as a main purpose of the study, or (ii) the contribution of CI to an outcome of interest related to hospitalisation, including other disease outcomes, surgical or medical treatments, or (iii) outcomes of people with CI in Intensive Care Units during hospital admission; where the outcomes occurred during hospitalisation or at discharge. The search was limited to articles published in the last 20 years (since 1997) as these will reflect contemporary service provision, care practices, and up-to-date methods of detecting dementia/CI. Studies which reported on outcomes of Emergency Department visits only, elective surgical patients, patients with delirium with no evidence of prior CI, and those taking place within specialised psychogeriatric units were excluded.

**2.4 Evaluation of evidence**

Titles and abstracts were screened for review aims. Full texts were obtained for potentially relevant articles, and screened against eligibility criteria. Screening and data extraction was undertaken by a single reviewer, and decisions checked with a second reviewer in case of uncertainty. The relevance of all included studies was verified by three reviewers.As one of the purposes of this review was to understand which outcomes are being measured for this population in hospital, no formal quality assessment was performed to maintain inclusivity. Methodological issues, e.g. the potential for bias, are indicated in text or tables where appropriate.

**3 RESULTS**

1,362 records were identified from database searches,reference lists and website searches. Following review of abstracts and full papers against eligibility criteria, , 104 articles were included in the review (Figure 1). The median number of participants was 498 (range 4-3,000,000), mostly of people aged ≥50. Participants cohorts included general inpatients, specific conditions e.g. heart failure or fractures, , or with specific clinical interventions, e.g. catheterisation. CI was defined in several ways, e.g. of dementia diagnosis, cognitive spectrum disorder (delirium, dementia or Abbreviated Mental Test (AMT) <8), or other assessments e.g. Short Blessed Test (SBT).

The articles encompass a range of methodologies, e.g. observational studies comparing patients with/without CI; studies in which cognitive status or dementia were evaluated as risk factors for specific outcomes; qualitative studies and audits. A variety of outcomes were explored, mostly in patients with dementia compared to those without, but also in patients with measurable CI regardless of diagnosis. Associations between CI and outcomes were assessed using a variety of covariates, reflecting the study context and data sources available. Articles with more than one outcome are presented in the appropriate tables.

**3.1 Clinical and patient-centred outcomes during hospitalisation**

***3.1.1 Patients’ experiences of hospital admission***

An integrative review summarising 24 papers on patient and carer experience concluded people with dementia are stigmatised in hospitals, and acute care needs and tasks are prioritised over personalised care. [[14](#_ENREF_14)] (Table 1) The UK National Audit of Dementia Care found 17% of comments about patient care (collected via a carer questionnaire) described care negatively, and 9% expressed patient did not receive care appropriate to their needs. [[15](#_ENREF_15)] Surveys estimate around 60% of people with dementia are not treated with dignity or understanding whilst hospitalised, and the majority are frightened by the hospital environment. [[3](#_ENREF_3)] Reporting of negative experiences has been observed to follow a model, the ‘cycle of discontent’, in which poor communication and relationship building between staff and patients/carers lead to expectations not being met, subsequent cycles of identification of poor care and challenge to staff, further deterioration in the relationship and ultimately reporting of poor experiences. [[16](#_ENREF_16)] It has been observed there are many missed opportunities in hospitals to provide person-centred care and enable a person with dementia to sustain personhood. [[17](#_ENREF_17)] No studies were found that discussed experiences of older patients with any cause of CI.

***3.1.2 Behavioural and psychological symptoms of dementia (BPSD)***

The prevalence of BPSD symptoms in people with dementia in hospital rises during admission, likely due to unmet needs and distress, and a higher overall BEHAVE-AD score (incorporating BPSD) associated with increased mortality. [[18](#_ENREF_18)] BPSD have been identified as a frequent cause of complications in an Alzheimer Special Acute Care inpatient Unit, with agitation and aggressiveness representing 60% of BPSD events. [[19](#_ENREF_19)] A qualitative study identified disruption in routine, e.g. admission to hospital, triggering negative changes in behaviour as the person with dementia attempts to gain control over an unfamiliar environment. [[20](#_ENREF_20)]

***3.1.3 Malnutrition or dehydration***

Older people with dementia are more likely to have a low mini-nutritional assessment (MNA) score and laboratory indices indicating malnutrition at hospital admission, with overall MNA score and sub-score related to dietary habits (MNA-3) significant predictors of death in hospital. [[21](#_ENREF_21)] Of dmitted patients who are already undernourished, those with CI are less likely to meet their required energy and protein intake, achieving <50% of total energy expenditure requirements. [[22](#_ENREF_22)] Organisational factors may contribute to decline in nutritional status through lack of availability of adequate nutrition. An audit revealed only 76% of staff considered people with dementia had their nutritional needs met ‘always or most of the time’, and <75% of staff said they could obtain snacks between meals for patients with dementia, who were unable to eat full meals at regular times. [[15](#_ENREF_15)] Fluid intake is also a key indicator of fundamental care in hospital. Assessment of renal conservation of water in older patients showed concentrated urine in 16% of patients, more commonly in patients with confusion and/or dementia, and was related to higher 30-day mortality. [[23](#_ENREF_23)]

***3.1.4 Functional or cognitive decline***

A meta-analysis identified functional decline (measured by activities of daily living (ADL), instrumental ADLs (IADL), Barthel Index (BI), mobility, functional independence measure (FIM) or Rankin scale) in hospitalised adults aged ≥65 is independently associated with CI or a dementia diagnosis. [[24](#_ENREF_24)] Further cognitive decline during hospitalisation is associated with an increased risk of functional decline, defined as a loss of ability to perform one or more ADLs without help between admission and discharge. [[25](#_ENREF_25)]

***3.1.5 Incident delirium during hospitalisation***

The prevalence of delirium in general hospital patients is around 20%, and approximately half these patients have pre-existing dementia.[[6](#_ENREF_6)] Although patients with dementia are more likely to have delirium at admission, dementia increases the likelihood of new-onset delirium (or ‘delirium superimposed on dementia’ - DSD) during hospitalisation. [[26-29](#_ENREF_26)] Regardless of a dementia diagnosis, lower cognitive scores are associated with increased occurrence of delirium in hospital, and symptoms of greater severity, e.g. disordered attention, orientation, thought organization and memory.[[27](#_ENREF_27), [30-33](#_ENREF_30)] CI and dementia are predictive of delirium occurring prior to or following surgery for fractures of the hip or proximal femur. [[34-37](#_ENREF_34)] Hospital outcomes including mortality, institutionalisation and length of stay for patients with delirium are worse with pre-existing dementia.[[38-41](#_ENREF_38)] Dementia was associated with an increased risk of least 1 episode of delirium during the first 3 days of admission in adults aged ≥65, and increased the odds of unanticipated ICU admission or in-hospital death. [[42](#_ENREF_42)].

***3.1.6 Adverse events and complications occurring in hospital***

Events occuring during hospitalisation, e.g. urinary tract infections (UTI), pneumonia or gastroenteritis (Hospital acquired infections - HAI), pressure ulcers (PU), adverse drug reactions (ADR) falls and fractures impair recovery by reducing mobility, functional ability and nutritional status, increase care required and extend hospitalisation. CI or dementia leads to an increased risk of falls in hospital, [[43](#_ENREF_43), [44](#_ENREF_44)] including recurrent falls [[45](#_ENREF_45)] and falls related to impulsive behaviour. [[46](#_ENREF_46)] In addition, factors identified in >75% of falls in patients with dementia included being in hospital at night, acute disease or symptoms of disease and/or acute drug side-effects. [[47](#_ENREF_47)] Falls may result in fractures, which delay recovery and lengthen hospitalisation. Occurrence of fractures in patients with dementia is associated with hypnotic medicines, specifically short-acting benzodiazepine hypnotics, ultrashort-acting non-benzodiazepine hypnotics, hydroxyzine, risperidone and perospirone. [[48](#_ENREF_48)] Both medical and surgical inpatients with dementia are at higher risk of four common complications, UTIs, PUs, pneumonia and delirium, and medical patients are also at increased risk from sepsis and ‘failure to rescue’. [[49](#_ENREF_49)] Pressure ulcers are also more common in patients with CI. [[27](#_ENREF_27)] CI was shown to be the most significant risk factor for developing urinary and faecal incontinence [[43](#_ENREF_43)], with 36% and 2% new incontinence at discharge respectively. [[50](#_ENREF_50)]

Polypharmacy (≥ 5 drugs/day) and dependence for at least 1 ADL were related to occurrence of at least one adverse drug reaction (ADR) in in-patients with dementia. [[51](#_ENREF_51)] CI in older people is associated with increased HAIs, ADRs, and length of stay ≥7 days [[52](#_ENREF_52)] ADRs may be less frequently reported in patients with CI, due to reduced ability to recognise and communicate side effects, leading to unsafe care. [[53](#_ENREF_53)] However, older patients with CI may be less likely to use inappropriate medication (as per Beers criteria), thus reducing ADR reporting in this group. [[54](#_ENREF_54)] A study exploring the relationship of adverse clinical events (i.e. any acute clinical problem that occurs newly during hospitalization) and mortality in patients with dementia showed at least one adverse clinical event (e.g. electrolyte disorders, hypertensive crisis, fractures or infections) increased the risk of death tenfold. [[55](#_ENREF_55)] Mild/moderate CI was associated with adverse events defined as ‘incidents’ (e.g. following an unintended ‘accident’ in hospital such as a slip or trip, medication error or staff miscommunication), but not subsequent mortality. [[56](#_ENREF_56)]

In-patients with dementia have a higher risk of acute organ dysfunction and severe sepsis, particularly patients with comorbidities such as chronic obstructive pulmonary disease (COPD). [[57](#_ENREF_57), [58](#_ENREF_58)] Inpatients with COPD and dementia were less likely to be receiving treatment for COPD and to have their lung function assessed, suggesting under-treatment could contribute to poorer outcomes. [[59](#_ENREF_59)]

**3.2 Differences in care during hospitalisation**

***3.2.1 ‘Outlying’ and bed moves***

Pressures on hospital beds lead to older people not always being placed in the most suitable location for their care; known as ‘outlying’ or ‘boarding’. These patients may be moved around the hospital several times until they reach their ‘home ward’. Of patients under an Older Person Evaluation Review and Assessment (OPERA) team, who were more likely to be boarding than general medicine patients, those with pre-existing CI were more likely to be moved 3 or times during their hospital admission (Table 2). [[60](#_ENREF_60)] In a further study, boarding patients with dementia and/or delirium had higher mortality within 48 hours of admission. [[61](#_ENREF_61)] Although hospital organisational factors result in night-time bed moves, these were deemed avoidable by 50% of staff surveyed in an audit, and considered detrimental to patient experience. [[15](#_ENREF_15)]

***3.2.2 Pain and end-of-life or palliative care***

Pain may indicate a new infection, injury or worsening in condition. The prevalence of pain amongst in-patients with CI is estimated at 39%, and is associated with increases in the Behavioural Pathology in Alzheimer Disease Scale (BEHAVE-AD) score, and increased aggression, phobia and anxiety. [[62](#_ENREF_62)] Dementia reduces a patient’s ability to describe pain characteristics and changes, thus delaying diagnosis of infections or overtreating with analgesics like opioids, contributing to complications e.g. delirium, bowel problems and lengthened stay. [[63](#_ENREF_63)] There is no current evidence as to whether patients with CI experience more pain during hospitalisation, probably due to difficulties in assessment.

End-of-life patients with dementia have fewer referrals to palliative care and are less prescribed palliative medicines, although no differences were found in one study comparing patients with terminal dementia to terminal heart failure. [[64-66](#_ENREF_64)] Whereas invasive interventions were equally utilised in one study, arterial blood gas measurement and catheterisation were more frequent for patients with dementia, and central line placement less used in another study. [[64](#_ENREF_64), [65](#_ENREF_65)] Drug withdrawal rates in hospitalised end-of-life patients with dementia were higher than for patients with COPD or heart failure. [[67](#_ENREF_67)] In patients with terminal dementia, only 46% had adequate symptom control, with 13.5% experiencing uncontrolled pain and 51.5% dyspnoeic. [[66](#_ENREF_66)] In an evaluation of suffering at end-of-life in patients with dementia using the Mini Suffering State Examination scale (MSSE), which includes psychological distress, spiritual concerns and physical pain, only 7% of patients died with the lowest level of suffering, with the majority experiencing significant suffering, highlighting insufficient assessment and palliative treatment. [[68](#_ENREF_68)]

***3.2.3 Inappropriate catheterisation***

Catheterisation could indicate deterioration in a person with CI in hospital, a sign of poor care (if inappropriately performed), or reduction in the ability of staff to provide effective care. Presence of CI was related to inappropriate catheterisation in older patients, with ‘convenience of care’ cited in 50% of cases, and led to a greater decline in ADLs during admission. [[69](#_ENREF_69)]

**3.3 Mortality in hospital**

Of 11 studies comparing mortality in general in-patients with/without dementia, 8 concluded patients with dementia have an increased risk of death, with estimates varying from adjusted Odds Ratio (aOR) 1.09 [1.03-1.16] to aOR 2.1 [1.0-4.5] (Table 3). [[5](#_ENREF_5), [55](#_ENREF_55), [70-77](#_ENREF_70)] This difference is greater in people >65 years with dementia as compared to older patients (aOR 1.93 [1.55-2.41]). [[71](#_ENREF_71)] In-patients with COPD and dementia have a higher mortality risk.[[58](#_ENREF_58)] Moderate and severe CI was associated with mortality after ICU admission, even adjusting for acuity scores (Acute Physiology and Chronic Health Evaluation II (APACHE II)). [[78](#_ENREF_78)] A large cohort demonstrated significant differences in mortality for patients with CI but no diagnosis of dementia as compared to patients with no CI (11.8% vs 9.0%), and a further study showed a difference between ‘all cause’ CI and no CI (13.6% vs 9.0%). [[10](#_ENREF_10), [11](#_ENREF_11)] The presence of CI, regardless of dementia, may independently predict in-hospital mortality, with the highest risk in patients with severe CI. [[5](#_ENREF_5), [79](#_ENREF_79)]

Studies which have not shown a difference in mortality between people with/without dementia include a stratified analysis by occurrence of delirium, and one study excluding patients with sensorial deficits, communication problems or severe acute illness, i.e. a higher mortality risk. [[28](#_ENREF_28), [29](#_ENREF_29), [41](#_ENREF_41), [80](#_ENREF_80)] A systematic review concluded although cognitive function was a predictor of in-hospital mortality in 6 of 12 studies assessed, assessments of physical function and nutrition were also important in older patients. [[81](#_ENREF_81)] In patients aged ≥80, functional status and comorbidities were predictive of poor outcomes, whereas dementia or other CI was not. [[82](#_ENREF_82), [83](#_ENREF_83)] Studies exploring the contribution of CI to mortality have been adjusted for a range of covariates, e.g. functional/ nutritional assessments, comorbidities, laboratory indicators, which influence estimates of effect.

Contradictory findings regarding the contribution of dementia to mortality in patients presenting to hospital with acute myocardial infarction (AMI) could relate to variation in care provision, as patients with dementia report less chest pain and wait longer for treatment, have fewer transfers to intensive or coronary care units, and less frequent provision of invasive interventions. [[84-86](#_ENREF_84)] Dementia was not found to be associated with hospital mortality in patients with stroke, or those with an ICU admission. [[87](#_ENREF_87), [88](#_ENREF_88)]

**3.4 Resource utilisation and discharge destination**

***3.4.1 Length of hospital stay***

In most studies, CI or dementia increased length of hospital stay (LOS). [[10](#_ENREF_10), [11](#_ENREF_11), [71](#_ENREF_71), [73](#_ENREF_73), [77](#_ENREF_77), [89-97](#_ENREF_89)] (Table 4) Patients with DSD had longer mean LOS than those with dementia or delirium alone. [[11](#_ENREF_11)] Concurrent dementia extends stays in older patients with hip fracture, [[98](#_ENREF_98)] and haemorrhagic peptic ulcer disease.[[99](#_ENREF_99)] However, similar LOS were described in one article, and comorbidities found more predictive of longer hospital stays in another study. [[76](#_ENREF_76), [82](#_ENREF_82)] Discharge after the patient is ‘medically fit’, due to delays in discharge planning or difficulties in organising residential care, contribute to longer LOS in people with CI, [[90](#_ENREF_90), [100](#_ENREF_100)] in addition to mental and behavioural manifestations, falls or hospital-acquired complications. [[45](#_ENREF_45), [101](#_ENREF_101), [102](#_ENREF_102)] LOS was longer in patients with Parkinsonism-related dementia or vascular dementia than Alzheimer’s, and patients with concurrent diabetes mellitus, pneumonia and fall-related hip fracture had more hospital stays of >14 days. [[103](#_ENREF_103)]

***3.4.2 Costs***

Excess costs relating to increased LOS for patients with dementia exceeded £80 million, and dementia estimated to increase the average cost of an admission threefold (UK figures, 2011). [[77](#_ENREF_77), [96](#_ENREF_96)] CI (dementia or delirium coded during admission) increased costs of hospital stay by 51% in Australia, and 39% for dementia alone [[91](#_ENREF_91), [95](#_ENREF_95)]. In Ireland, dementia adds 246,908 hospital days per annum, costing €199 million. [[92](#_ENREF_92)] Dementia was associated with increased treatment costs of $1171 for endoscopic hemostasis of hemorrhagic peptic ulcer. [[99](#_ENREF_99)] Patients with dementia experiencing complications accounted for 10.4% of hospital episodes, and 22% of extra costs. [[102](#_ENREF_102)] Large numbers of patients with dementia die in hospital, where costs for end-of-life care can be six times higher than hospice/home care, [[104](#_ENREF_104)] although appropriate management, e.g. palliative care consultations, reduce pharmacy costs through prescribing changes . [[105](#_ENREF_105)]

***3.4.3 Discharge to a nursing or residential care home***

Patients with CI are frequently discharged to nursing/residential homes. [[10](#_ENREF_10), [77](#_ENREF_77), [82](#_ENREF_82), [89](#_ENREF_89), [106](#_ENREF_106)] Dementia predicts of institutionalisation, (odds ratio 2.14 [1.24-3.70]), although less so in ambulatory care sensitive conditions [[71](#_ENREF_71), [82](#_ENREF_82), [107](#_ENREF_107), [108](#_ENREF_108)]. However, in stroke patients, no difference in discharge disposition was found between patients with/without dementia. [[87](#_ENREF_87)] Contributors to nursing home admissions in people with dementia include poor, uncoordinated hospital care, non-cognitive symptoms of dementia, (e.g. depression, agitation and delusions) and aggression as part of BPSD. [[93](#_ENREF_93), [109](#_ENREF_109), [110](#_ENREF_110)] Discharge planning should include considering the patient’s wishes and using multidisciplinary-informed standards for discharge from hospital to a care home, although in an audit, consent to a change in residence was not recorded in >30% of patients, nor evidence of ‘best interests’ decision making where patients lacked capacity. [[15](#_ENREF_15), [106](#_ENREF_106), [111](#_ENREF_111)] 54% of carers’ comments regarding discharge/care transfer said discharge was unsafe and poorly planned, which may lead to readmissions due to lack of available support in the discharge location.

**4 DISCUSSION**

It appears the presence of cognitive impairment (particularly dementia) in older hospitalised patients influences a variety of clinical and health service outcomes. This is replicated globally, within different healthcare systems and patient populations. Although most studies focus on patients with diagnosed dementia rather than ‘all-cause’ CI, an increased risk of poor outcomes e.g. in-hospital mortality, delirium, longer LOS and institutionalisation at discharge was common. Higher mortality rates may partly reflect lack of available suitable care at end-of-life, lack of end-of-life care plans e.g. ‘do-not-hospitalise’ advance directives, or unnecessary transfers from nursing homes.[[70](#_ENREF_70), [112-115](#_ENREF_112)] Delays in organising appropriate discharge contribute to lengthened hospital stays, highlighting administrative management and linked services required by these patients may impact on final hospital outcome, as more days in hospital may lead to de-conditioning, and policy changes to health and social care infrastructure have unforeseen impacts. [[116](#_ENREF_116)]

Patients with CI are at increased risk of new infections in hospital, decline in functional and nutritional status, behavioural symptoms and incontinence. These may be considered ‘intermediate’ outcomes, precipitating patient deterioration, for example, CI was associated with mortality only in patients who had at least one adverse event in hospital, and dementia associated with mortality only if delirium had occurred. [[41](#_ENREF_41), [79](#_ENREF_79)] Suchadverse clinical events could indicate a ‘failure to maintain’ patients’ basic health needs, leading to further deterioration. [[117](#_ENREF_117)] A better understanding of how CI precipitates these events, and what can be done to prevent, detect and reduce their risk would enable development of better care models and improved patient outcomes. The multifactorial nature of these events requires a multilevel approach at seven levels of care - patient, task, staff, team, environment, organisation and institution - to make improvements, and outcomes for hospital dementia care should reflect changes at each of these levels.[[118](#_ENREF_118)] Maintaining clinical and functional status of patients may impact on post-discharge outcomes, e.g. mortality, short-term readmissions, institutionalisation within a year and continued functional decline. [[119-122](#_ENREF_119)]. A focus on fundamentals of care, e.g. ensuring nutrition, hydration, skin care and mobilisation of patients and psychological care, may improve intermediate outcomes and reduce in-hospital and post-discharge decline.

The variety of covariates used for adjustment in the articles, and different approaches used to account for the same underlying characteristics (e.g. individual diagnostic groups vs Charlson comorbidity score) may explain variability in study conclusions. For example, functional scores were more significant in predicting mortality than dementia in older patients, but few studies investigating the relationship between CI and mortality adjusted for patient function, suggesting residual confounding. The current trend for including frailty assessments in acute hospital care will provide key information, although it will become difficult to disentangle the relative contributions of frailty and CI, as CI comprises part of commonly used frailty assessments. The majority of studies explored associations between patient characteristics at the beginning of hospital admission with a binary outcome during hospitalisation or outcomes at discharge, not accounting for time-varying covariates, e.g. staffing levels, changes in illness acuity or function. Availability of longitudinal data representing day-to-day care, or outcomes reflecting care processes, are essential to understand more about modifiable risk factors contributing to poor outcomes.

Staffing levels, knowledge and skills are a barrier to provision of best-practice care for people with CI in hospital [[15](#_ENREF_15), [123](#_ENREF_123)] However, studies in this review neither included detailed descriptions of staffing levels and skill mix, staff continuity, training and knowledge, and the general hospital environment, nor took account of these in analyses. Outcomes of value in capturing aspects of care, e.g. patient experience, may require specific questionnaires or assessments, and are not commonly available. For example, the person-centred care of older people with CI in acute care scale (POPAC) measures nursing staff best practice care processes to identify CI and employment of nursing interventions to meet associated needs, and could be useful in evaluating routine care and service developments such as training, as well as an outcome in research. [[124](#_ENREF_124)]

No single study included a wide range of care, clinical and wellbeing outcomes. Given the role of intermediate outcomes in influencing catastrophic events such as mortality, a core outcome set for CI focussed on hospital care is required. This could be used to standardise outcomes for interventional and observational studies, improving comparability of studies, and in routine care to improve care quality and enable evaluation of care innovations. Dementia care audits provide a good starting place to develop outcome sets, as they focus on fundamental care that should be in place to prevent negative outcomes. Examples include delirium screening, mobility assessment, nutritional status, pressure ulcers, pain, continence and functioning, [[15](#_ENREF_15)] plus access to services, e.g. liaison psychiatry, speech and language, occupational therapy, social work and continence services, which indicate holistic care.[[100](#_ENREF_100)] Assessments used in long-term institutions such as the quality of life in late-stage dementia (QUALID) scale, [[125](#_ENREF_125)] could be useful, as the hospital environment can negatively influence health outcomes, e.g. functional independence and quality of life, through a range of processes. [[126](#_ENREF_126)]

**Limitations**

Due to the diffuse questions addressed and limited resources, a single reviewer took decisions on study exclusion and data extraction, involving other reviewers in case of ambiguity. Conclusions would be altered substantively only if a number of large scale studies had been accidentally omitted, which seems unlikely. Trials registers were not searched for on-going studies in this area. Non-English language articles were not included due to translation restrictions. The majority of findings indicate a relationship between CI and outcomes. Although selective publication of significant results is possible, there would have to be several large unpublished studies to substantially change the overview of findings.

**Conclusions**

Whilst it is important to understand the impact of cognitive impairment on mortality, length of stay and institutionalisation, improvement of care for these patients requires insight into the precipitating factors for intermediate outcomes, e.g. infections, dehydration and functional decline, during hospitalisation. Extrinsic factors, e.g. staffing and environment, need exploration. Core outcome sets which reflect intermediate outcomes in hospital could be developed and used for clinical trials and quality improvements.

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