Age and Ageing 2013; **42:** 582–588
doi: 10.1093/ageing/aft074
Published electronically 25 June 2013

Six-month outcomes following an emergency hospital admission for older adults with co-morbid mental health problems indicate complexity of care needs

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Abstract

Background: two-thirds of older patients admitted as an emergency to a general hospital have co-existing mental health problems including delirium, dementia and depression. This study describes the outcomes of older adults with co-morbid mental health problems after an acute hospital admission.
Methods: a follow-up study of 250 patients aged over 70 admitted to 1 of 12 wards (geriatric, medical or orthopaedic) of an English acute general hospital with a co-morbid mental health problem and followed up at 180 days.
Results: twenty-seven per cent did not return to their original place of residence after the hospital admission. After 180 days 31% had died, 42% had been readmitted and 24% of community residents had moved to a care home. Only 31% survived without being readmitted or moving to a care home. However, 16% spent >170 of the 180 days at home. Significant predictors for poor outcomes were co-morbidity, nutrition, cognitive function, reduction in activities of daily living ability prior to admission, behavioural and psychiatric problems and depression. Only 42% of survivors recovered to their pre-acute illness level of function. Clinically significant behavioural and psychiatric symptoms were present at follow-up in 71% of survivors with baseline cognitive impairment, and new symptoms developed frequently in this group.
Conclusions: the variable, but often adverse, outcomes in this group implies a wide range of health and social care needs. Community and acute services to meet these needs should be anticipated and provided for.

Keywords: *older people, mental health, general hospital, outcome*

Introduction

Two-thirds of older patients admitted as an emergency to a general hospital have co-existing mental health problems, including delirium, dementia and depression [1–3]. In hospital, their needs are high due to severe levels of physical dependency and behavioural problems [2–4]. Their experience in hospital can be poor [5], as are outcomes, including survival, length of stay and discharge destination [1, 2, 6–9].

There is a lack of systematic data quantifying the health outcomes for this population, despite its importance for planning services to meet their needs. Previous studies have focused on specific mental health diagnoses. However, many

mental health problems are poorly diagnosed both in the community and hospital. Staff and carers often identify symptoms and behaviours rather than diagnoses, and there is considerable overlap between diagnoses [9, 10]. For example, two-thirds of people with dementia admitted to hospital have superimposed delirium [11–13]. This paper describes a range of outcomes 180 days following emergency admission to a general hospital for a cohort of older patients with co-morbid mental health problems. We describe the natural history of problems, and baseline features which are associated with outcomes, to identify prognostic and potentially modifiable factors. From these we draw implications about healthcare needs.

Methods

Study population

Patients aged 70 years or over with an unplanned admission lasting two or more days to 1 of 12 wards in a large general hospital (two trauma orthopaedic, three acute geriatric medical and seven general medical) were screened using brief tests of cognition [14], depression [15], anxiety [16], alcohol misuse [17] or other mental health diagnosis. The intention of screening was to identify and exclude patients unlikely to have a mental health problem. For details of the screening process, see Supplementary data available in *Age and Ageing* online or [3, 18].

Patients screening positive were invited to take part in the study. Participants with mental capacity gave written informed consent. Those lacking mental capacity were recruited subject to agreement from a family member or carer.

Baseline data

Baseline information was collected by interview with the participant, carer informants, observation or casenotes, and comprised: demographic details; medications taken at admission, co-morbidity (Charlson co-morbidity index [19]); severity of acute illness (Modified Early Warning Score [20]); presenting geriatric syndromes; cognitive function (Mini-Mental State Examination, MMSE [21]); delirium diagnosis and severity (Delirium Rating Scale-Revised-98, DRS-R-98 [22]); depression (Cornell Scale for Depression in Dementia, CSDD [23, 24]); behavioural and psychological symptoms (neuropsychiatric inventory, NPI [25]); activities of daily living (ADL) at admission and prior to the acute illness (Barthel index [26]); nutritional status (short-form Mini-Nutritional Assessment [27]) and health-related quality of life (EuroQol EQ5D [28]).

Follow-up

Participants were followed up 180 days after recruitment. Information was collected from the participant, family members, other informal or professional carers. Researchers were extensively trained in data collection procedures and underwent periodic co-observation. Information on readmissions and total number of days spent in hospital was collected from hospital administration systems. Mortality and dates of care home placements were ascertained from hospital administration systems, general practitioners, carer informants or care homes. Surviving participants were interviewed at home with a carer, or by telephone interview with an informant if this was not possible. Participants were tested for cognitive function [21], and carers provided information on behavioural and psychological symptoms and activities of daily living.

Outcomes

Three outcomes were defined:

- survival to 180 days;
- days spent at home—defined as 180 minus the total number of days spent in hospital, care homes or dead for patients living in the community at admission or total number of days spent in hospital, a new care home or dead for patients living in care homes at admission [29, 30];
- composite good outcome—survival without being re-admitted or moving to a new care home.

Health status outcomes were reported for survivors:

- change in ADL—defined by an increase or decrease of two points of more on the Barthel index at follow-up compared with admission and prior to the acute illness.
- behavioural and psychological symptoms in participants with baseline cognitive impairment (MMSE <25)—a score was calculated for each of the 12 domains on the NPI (frequency × severity, range 0–12, higher scores indicating greater symptoms). A clinically significant problem was defined as a domain score ≥4 [31–33].

Statistical analysis

Univariate and multivariate regression analysis was conducted to determine the association between outcomes and demographic and health status variables measured at baseline. Logistic regression was used for survival and the composite good outcome. A two-part model was used to analyse days at home (see Supplementary data available in *Age and Ageing* online).

Multivariate regression models were built by first including all variables significant in the univariate analysis along with age, sex and patient residence at admission, and then entering other variables until all variables in the model were statistically significant and no further variables reached significance when entered. Continuous variables were checked for linearity, or fitted in quartiles or commonly used categories. Missing items from measurement scales were imputed using simple methods.

Sample size

Sample size was calculated to identify characteristics assessed at admission which were associated with adverse outcomes 180 days later. A sample size of 250 was chosen to be able to fit a linear regression model for the number of days at home with 15 potential explanatory variables.

Research ethics committee approval was obtained.

Results

Between April and November 2009, 1,004 patients were screened out of 3,680 unplanned admissions of people over 70 to the study wards lasting >2 days. Six hundred and forty-three patients screened as possibly having a mental health disorder [3]. Two hundred and fifty (39%) were recruited to the study (study flow diagram, Supplementary data are available in *Age and Ageing* online, Appendix Figure S1). One hundred and ninety-seven (79%) lived in a private home and 52 (21%) were from care homes. Participants were highly dependent and cognitively impaired (Table 1): half had a Barthel index of 10/20 or less at admission and 159 (64%) had moderate or severe cognitive impairment (MMSE score 20/30 or less). Thirty-nine of forty-two participants without cognitive impairment screened positive on the GDS4, of whom 24 had probable or definite major depression on the CSDD. The median hospital length of stay for the initial admission was 13 days [inter-quartile range (IQR) 7–24, range 2–131].

Three participants withdrew before follow-up. Sixty-five (27%) did not return to their previous place of residence after the initial hospital admission (Table 2): 28 (11%) died in hospital, 14 (6%) died following stays in a new care home, 20 (8%) moved to a permanent new care home from the community, and three care home residents (1%) moved to a new care home. At 180 days 135/247 (55%) participants were alive and living in the same type of residence as at admission. Out of 195 participants from the community, 34 (17%) were alive and living in a new care home, 12 (6%) died following stays in new care homes, and 43 (22%) died without entering a care home. Out of 52 participants from care homes, 23 (44%) died. One hundred and four (104/247, 42%) were readmitted, 45/247 (18%) within 30 days of discharge and 42/247 (17%) were readmitted more than once.

Table 1. Patient characteristics at admission

	Patient residence at admission		
	Community (n = 197)	Care home (n = 52)	Total (n = 249)
Age	83 (78–88)	88 (84–92)	84 (79–89)
Female (%)	123 (62)	42 (81)	165 (66)
Ward (%)			
Elderly	95 (48)	23 (44)	118 (47)
General medicine	73 (37)	12 (23)	85 (34)
Orthopaedics	29 (15)	17 (33)	46 (18)
Barthel ADL prior to acute illness			
n	196	48	244
Median (IQR)/20	17 (13–19)	11.5 (8–15.5)	16.5 (8–18)
Barthel ADL at admission/20	11 (7–15)	4 (1–6.5)	10 (5–14)
Change in the Barthel ADL score at admission compared with pre-acute illness[a]	−4 (−7.5 to −1)	−6 (−10 to −1)	−4 (−8 to −1)
Cognitive function (MMSE)/30	19 (13–24)	4 (0–10.5)	16 (9–22)
Cognitive impairment (%)			
Severe (MMSE 0–9)	29 (15)	38 (73)	67 (27)
Moderate (MMSE 10–20)	79 (40)	13 (25)	92 (37)
Mild (MMSE 21–24)	46 (23)	1 (2)	47 (19)
None (MMSE 25–30)	42 (21)	0	42 (17)
Depression score (CSDD)[b]/38	11 (7–15)	12 (7–17)	11 (7–15)
Probable major depression[b] (%)	83 (42)	16 (31)	99 (40)
Definite major depression[b] (%)	22 (11)	11 (21)	33 (13)
Delirium (DRS-R-98 > 17.75)[c] (%)	64 (32)	43 (83)	107 (43)
Behavioural and psychiatric symptoms (total NPI score)[d]			
n	191	50	241
median (IQR)/144	23 (13–33)	32 (17–50)	24 (14–36)
Charlson co-morbidity score/37	2 (1–4)	2.5 (1–3)	2 (1–4)
Nutritional score (MNA-SF)[e]			
n	192	50	242
Median (IQR)/14	9 (7–11)	6.5 (5–9)	9 (6–11)
EQ-5D quality of life			
n	194	42	236
Median (IQR)/1.0	0.20 (0.03–0.42)	0.03 (−0.1 to 0.20)	0.19 (−0.04 to 0.38)
Length of initial hospital stay	13 (7–25)	11.5 (7–18)	13 (7–24)

Median (IQR) presented for continuous/ordinal variables and frequency (%) for categorical variables.

[a]Change calculated as Barthel ADL score at admission – Barthel ADL score pre-acute illness. Negative values indicate a deterioration in ADL scores.

[b]Scores on the CSDD >10 indicate a probable major depression and scores >18 indicate a definite major depression. One item (of 19) imputed for 12 participants, two items for three participants and three items for two participants.

[c]One item (of 16) imputed for 15 participants, two items for one participant.

[d]Total NPI score is sum of frequency × severity score for the 12 symptoms evaluated, range 0–144, higher scores indicating greater symptoms.

[e]Scores on the MNA-SF of between 0 and 7 indicate malnourishment, 8 and 11 indicate being at risk of malnourishment and satisfactory nutrition for scores between 12 and 14. For seven participants, one item was missing due to BMI being unknown and being unable to measure calf circumference.

Table 2. Patient outcomes at 180 days

	Patient residence at admission		
	Community (*n* = 197)	Care home (*n* = 52)	Total (*n* = 249)
Status at 180 days (%)			
Alive	140 (71)	29 (56)	169 (68)
Dead	55 (28)	23 (44)	78 (31)
Withdrawn	2 (1)	0	2 (1)
Move to care home from community[a] (%)			
No	149 (76)	52 (100)	201 (81)
Yes	46 (24)	0	46 (19)
Death or move to a care home[a,b] (%)			
No	106 (54)	29 (56)	135 (55)
Yes	89 (46)	23 (44)	112 (45)
Readmission[a] (%)			
No	109 (56)	34 (65)	143 (58)
Yes	86 (44)	18 (35)	104 (42)
Death or readmission[a,c] (%)			
No	77 (39)	19 (37)	96 (39)
Yes	118 (61)	33 (63)	151 (61)
Alive without readmission or move to a care home[a,d] (%)			
No	138 (71)	33 (63)	171 (69)
Yes	57 (29)	19 (37)	76 (31)
Days at home[e]			
Median (IQR)	104 (0–161.5)	128.5 (4–167)	107.5 (0–163)
Did not return to previous residence following admission (%)	52 (27)	13 (25)	65 (27)
Days at home if returned home			
n	140	39	179
Median (IQR)	147.5 (83–168)	159 (63–167)	151 (80–168)

[a]For the 247 participants completing the study (i.e. not withdrawing).
[b]Twelve participants from the community moved into a care home and died during the study.
[c]Thirty-one participants with readmissions died during the follow-up period, 23 from the community and 8 from care homes.
[d]Nine participants were readmitted, moved to a care home and died, 3 participants moved to a care home and died, 22 participants were readmitted and died during the study period and 14 participants were readmitted and moved to a care home during the follow-up period. A further 44 participants are included as not having this good outcome due to death only, 20 due to moving to a care home only and 59 with readmission only.
[e]For 244 participants, 3 participants not included as not known if participant returned to the previous place of residence after the initial admission.

Survival to 180 days

Out of a total of 249, 78 (31%) participants died within 180 days. Co-morbidity, depression, poorer nutritional status, dependency in ADL at admission, deterioration in ADL prior to admission, poorer cognitive function and presenting with dehydration were associated with poorer survival in univariate analyses. Increased co-morbidity and poorer nutritional status were significantly associated with mortality in multivariate analyses (Supplementary data are available in *Age and Ageing* online, Appendix Table S4).

Days at home

The median number of days spent at home was 107.5 (IQR 0–163) overall and 151 (IQR 80–168) for the 179 patients returning to their previous place of residence. Thirty-eight (16%) spent >170/180 days at home (or in their original care home) after recruitment (Supplementary data are available in *Age and Ageing* online, Appendix Figure S2).

Older age, poorer cognitive function, deterioration in ADL prior to the admission, nutritional status, behavioural problems, dependency in ADL and depression were associated with significantly reduced odds of returning home from the initial hospital stay in univariate analysis. Not living in a care home at admission, poorer cognitive function, deterioration in ADL prior to admission and nutritional status were associated with lower odds of returning home in the multivariate analysis (Supplementary data are available in *Age and Ageing* online, Appendix Table S5).

For the 179 patients who returned home, co-morbidity and deterioration in ADL prior to admission were associated with spending fewer days at home in univariate and multivariate analysis. Poor nutritional status was associated with fewer days at home in univariate, but not in multivariate analysis (Supplementary data are available in *Age and Ageing* online, Appendix Table S5).

Composite good outcome

At the end of the study 76 participants (31%) had a good composite outcome: 57/195 (29%) living in the community at admission were alive, had not moved to a permanent care home and had not been readmitted to hospital; 19/52 (37%) living in care homes at admission were alive and had not been readmitted. Univariate characteristics associated with a good outcome were lower co-morbidity scores, better cognitive function, fewer behavioural problems and less depression. In multivariate analysis (Supplementary data are

available in *Age and Ageing* online, Appendix Table S4), lower co-morbidity scores, better cognitive function and total number of medications were significantly associated with composite good outcome.

Health status outcomes

Information on one or more health status measures at follow-up was collected for 143 participants (85% of survivors). Surviving participants who were not followed up were younger than survivors who were (median 79 versus 84 years), but there was no significant difference between their levels of cognitive impairment, ADL or total NPI score at admission.

Activities of daily living

The follow-up Barthel index improved by two or more points from admission for 63/143 (44%) participants, deteriorated by two or more points in 41/143 (29%), and remained within two points of admission in 39/143 (27%). Compared with ability prior to the acute illness, follow-up Barthel index improved by two or more points for 14/141 (10%) participants, deteriorated by two or more points in 82/141 (58%) and remained within two points of the pre-acute illness score in 45/141 (32%).

Behavioural and psychiatric problems

Paired admission and follow-up NPI scores were analysed for 110/134 (82%) surviving participants with cognitive impairment at admission (MMSE < 25/30).

At baseline, 103/110 (94%) had at least one clinically significant behavioural or psychological problem (on NPI). At follow-up 78/110 (71%) had a clinically significant problem. The median change in the total NPI score was a 10-point improvement (IQR −23 to +1, range −59 to +67, negative scores indicating improvement). Changes were complex, however: new behavioural or psychiatric problems frequently appeared during the follow-up, even among those who improved overall (Table 3).

Table 3. Course of behavioural and psychiatric symptoms during the study for the 110 participants completing follow-up with an MMSE score <25 at admission

Condition	Clinically significant at admission[a] (%)	Clinically significant at follow-up[a] (%)	New problem at follow-up not present at admission[b] (%)
Delusions	25 (23)	19 (17)	14 (27)
Hallucinations	16 (15)	9 (8)	7 (9)
Agitation	14 (13)	20 (18)	28 (39)
Depression	42 (38)	16 (15)	11 (30)
Anxiety	52 (47)	21 (19)	10 (28)
Elation	2 (2)	1 (1)	6 (6)
Apathy	54 (49)	42 (38)	23 (50)
Disinhibition	12 (11)	7 (6)	13 (15)
Irritability	28 (25)	15 (14)	12 (31)
Motor behaviour	32 (29)	17 (15)	5 (7)
Difficulty sleeping	36 (33)	21 (19)	15 (24)
Appetite problems	60 (55)	29 (26)	9 (20)
Any	103 (94)	78 (71)	7 (100)

[a]Clinically significant defined by domain score ≥4.
[b]New problem defined by domain score ≥0 at follow-up where domain score 0 at admission (i.e. not present). Number who did not have symptoms present at admission used as denominator to calculate percentages.

Discussion

The outcomes for older people in acute hospitals who also have mental health problems were variable, but often poor: within 6 months of admission 31% died, 42% were readmitted and only 31% survived without being readmitted or moving to a care home. Screening with simple tools can identify these patients. Significant predictors for poor outcomes were co-morbidity, nutrition, cognitive function, reduction in ADL ability prior to admission, behavioural and psychological problems and depression. More than half of survivors did not recover from the increased dependency associated with their acute illness; significant behavioural and psychological symptoms remained present in over 70% of survivors with cognitive impairment.

Screening, recruitment and retention in this study were difficult because of the fast pace of hospital care, the fact that potential participants were frail and ill and difficulties in obtaining consent in people with mental health problems. Recruitment was from one hospital, which limits generalisability, but this provided the only acute hospital care for the local population, and the length of initial hospital stay and mortality were similar to another UK study [2]. Recruitment rate was only 39%, but there were no major differences between those who were or were not recruited [3]. A comparison group with no mental health problems would have strengthened the study, but we did not study these patients due to resource constraints. Previous UK studies on older patients without mental health problems have shown inpatient mortality rates <8% [2, 6, 34, 35], discharge rates to usual place of residence over 80% [6, 34, 36, 37] and survival rates at 180 days over 80% [34, 35, 37]. The study used symptoms and behaviour rating scales to characterise patients instead of definitive psychiatric diagnoses, reflecting the perspective of general hospital practice: there is much overlap between syndromes, staff rarely make accurate mental health diagnoses, but do describe problems and use rating scales to make assessments. Attrition was high for the health status outcomes due to mortality and loss to follow-up or carer informants being unable to provide information on behavioural and psychological symptoms.

Severity of cognitive impairment, the Charlson co-morbidity index, nutritional status and patients with reduction in ADL ability have previously been reported as associated with poor outcomes [2, 38–41, 42, 43]. Previous studies indicate that 50–60% of older adults recover to their previous

functional ability 6 months after a hospital admission [44–48, 49], higher than in this study, and likely due to cognitive impairment and mood disorders being poor prognostic factors [50]. The persistence and evolution of behavioural and psychiatric symptoms in dementia have also been reported previously [31, 32, 51, 52].

The patients we studied had complex healthcare needs, including acute medical or surgical care, severe and active mental health problems, decline in function requiring rehabilitation and domiciliary care support, advance care planning, palliative care and appropriate assessment for care home placement. The hospital experience of these patients and their families can be distressing [53], and efforts are needed to ensure a positive experience of care [54]. Nutrition and the prevention of delirium were the only prognostic factors that lend themselves to therapeutic intervention, although comprehensive geriatric assessment approaches improve outcomes in similar populations [55]. Changes over time in functional ability and behavioural and psychiatric symptoms raise the possibility that loss of function is not inevitable, and that rehabilitation, and skilled attention to mental health problems, may improve health status in some cases. The data suggest that a model of hospital care concentrating predominately on acute medical needs, with predominantly curative therapeutic intent, and little consideration of mental health and other long-term conditions, carer needs or integration with community health and social services is unlikely to provide well for these patients. A more suitable model would also include anticipatory and crisis avoidance care, as well as follow-up after an acute hospital admission and will need information to be shared between services on patient needs and preferences to ensure consistency of care in hospitals, the community and care homes. This represents a paradigm shift.

The adverse outcomes we describe could form the basis of a system-wide outcome measure, necessary to ensure quality in commissioned services. Service development will need to demonstrate access to skills in mental health and palliative or supportive care, as well as acute medical care and rehabilitation. Research to evaluate the effectiveness of services adopting different approaches is urgently needed [56].

Key points

- Outcomes for older patients admitted to hospital with a comorbid mental health problem are variable, but often poor.
- Thirty-one per cent die, 42% are readmitted and 24% of community residents move to care homes within 6 months.
- Abilities in activities of daily living return to pre-acute illness levels in fewer than half.
- Behavioural and psychiatric symptoms persist in 71% and new ones develop.
- A wide range of healthcare services, including acute, mental health and community services and social care provision is needed to meet the needs of this group.

Acknowledgements

The authors would like to thank the patients and caregivers who participated in this research and the Mental Health Research Network, Trent Dementia Research Network and the Trent Comprehensive Local Research Network for supporting this research. The authors would also like to thank Matt Franklin and Clare Litherland for collecting some of the outcome data.

Conflicts of interest

None declared.

Funding

This work was supported by the National Institute for Health Research (NIHR) under its Programme Grants for Applied Research funding scheme (grant number RP-PG-0407-10147). The views expressed in this publication are those of the author(s) and not necessarily those of the National Health Service, the NIHR or the Department of Health.

Supplementary data

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

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The full list of references, including for the assessments used in the study, is available as part of the Supplementary data in *Age and Ageing* online. References listed below are shown in bold in the text.

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Received 12 June 2012; accepted in revised form 17 May 2013