J R Coll Physicians Edinb 2018; 48: 202–209 | doi: 10.4997/JRCPE.2018.303 ORIGINAL RESEARCH PAPER

Care home residents admitted to hospital through the emergency pathway: characteristics and associations with inpatient mortality

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Abstract

Background Routinely collected hospital information could help to understand the characteristics and outcomes of care home residents admitted to hospital as an emergency.

Methods This retrospective 2-year service evaluation included first emergency admissions of any older adult (≥75 years) presenting to Cambridge University Hospital. Routinely collected patient variables were captured by an electronic patient record system. Care home status was established using an official register of care homes.

Results 7.7% of 14,777 admissions were care home residents. They were older, frailer, more likely to be women and have cognitive impairment than those admitted from their own homes. Additionally, 42% presented with an Emergency Department Modified Early Warning Score above the threshold triggering urgent review, compared to 26% of older adults from their own homes. Admission from a care home was associated with higher 30-day inpatient mortality (11.1 vs 5.7%), which persisted after multivariable adjustment (hazard ratio: 1.42; 95% confidence interval: 1.09–1.83; p = 0.008).

Conclusion Care home residents admitted to hospital as an emergency have high illness acuity and inpatient mortality.

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Introduction

Population ageing is associated with increasing numbers of frail older adults. Many require institutional care, and approximately 405,000 older adults (≥65 years) in England live in either residential or nursing homes.[1,2] This amounts to around 4% of the population aged 65 years and over living in care homes.[3]

As well as social care needs, care home residents have complex health needs with a high burden of disability, frailty and comorbidity. For example, between 50–80% of older adults living in residential or nursing home facilities are estimated to be living with dementia.[4,5] Additionally, many are in the last year of their life,[6] with median lengths of stay in care homes reported to be between 1 and 2 years, depending on the vulnerability of the population studied.[7] Given the complex health needs of care home residents it is not surprising that they access emergency hospital services more than older adults living in their own homes.[3] In order to better understand the needs of care home residents admitted to hospital as an emergency, it would be helpful to describe the characteristics of those admitted to hospital and their outcomes thereafter. However, studies to date report inconsistent findings, with some reporting few differences between care home and non-care home older adults admitted to hospital as an emergency, and others reporting higher illness acuity and higher inpatient mortality amongst hospitalised care home residents.[8–10]

Some of this variation in the characteristics and outcomes of care home residents admitted to hospital may be explained by local variations in the configuration and delivery of health services.[11] Therefore, local audits on this issue are important. Routinely collected information on hospitalisations from care homes can be used to enhance the understanding of hospital use by care home residents,[3] and this, in turn, can inform

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service interventions to optimise the medical care delivered to this vulnerable population.

The aim of our study was to describe the characteristics and outcomes of older adults admitted as an emergency to a large NHS university hospital in England, and compare care home residents with older adults admitted from their own homes. We also aimed to evaluate the association between care home status and hospital outcomes, primarily inpatient mortality at 30 days.

Methods

Setting

This was a retrospective observational study conducted in an (approximately) 1,000-bed NHS university hospital in England. The hospital receives around 100,000 visits to the emergency department (ED) every year. There are approximately 12,000 non-elective admissions in patients who are ≥75 years old annually, these include older persons admitted from care homes. There are approximately 36 care homes, both residential and nursing, located within a 20-mile radius of the hospital. All non-elective patients present to the hospital's ED, regardless of specialty.

Sample

This study included the first emergency inpatient episode of any older adult (≥75 years old) admitted to the hospital between 1 October 2014 and 29 November 2016. All data were routinely collected and captured by an electronic patient record system, introduced in October 2014.

Patient characteristics

An anonymised dataset was retrieved with patient characteristics including age (years), sex, registered home address and first admission weight (kilograms). The severity of acute illness presentation was measured using the ED Modified Early Warning Score (ED-MEWS). This is a summative score (range 0–15) quantifying the deviation of heart rate, systolic blood pressure, consciousness level, respiratory rate and temperature from the normal range. Higher scores indicate higher illness severity, with a score of ≥4 triggering an immediate medical review.[12] Preadmission level of frailty was captured by the Clinical Frailty Scale (CFS), which is routinely recorded within 72 h of admission. This is now standard practice at our centre, although it was introduced in 2014 as part of a local Commissioning for Quality and Innovation (CQUIN) scheme.[13] Scoring is based on clinical judgement and evaluates the impact of comorbidities and associated symptoms on physical function and dependency. Possible scores are: 1 (very fit), 2 (well), 3 (managing well), 4 (vulnerable), 5 (mildly frail), 6 (moderately frail), 7 (severely frail), 8 (very severely frail) and 9 (terminally ill).[14] The clinical use of the CFS was permitted by the principal investigator at Geriatric Medicine Research, Dalhousie University, Halifax, Canada. Information on primary admission diagnosis was not available, but all discharge diagnoses were coded using the tenth version of the World Health Organization International Classification of Diseases. A Charlson Co-morbidity Index (CCI) was retrospectively calculated using this information. Patients' cognitive status was ascertained using two screening questions routinely documented for admissions in older adults as part of a national CQUIN scheme: 'is there a history of dementia?' (yes, no) and 'is there current evidence of acute confusion?' (yes, no). Discharging specialty was also recorded (medical specialty vs non-medical specialty).

Laboratory values were available from point-of-care tests measured in the ED and included C-reactive protein (CRP; mg/l), white cell count (WCC; 10^9/l), lactate (mmol/l), urea (mmol/l), creatinine (μmol/l), glucose (mmol/l) and haematocrit (%).

Additionally, we compiled a list of care homes registered with the official UK regulator, the Care Quality Commission, within five local counties (Cambridgeshire, Bedfordshire, Hertfordshire, Essex and Suffolk) and cross-matched each admission postcode with the postcodes of known care homes. Both residential and nursing homes were included. Patient records identified as a 'match' were further screened using the first line of the address and those with discordant addresses were manually screened to confirm care home status. This separated the patients into two cohorts; 'care home resident' and 'non-care home resident'.

Patient outcomes

The electronic patient record system routinely captures inpatient mortality. Deaths during the first 30 days of admission were calculated using date of admission and date of death. Date of both admission and discharge were used to calculate length of inpatient stay (LOS, days), and prolonged length of stay was defined as those admitted for ≥10 days. Delayed discharge (yes, no) was calculated as a length of stay at least 1 day longer than the last recorded 'clinically fit date' (CFD).[15] The CFD is determined by the clinical team and indicates when patients are medically fit for discharge from hospital. Inpatient stay beyond this time is indicative of delays waiting for onward care, e.g. social care at home or inpatient rehabilitation. Readmission to our hospital at 30 days (yes, no) was also routinely available. Those who died during the admission were excluded from analyses of prolonged length of stay, delayed discharge and readmission.

Statistical analyses

Anonymised data were analysed using STATA (version 12). Descriptive characteristics were described by means, medians and proportions, and older adults from care homes were compared to older adults admitted from their own homes using t-tests, Kruskal–Wallis and chi-squared tests as appropriate. Differences between patients with complete and incomplete data were also described using t-tests, Kruskal–Wallis and chi-squared tests as appropriate. Associations between admission from a care home and outcome measures were evaluated using multivariable regression models. Cox proportional hazards regression was used to evaluate

relationships between care home status and inpatient mortality after inspection of Kaplan–Meier curves to ensure no violation of the proportional hazards assumption was evident. Associations were first adjusted for age and sex (Model 1) and then additionally for CCI, history of dementia or cognitive concern, ED-MEWS category (ED-MEWS 0–3 'low acuity' and ED-MEWS ≥4 'high acuity') and discharge specialty (Model 2). Finally, models were adjusted for CFS category (Model 3). In all analyses CFS score was categorised as follows: CFS score 0–4 'up to vulnerable'; 5 'mild frailty'; 6 'moderate frailty'; 7–8 'severe–very severe frailty'; and 9 'terminally ill'. Binary outcome measures (prolonged LOS, delayed discharge and 30-day readmission) were evaluated using logistic regression models with the same covariable adjustments.

Ethics approval

This study is based on a service evaluation audit that was registered with our centre's Safety and Quality Support Department (Project register number 5286). Formal confirmation was received that approval from the Ethics Committee was not required. This study received no funding.

Results

There were 26,696 admission episodes during the 2-year service evaluation period and of these 14,794 were first admissions. 17 patients had no available data for age and/or sex and were excluded from analyses. This left a total sample size of 14,777 patients of whom 1,143 (7.7%) were care home residents. Table 1 compares the clinical characteristics and outcomes of patients admitted from care homes vs those admitted from their own home. Patients admitted from care homes were older, more likely to be women, with lower weight, higher frailty, higher illness acuity, and higher burden of dementia or cognitive concern than those admitted from their own homes. In terms of laboratory markers, care home residents had higher inflammatory markers (CRP, WCC and lactate) and higher urea on admission, but had a slightly lower haematocrit. A lower proportion of care home residents experienced prolonged length of stay than older adults admitted from their own homes, but care home residents were more likely to experience readmission within 30 days of discharge and 30-day inpatient mortality. There was no apparent difference in CCI, glucose level, creatinine level or delayed discharge in unadjusted analyses.

In particular, 46% of care home residents presented with an ED-MEWS score of ≥4 triggering an immediate medical review, compared to only 26% of older adults admitted from their own home. Additionally, nearly double the proportion of care home residents died during the inpatient episode compared to older adults admitted from their own homes (11.1 vs 5.7%). Those who presented to the ED with high acuity were at particularly high risk of inpatient mortality (Figure 1).

Figure 1 suggests that the association between care home status and mortality is independent of illness acuity. Further exploration of this association was carried out using multivariable Cox proportional hazards regression. In multivariable models, data were missing for the ED-MEWS score (n = 1,350) and the CFS (n = 4,115), leaving a sample size of 10,152 patients for multivariable analyses. Those with missing data were younger, more likely to be men, more likely to be discharged by a surgical specialty and more likely to die during the inpatient episode. They were also less likely to have dementia/cognitive concern or experience a prolonged length of stay. There was no difference between those with and without missing data in relation to the proportion admitted from care homes or the CCI (Supplementary Table 1).

Of the 10,152 patients with complete data for age, sex, CCI, discharge specialty, ED-MEWS category and CFS, 813 patients were from care homes (8.0%) and there were 537 deaths (inpatient 30-day mortality proportion: 5.3%). The higher risk of inpatient mortality associated with being admitted from a care home did not attenuate after adjusting for age and sex [hazard ratio (HR): 2.06; 95% confidence interval (CI): 1.62–2.62] or after additional adjustment for history of dementia or cognitive concern, CCI, discharge specialty and ED-MEWS (HR: 2.04; 95% CI: 1.59–2.62). Preadmission frailty attenuated but did not remove the association (HR: 1.42; 95% CI: 1.09–1.83) (Table 2).

Care home residents were also at higher odds of 30-day readmission in multivariable analyses [odds ratio (OR): 1.41; 95% CI: 1.16–1.72] but were at lower odds of prolonged length of stay (OR: 0.34; 95% CI: 0.28–0.42) and delayed discharge (OR: 0.33; 95% CI: 0.27– 0.40) (Table 2). Sensitivity analyses including patients who died during the inpatient episode did not change the results of logistic regression analyses for prolonged length of stay (results available on request).

Discussion

The aim of our study was to describe the characteristics and outcomes of older adults admitted to a large NHS university hospital in England and compare care home residents with older adults admitted from their own homes. Our local retrospective study of 14,777 older adults (≥75 years old) found that 7.7% of emergency admissions were care home residents. Care home residents were more likely to have cognitive impairment and high frailty than older adults living in their own home.[9,16] We also observed that at the point of admission, care home residents had higher illness acuity than older adults presenting from their own homes, with nearly half meeting our hospital's criteria for immediate medical review in the ED. We do not have data to explain this finding, and we can only speculate on the underlying mechanisms that explain the comparatively high illness acuity of care home residents. It could be that older adults in care homes are supported through the early phase of an illness and only present to hospital when it becomes more severe. Alternatively, it is possible that, owing to the higher frailty of care home residents and associated poor physiological reserve, intercurrent illnesses lead to a greater and more rapid deterioration, making it more likely that they present to the ED with high acuity.[17]

Table 1 Characteristics of older patients admitted as an emergency

Characteristic mean (SD)	Care home (n = 1,143)	Non-care home (n = 13,634)	p-value
Age, years	87.7 (5.9)	83.7 (5.8)	<0.001
Sex, % women (n)	71.0 (812)	55.1 (7,518)	<0.001
Weight, kg			
Men (n = 4,975)	69.8 (14.6)	76.9 (15.2)	<0.001
Women (n = 6,355)	59.0 (14.5)	63.3 (15.1)	<0.001
CFS, % (n)			
Up to vulnerable	3.5 (40)	35.7 (4,867)	
Mildly frail	5.3 (61)	14.0 (1,914)	
Moderately frail	23.0 (263)	14.8 (2,023)	
Severe–very severely frail	39.5 (451)	7.0 (951)	
Terminally ill	1.8 (21)	0.5 (71)	<0.001
Dementia or cognitive concern	39.3 (449)	13.2 (1,794)	<0.001
CCI*	1 (1–2)	1 (0–3)	0.29
ED-MEWS ≥4	42.3 (483)	26.3 (3,592)	<0.001
Discharge specialty, % (n)			
Geriatric medicine	31.0 (354)	22.1 (3,006)	
Other medical specialty	55.7 (637)	55.5 (7,566)	
Surgical specialty	6.0 (68)	16.6 (2,257)	
Trauma and orthopaedics	7.4 (84)	5.9 (805)	<0.001
Laboratory values			
C-reactive protein, mg/l*	20.3 (5.8–65.35)	12.2 (3.1–49.7)	<0.001
WCC, 10^9/l*	9.7 (7.3–12.9)	9.3 (7.2–12.3)	0.007
Lactate, mmol/l*	1.7 (1.2–2.4)	1.5 (1.2–2.1)	<0.001
Urea, mmol/l	9.1 (4.9)	8.4 (4.4)	<0.001
Creatinine, μmol/l*	86.4 (67.7–112.8)	84.3 (66.3–113.1)	0.31
Glucose, mmol/l	7.8 (3.5)	7.6 (3.0)	0.16
Haematocrit, %	40.5 (6.4)	41.1 (6.2)	0.002
Prolonged stay (≥10 days), % (n)			
Yes	26.1 (298)	30.0 (4,085)	
No	73.9 (845)	70.0 (9,549)	0.006
Delayed discharge, % (n)**			
Yes	26.9 (271)	29.1 (3,711)	
No	53.5 (538)	53.6 (6,830)	0.3
30-day readmission, % (n)**			
Yes	28.6 (288)	24.1 (3,076)	
No	71.4 (718)	75.9 (9,677)	0.001
30-day inpatient death, % (n)			
Yes	11.1 (127)	5.7 (780)	
No	88.9 (1,016)	94.3 (12,855)	<0.001

*Median (interquartile range).
**Delayed discharge and 30-day readmission figures exclude those who died during the inpatient episode (n = 1,017).
The following variables were incomplete (n = number of patients with complete data): weight (n = 11,330), Clinical Frailty Scale (CFS; n = 10,662), Emergency Department Modified Early Warning Score (ED-MEWS; n = 13,427), C-reactive protein (n = 10,995), white cell count (WCC; n = 10,883), lactate (n = 12,517), urea (n = 11,685), creatinine (n = 12,013), glucose (n = 12,520), haematocrit (n = 12,877) and delayed discharge due to missing 'clinically fit date' (n = 11,350).
Note: percentages may not add up to 100% owing to missing data.
CCI: Charlson Co-morbidity Index; SD: standard deviation

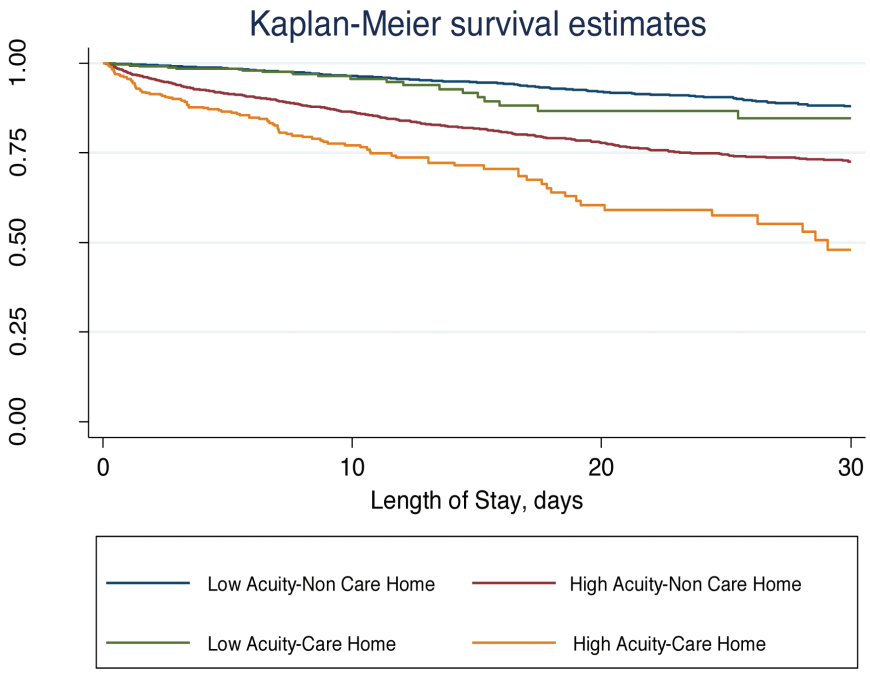

Figure 1 Inpatient mortality by acuity and care home status. Low acuity: emergency department modified early warning score of 0–3; high acuity: emergency department modified early warning score of ≥4.

Furthermore, our data supports a higher mortality proportion amongst care home residents than in older adults admitted from their own homes, in contrast to some reports.[8] Double the proportion of care home residents died during the inpatient admission and this higher risk persisted after adjustment for illness acuity, cognitive impairment, comorbidity and frailty, although preadmission frailty partly attenuated the association. Frailty is routinely measured in our hospital using CFS.[14] This has been shown to predict hospital outcomes in our patient population and appears feasible and acceptable to use across the whole population of older adults accessing our acute hospital services.[13] However, other measures may capture the heterogeneity of frailty amongst care home residents more accurately than the CFS, such as the Frail-Nursing Home scale.[18] Thus, we cannot exclude residual confounding from unmeasured frailty as an explanation for the strong association between care home status and mortality in our population.

We observed that care home residents were less likely to have prolonged lengths of stay or delayed discharge than non-care home residents. This was only evident after accounting for covariables associated with both care home status and longer length of inpatient stay, such as advanced age and frailty.[19] Thus, older adults of equivalent age and frailty are more likely to have a prolonged hospital stay if they are admitted from their own home. This may be because older adults admitted to hospital from their own homes are more likely than care home residents to need additional social care after discharge, above and beyond their preadmission level of home support. Such care packages are increasingly delayed owing to scarce community resources, potentially contributing to the delayed transfers of care out of acute hospitals.[15]

However, care home residents were more likely to be readmitted to our hospital within 30 days of discharge than non-care home residents. This is consistent with evidence that high levels of hospital use by care homes can be partly explained by a small number of residents admitted many times.[3] It is also an area for potential intervention. Improved communication with care homes on hospital discharge could prevent inappropriate readmission.

There is much interest in reducing unplanned hospital admissions from care homes, considering the current pressures on inpatient NHS resources and the potential harms of hospitalisation.[20] Nearly all six of the NHS care home vanguard projects in the UK include unscheduled hospital use as an outcome measure.[21] Additionally, variability in admission rates from care homes suggests that many hospitalisations may be potentially avoidable, i.e. the intervention could have been delivered just as well in the care home, and/or inappropriate, i.e. hospital admission is not in the best interests of the patient.[3] However, there is no universally accepted definition of an 'inappropriate' care home transfer to hospital and the long-term trajectories of individual care home residents are difficult to predict.[22,23] This increases the challenge facing community healthcare providers assessing the risks and benefits of hospital transfer. Furthermore, interventions aimed at reducing care home–hospital transfer report mixed success.[24–27] The high acuity of care home residents admitted to our hospital, with nearly half requiring immediate medical review on presentation, should be considered. In order to provide effective community healthcare, care home residents are likely to need input from senior clinicians experienced in the care of frail older adults. For example, staff skilled at recognising and managing delirium and able to lead advanced care planning discussions.[26] Furthermore, residents may require community access to a broader range of medical interventions than are currently available, such as access to intravenous antibiotics and intravenous fluids that can

Table 2 Associations between care home status and hospital outcomes

	Hazard ratio (95% confidence interval)*		
	Model 1	**Model 2**	**Model 3**
	30-day inpatient mortality		
Care home resident			
No	1.0	1.0	1.0
Yes	2.06 (1.62–2.62)	2.04 (1.59–2.62)	1.42 (1.09–1.83)
Age (years)	1.04 (1.03–1.06)	1.04 (1.03–1.06)	1.03 (1.02–1.05)
Sex			
Men	1.0	1.0	1.0
Women	0.85 (0.71–1.01)	0.84 (0.71–1.00)	0.84 (0.71–1.01)
Charlson Co-morbidity Index	–	1.12 (1.07–1.17)	1.08 (1.04–1.13)
ED-MEWS score			
<4	–	1.0	1.0
≥4	–	2.89 (2.42–3.46)	2.64 (2.21–3.16)
Dementia/cognitive concern			
No	–	1.0	1.0
Yes	–	0.58 (0.47–0.71)	0.54 (0.44–0.67)
Discharge specialty			
Medicine	–	1.0	1.0
Non-medical specialty	–	0.64 (0.49–0.84)	0.74 (0.56–0.98)
Clinical Frailty Scale			
Up to vulnerable	–	–	1.0
Mildly frail	–	–	1.13 (0.84–1.53)
Moderately frail	–	–	1.63 (1.27–2.11)
Severe/very severely frail	–	–	2.29 (1.75–2.99)
Terminally ill	–	–	10.6 (7.37–15.33)
	Odds ratio (95% confidence interval)*		
	Model 1	**Model 2**	**Model 3**
	Prolonged length of stay		
Care home resident			
No	1.0	1.0	1.0
Yes	0.73 (0.61–0.87)	0.45 (0.37–0.55)	0.34 (0.28–0.42)
	Delayed discharge		
Care home resident			
No	1.0	1.0	1.0
Yes	0.63 (0.53–0.76)	0.41 (0.34–0.49)	0.33 (0.27–0.40)
	30-day readmission		
Care home resident			
No	1.0	1.0	1.0
Yes	1.31 (1.09–1.56)	1.47 (1.22–1.76)	1.41 (1.16–1.72)

*Model 1: age and sex; Model 2: Model 1 and Charlson Co-morbidity Index, ED-MEWS category, discharge specialty, history of dementia or cognitive concern; Model 3: Model 2 and Clinical Frailty Scale category.
n = 10,152 for mortality; n = 9,531 for length of inpatient stay and 30-day readmission models (621 patients who died excluded); n = 8,485 for delayed discharge owing to exclusion of those who died as an inpatient and missing clinically fit date data.
ED-MEWS: Emergency Department Modified Early Warning Score

be administered within the environment of the care home.[27] We do not have data to support this, but our findings lead us to hypothesise that even when personalised care plans and admission avoidance strategies are in place, high-acuity situations may prove difficult for existing community medical cover to manage on site. Therefore, our findings could help develop future models of hospital outreach services that would support an 'enhanced' model of medical cover in care homes. For example, a previous study looked at the impact of a package of enhanced support for older people living in care homes. It found that care home residents who received the enhanced support were admitted to hospital as an emergency 23% less frequently than similar residents in other parts of the country.[28]

The high acuity and inpatient mortality of care home residents admitted to hospital is also informative for those designing hospital services. Access to clinicians with expertise in geriatric medicine at the 'front door' of the hospital is desirable, but resources are limited and not all older patients presenting to ED can be reviewed by practitioners with expertise in geriatric medicine. Identification of patient groups that would most benefit from such services is of interest, and residents presenting from care homes with high acuity could be one such group. These patients will benefit from early comprehensive geriatric assessment and personalised care planning, to identify treatment goals and anticipate and plan for potential deterioration. The transition of care to and from the acute hospital is also a key area for potential improvement in the quality of care delivered to care home residents. The 'red bag' initiative developed by Sutton Homes of Care Vanguard highlights how simple measures can improve communication between primary and secondary care.[29] Each resident has a red bag that goes with them to hospital and contains information on their health conditions and treatment preferences. This information facilitates treatment and care planning decisions on presentation to the ED, saving vital time in the management of a high-acuity patient population.

Our study has important limitations. It is a retrospective, observational study of inpatients admitted to one hospital in England. Therefore, our results are not generalisable to the wider population. Additionally, only routinely collected data were used and we did not have access to information, such as admission diagnosis, which would have been useful to help further characterise our care home residents and compare with other studies. We did observe differences in laboratory values between our cohorts of care home and non-care home older adults that were consistent with reported differences in admission presentations. Care home residents had comparatively higher CRP, WCC and lactate than non-care home residents, consistent with over-representation of infections as the admission diagnosis, e.g. pneumonia and sepsis,[3,10] compared to the general older adult population. Furthermore, our measure of the CCI was retrospectively calculated using information on discharge diagnoses, and the comorbidity burden of our cohort was lower than expected. Under-coding problems in hospital databases are well recognised, in both medical and surgical specialties,[30,31] and our measure of comorbidity is likely to be less accurate than if we had been able to prospectively record this information. Finally, we were restricted to the measures of frailty, acuity and cognition routinely used at our centre, and missing data were more prevalent in our service evaluation than would be expected in a prospective research study. In addition, we could not differentiate between the residential and the nursing type of care homes, because many homes are listed as offering both residential and nursing beds.

However, the main strength of our study is that it is based on information pertaining to important geriatric syndromes that is routinely collected in patients presenting as an emergency to our centre. This has allowed a good description of our cohort of hospitalised older adults and there are few acute care settings in the UK that have implemented the routine measurement of clinical frailty. Additionally, the implementation of an electronic patient record system in our hospital has facilitated the routine capture of data pertaining to the physical and cognitive health of older adults, facilitating a large sample size and a cohort of care home residents comparable to sample sizes of other published studies.[8,9]

In summary, care home residents presenting to a large NHS university hospital in England had high frailty, acuity and inpatient mortality. These patients would benefit from early personalised care planning during their inpatient stay and further work should explore the potential benefits of targeted interventions, such as early assessment by front door practitioners with expertise in geriatric medicine. Policy makers and community clinicians designing pathways to improve the quality of care delivered to care home residents, both in the community and during transfers to and from secondary care facilities, should also consider the high acuity of care home residents on admission to hospital. This may inform future work examining the efficacy of enhanced models of medical cover in care homes.

Online Supplementary Material

Supplementary Table 1 is available with the online version of this paper, which can be accessed at https://www.rcpe.ac.uk/journal.

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