Earlier Physical Therapy Input is Associated with a Reduced Length of Hospital Stay and Reduced Care Needs on Discharge in Frail Older Inpatients: An Observational Study

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ABSTRACT

Background and Purpose: Pressures on hospital bed occupancy in the English National Health Service (NHS) have focused attention on enhanced service delivery models and methods by which physical therapists might contribute to effective cost savings, while retaining a patient-centered approach. Earlier access to physical therapy may lead to better outcomes in frail older inpatients, but this has not been well studied in acute NHS hospitals. Our aim was to retrospectively study the associations between early physical therapy input and length of hospital stay (LOS), functional outcomes and care needs on discharge.

Methods: This was a retrospective observational study in a large tertiary university NHS hospital in the United Kingdom. We analyzed all admission episodes of people admitted to the Department of Medicine for the Elderly wards over 3 months in 2016. Patients were

categorized into 2 groups: those examined by a physical therapist within 24 hours of admission and those examined after 24 hours of admission.

The outcome variables were: LOS (days), functional measures on discharge (Elderly Mobility Scale and walking speed over 6 meters), and the requirement of formal care on discharge. Characterization variables on admission were: age, gender, existence of a formal care package, pre-admission abode, the Clinical Frailty Scale, Charlson Comorbidity Index, the Emergency Department Modified Early Warning Score, C-reactive protein level on admission, and the 4-item version of the Abbreviated Mental Test.

The association between the delay to physical therapy input and LOS before discharge home was evaluated using a Cox proportional hazards regression model.

Results and Discussion: There were 1022 hospital episodes over the study period. We excluded 19 who were discharged without being examined by a physical therapist. Of the remaining 1003, 584 (58.2%) were examined within 24 hours of admission (early assessment), and 419 (41.8%) after 24 hours of admission (late assessment).

The median (interquartile range: IQR) LOS of the early assessment group was 6.7 (3.1–13.7) versus 10.0 (4.2-20.1) days in the late assessment group, $P < 0.001$. The early assessment group was less likely to require formal care on discharge: n=110 (20.3%) versus n=105 (27.0%), $P = 0.016$. No other statistically significant differences were seen between the 2 groups.

In the unadjusted Cox proportional hazards model, the hazard ratio for early assessment compared to late assessment was 1.29 (95% confidence interval: 1.12-1.48, $P < 0.001$). Early assessment was associated with a 29% higher probability of discharge to usual residence within the first 21 days after admission, compared to late assessment. Adjustment for possible confounding variables increased the hazard ratio: 1.34 (1.16 – 1.55) $P < 0.001$.

Conclusions: Early physical therapy input was associated with a shorter LOS and lower odds of needing care on discharge. This may be due to the beneficial effect of early physical therapy in preventing hospital-related deconditioning in frail older adults. However, causality cannot be inferred and further research is needed to investigate causal mechanisms.

Key Words: Physical therapy, Outcome assessments, England, Older adults, Acute care

INTRODUCTION

Frail older people have increased vulnerability to poor resolution of homeostasis following a stressor event,[1] such as an illness or fall necessitating an admission to hospital. In frail older adults, hospitalization is associated with longer length of stay (LOS),[2,3] and sometimes it can lead to physical deconditioning and loss of functional ability.[4,5]

Pressures on hospital bed occupancy in the English National Health Service (NHS) are increasing: over the period of 2006/07 to 2012/13, hospitals have reported increases in admissions from 12.6 million per year to 14.6 million per year, an increase of 16%.[6] These pressures have in part been driven by an increase in the population of frail older people,[7] and have focused attention on enhanced service delivery models and potential methods by which geriatric physical therapists might contribute to effective cost savings, while retaining a patient-centered approach. Our previous work suggested that higher physical therapy frequency is associated with shorter LOS and greater functional recovery in hospitalized frail older adults.[8] Few studies investigated the effect of early mobilization on LOS in similar populations,[9,10] as well as the effect of physical therapy within the emergency department in reducing admissions.[11] An important distinction exists between early physical therapy assessment and early mobilization. Assisting mobilization is often an intervention carried out by a physical therapist, but by no means exclusively. Physical therapy assessment includes assessment of the patient's impairments, activity limitations, and social situation. The information ascertained from the assessment is used to devise a management plan to optimise physical functioning and facilitate discharge from hospital. Few studies have investigated early physical therapy assessment on LOS, functional outcomes and care needs on discharge. Our aim was to study these associations using a retrospective observational design. We hypothesized that early assessment may reduce LOS through earlier optimization of physical functioning and reduce the need for care on discharge.

METHODS

Setting and participants

This was a retrospective observational study in a large tertiary university NHS hospital in the United Kingdom. We analyzed all admission episodes of people admitted to the Department of Medicine for the Elderly wards between 2nd May and 26th Aug 2016. Patients who were discharged without being examined by a physical therapist were excluded.

Measures

Anonymous routinely collected clinical data was obtained from the hospital electronic medical records. Most data was collected from running an electronic report of variables of interest. Other data was manually searched in the patients' electronic medical records by a member of the physical therapy team, and verified independently by a second member. All measures used in this service evaluation audit were routinely collected as part of normal clinical care.

The exposures that we investigated were: early assessment by a physical therapist (i.e. within 24 hours of admission to hospital) and late assessment (i.e. after 24 hours). The definition of assessment did not take into account whether any intervention had been carried out. The definition of early and late was arbitrarily set, although the policy in our Department of Medicine for the Elderly is that every patient should be examined by a physical therapist on the day of admission. A physical therapist is employed at the weekend to assess patients admitted to the Department of Medicine for the Elderly wards, this includes those patients admitted on a Friday, Saturday or Sunday.

The outcome variables were: LOS (days), the Elderly Mobility Scale (EMS),[12] walking speed over 6 meters (meters/second), and the need for a new formal care package on

discharge (yes or no) or new institutionalization. Information on in-patient mortality was also collected.

The Elderly Mobility Scale is a 20-point ordinal scale for the assessment of function in frail older patients[12,13] (worst: 0 points; best: 20 points). The scale includes the assessment of balance, mobility and ability to change body positions (e.g. from lying to sitting). The inter-rater reliability of the Elderly Mobility Scale has been reported as $r = 0.88$ ($P < 0.001$), and it has good convergent validity with the Barthel Index ($r = 0.787$, $P < 0.001$).[13] The Elderly Mobility Scale (which includes walking speed over 6 meters) is routinely measured by Department of Medicine for the Elderly physical therapists on initial assessment and on day of discharge from hospital.

A new formal care package on discharge is defined as new care provided by an external care agency as opposed to informal arrangements of support with family or friends. Patients are discharged home once they are deemed clinically fit for discharge by the multi-disciplinary team and any social support required is in place. New institutionalization is defined as discharge to a care home when patients had been admitted from home.

Admission variables collected for descriptive purposes were: age, gender, the existence of a formal care package on admission (yes or no), number of falls in past twelve months, whether the patient had daily contact with a family member or friend (yes/no, as reported by the patient or a next of kin), pre-admission abode, the Clinical Frailty Scale (CFS),[14] the Charlson Comorbidity Index (non-age adjusted),[15] specific co-morbidities, the Emergency Department Modified Early Warning Score (ED-MEWS, highest recorded in the ED),[16] C-reactive protein (CRP) level on admission, and the 4-item version of the Abbreviated Mental Test (AMT4).[17]

The CFS has been routinely collected in our center since 2013, thanks to a local Commissioning for Quality and Innovation (CQUIN) scheme

(https://www.england.nhs.uk/nhs-standard-contract/cquin/) that mandated that all patients aged 75 years or over admitted to the Hospital via the emergency pathway be screened for frailty using the CFS within 72 hours of admission. Our center uses the 9-point CFS (http://geriatricresearch.medicine.dal.ca/clinical_frailty_scale.htm). The reported inter-rater reliability of the CFS is high with an intra-class correlation coefficient 0.97 ($P < 0.001$), and it has high convergent validity with the Frailty Index (Pearson coefficient 0.80, $P < 0.01$).[14]

The Charlson Comorbidity Index (CCI) is based on patients' diagnoses as coded by the World Health Organization's International Classification of Diseases (10th version). The CCI has been validated for use in in acutely hospitalized older adults, with areas under the receiver operating characteristic curve to predict mortality of 0.66 at 3 months after admission, 0.70 at 1 year, and 0.73 at 5 years.[18]

ED-MEWS scores are routinely collected by nursing staff in ED, and are considered as a measure of acute illness severity.[16] Our ED-MEWS and its scoring protocol are shown in Table 1. An ED-MEWS score of 4 or more has been shown to be an independent predictor of survival time (HR = 2.87, 95% CI: 2.27–3.62, $P < 0.001$).[19] C-reactive protein is a measure of acute inflammation and is a recognized clinical measure of illness severity.[20,21]

The 4-item version of the Abbreviated Mental Test (AMT4)[17] is routinely collected in our center as part of a Dementia/Delirium CQUIN, which aims at detecting cognitive impairment on admission to hospital. The AMT4 consists of 4 questions regarding the patient's age, date of birth, the place that the person is currently located, and the current year. The AMT4 score showed a statistically significant correlation with AMT score (Somers' d statistic 0.90, $P < 0.001$).[17]

Analyses

Anonymized data was analyzed with IBM SPSS Statistics (version 22) software. Descriptive

statistics were given as count (with percentage) or mean (with standard deviation: SD). For continuous variables with a non-normal distribution, we reported median values with inter-quartile ranges (IQR). Differences in the characteristics and outcomes of patients who received early versus late physical therapy were evaluated using unpaired Student's t, chi-squared or Mann–Whitney tests as appropriate. Missing values for each variable were reported and treated as missing in each analysis. The level of statistical significance was set at $P < 0.05$, and $P < 0.1$ was considered as statistical trend.

The association between the delay to physical therapy assessment and LOS was evaluated using a Cox proportional hazards regression model. Patients admitted from a residential or nursing home were excluded, and we included only those admitted from their own home. Cox proportional hazards regression can account for the censoring of some participants who do not experience the outcome within the study timeframe. This type of regression is most commonly used to analyze survival data, where time to an event such as death or recurrence of disease is modeled. In this study the 'event' was set as 'Discharge to Usual Residence' within 21 days of hospital admission. Those who were not discharged to their usual residence within 21 days were censored. To differentiate those who died and to prevent informative censoring (i.e. at death) those who died were given an imputed LOS value of 21.01 days (i.e. just over the maximum follow-up time allowed) and were therefore only censored at the end of the study. The decision to choose 21 days as the cut-off was made because LOS had a very skewed distribution with a long tail at the right end. A preliminary analysis of our data showed that by 21 days over 80% of patients had been discharged from the hospital. Clinical experience tells us that the majority of patients not discharged by this point are considered 'stranded' that is, factors not related to the patient's physiological status keep them in the hospital. They can be delayed from going home for a number of non-patient related reasons such as requiring care but none being available, or requiring institutionalization but there not

being any places in their locality. By choosing the 21-day cut-off point we aimed to focus on the impact of physical therapy on the early optimization of patients' physiological status and functional abilities. In this study the hazard ratio represents the likelihood of being discharged back to usual residence within 21 days of admission.

Ethics Approval

This study was registered as a service evaluation audit with our center's Safety and Quality Support Department (Project Register Number 5205). Formal confirmation was received that approval from the Ethics Committee was not required.

RESULTS

There were 1022 hospital episodes over the study period. Of those, we excluded 19 who were discharged without being examined by a physical therapist. Of the remaining 1003, 584 (58.2%) were examined within 24 hours of admission (early assessment), and 419 (41.8%) after 24 hours of admission (late assessment).

Patient admission characteristics are reported in Tables 2 and 3. No significant differences were seen between the 2 groups, except that the following comorbidities were more frequent in the late assessment group: myocardial infarction, congestive heart failure, metastatic cancer and depression.

Patient outcomes are reported in Table 4. The median (IQR) LOS of the early assessment group was 6.7 (3.1 – 13.7) versus 10.0 (4.2 – 20.1) days in the late assessment group ($P < 0.001$). The other significant difference between the 2 groups was the number of patients requiring a new package of care on discharge: 110 (20.3%) in the early assessment group, versus 105 (27.0%) in the late assessment group ($P = 0.016$). There were no other statistically significant differences, although there was a trend observed with those in the

early assessment group being apparently less likely to require new institutionalization on discharge: 4.1% versus 6.7%, P = 0.073.

The result of the Cox proportional hazards regression model studying the association between delay to physical therapy and discharge to usual residence (excluding those already living in a residential or nursing home prior to admission) is presented in Figure 1. The hazard ratio (HR) for early assessment compared to late assessment was 1.29 (95% confidence interval: 1.12-1.48, P < 0.001) and can be interpreted as a 29% increase in the probability of discharge to usual residence for those in the early assessment group compared to those in the late assessment group. Table 5 presents the results of the Cox regression, with different covariates added to the model. After controlling for age, sex, ED-MEWS, Charlson Comorbidity Index and the Elderly Mobility Scale score on admission, results were still significant: 1.34 (95% CI: 1.16 – 1.55), P < 0.001.

DISCUSSION

This retrospective observational study examined the association between early physical therapy assessment and hospital and functional outcomes in acutely hospitalized older adults. In our busy NHS geriatric wards, the majority of eligible patients (58.2%) were examined by the physical therapist within 24 hours of admission. Early physical therapy assessment was associated with a shorter length of stay, reduced need for care on discharge, a trend towards reduced new institutionalization and equal amount of functional recovery by discharge. Causality cannot be inferred from this observational study, but results would suggest it is worth investigating in prospective studies whether physical therapy intervention within the first 24 hours of admission is beneficial. Our findings are in keeping with previous work reporting an association between early mobilization and reduced LOS,[9,10] and with previous evidence that early physical rehabilitation care for acutely hospitalized older adults may lead

to functional benefits and can be safely executed.[22,23] Indeed, in other specialty areas such as stroke it appears that mobilization within 24 hours of admission has become the 'norm' in recent years.[24] The reason why there was no difference in functional outcomes may be due to discharge criteria; for a patient to be deemed clinically fit for discharge, their physical function and amount of recovery is a factor taken into account by the geriatric multidisciplinary team (MDT). In the majority of cases, the MDT look for the patient to be close to their pre-admission level of function. Given the similarities in baseline characteristics it is probable that both groups had the same amount of recovery to be made, and the longer LOS seen in the late assessment group may be in part due to the slower functional recovery.

The reasons as to why some patients were not seen within 24 hours of admission are not clear from our design. Although Table 2 reports no significant differences between groups in key patient characteristics, an interesting finding is that specific comorbidities such as acute myocardial infarction, congestive heart failure, metastatic cancer and depression seemed to be more prevalent in the late assessment group (Table 3). It is possible that in some cases, the lateness of the physical therapy assessment may have been due to a medical contraindication arising from acute cardiovascular instability. In other cases, the delay in seeing the therapist may have been due to patients being too unwell or psychologically averse to therapy (e.g. depressed or withdrawn). A limitation is that our database did not contain the principal diagnosis for the admission, and this may have shed light into these subtle patient differences. Otherwise, patients in the 2 categories were treated by similar multi-disciplinary teams and we have no reasons to believe that the care received by the 2 groups differed. However, we cannot exclude the effects of day-to-day variations in staffing and number of admissions.

The main limitation of our study is the lack of randomization or blinding. As a result, we cannot make any assertions regarding the causality of our findings, definitive statements

of association, or the generalizability beyond our hospital. In addition, we only recorded measures of function on admission and discharge. Further measures at other time points may have given us an indication of the rate of functional recovery. All we can infer regarding functional change is that both groups had a similar overall amount of recovery and the earlier discharge in the early assessment group did not appear to represent risk-taking behavior by clinicians (i.e. patients were not discharged earlier without having made a similar amount of functional recovery as those in the late assessment group). We have isolated one aspect of the 'dose' of physical therapy input, the AVERT studies have highlighted the potential importance of studying other aspects of the dose of physical therapy input, such as frequency and duration.[25]A limitation of routinely collected clinical data obtained from the hospital electronic medical records is the risk of bias characteristic of retrospective studies.

Patients admitted to Department of Medicine for the Elderly wards undergo inpatient comprehensive geriatric assessment. There is evidence that frail patients undergoing comprehensive geriatric assessment in the hospital are more likely to be alive and at home after hospital discharge.[26] Our study suggests that physical therapy is likely a key part of comprehensive geriatric assessment, and earlier input may be associated with better hospital outcomes. The reasons for reduced hospital LOS are not clear and causality cannot be inferred from our findings. Frail older patients are particularly susceptible to functional loss during acute illness via direct inflammatory damage to the musculoskeletal and central nervous systems.[27-29] Furthermore, lack of physical activity and bed rest seen in this population[30,31] has been shown to result in rapid muscle atrophy.[32] It may be that early physical therapy assessment encourages increased physical activity, by direct intervention, education and improving patient confidence with self-administered exercise, and as a result reduces hospital deconditioning leading to faster functional recovery. Interestingly, our data in Table 4 demonstrates reduced need for care on discharge and a trend for reduced numbers

of patients in the early assessment group who required a new package of care on discharge. This may potentially represent reduced deconditioning in the early assessment group.

Our findings may not be generalizable beyond our hospital, but they make a worthwhile contribution to what the UK Medical Research Council defines as the 'development phase' of the development and evaluation of a complex intervention,[33] in this case the acute care of frail older patients. Prospective interventional studies are necessary to clarify the importance of early physical therapy input in the outcomes of hospitalized frail older people, including the prevention of hospital-related deconditioning.

CONCLUSION

We set out to investigate the association of early physical therapy input with length of stay, functional outcomes and care needs on discharge. We found that there was an association with reduced length of stay, need for formal care on discharge from hospital and a trend towards reduced new institutionalization on discharge from hospital. This may be due to preventing hospital deconditioning, however further prospective research is needed to establish causality and if appropriate investigate causal mechanisms.

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Figure 1: Kaplan Meier curve showing proportion of patients not discharged home against length of stay (days) during the first 21 days of hospital admission

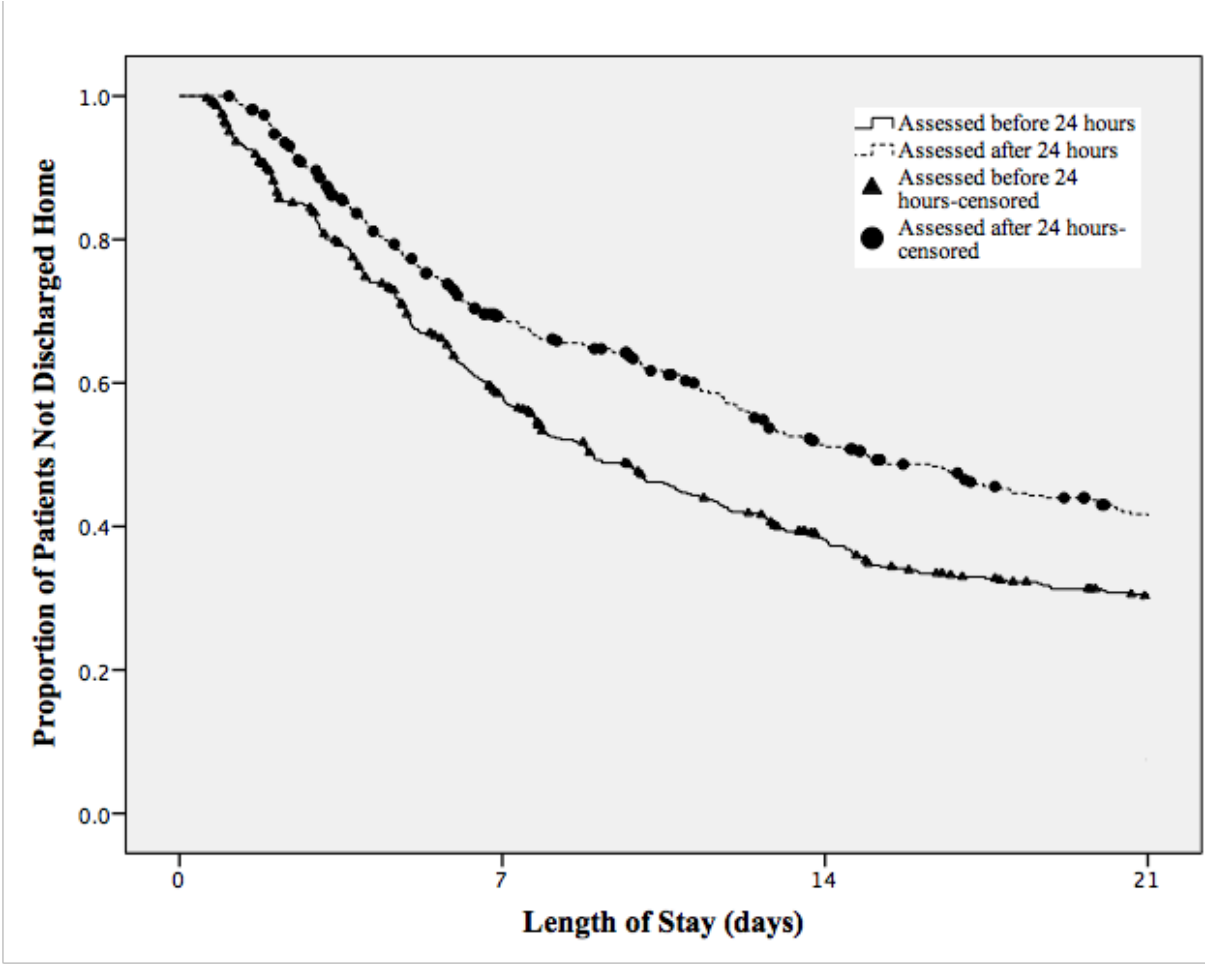

Table 1: Emergency Department Modified Early Warning Score (ED-MEWS) components and scoring

Component	**3**	**2**	**1**	**0**	**1**	**2**	**3**
HR	<40	41-50	51-60	61-90	91-110	111-129	≥130
RR	≤6	7-8	-	9-14	15-20	21-29	≥30
SBP	≤70	71-80	81-100	101-180	-	≥181	-
AVPU **GCS**	U	P	V	A 15	14	9-13	≤8
Temp	-	<35·0	-	35·0-38·4	-	38·5-39·0	≥39·0

Abbreviations: HR, heart rate (beats per minute); RR, respiratory rate (per minute); SBP, systolic blood pressure (mmHg); AVPU, **A**lert, responds to **V**oice, responds to **P**ain, **U**nresponsive; GCS, Glasgow Coma Scale; Temp, body temperature (degrees Celsius).
Scoring and escalation protocol: minimum score = 0 points; maximum score = 15 points. The usual trigger for escalation (i.e. immediate referral to doctor for clinical review) is 4 or more points.

Table 2: Comparison of baseline characteristics between the early and late assessment groups.

Characteristics	**Early assessment** n = 584	**Late assessment** n = 419	**p for difference**
Delay from admission to assessment (days) Median (IQR)	0.71 (0.55-0.83) [missing data n = 0]	1.81 (1.40-2.63) [missing data n = 0]	**p < 0.001**
Age Mean (SD)	85.3 (6.58) [missing data n = 0]	85.8 (7.07) [missing data n = 0]	p = 0.298
Female Count (%)	333 (57.0) [missing data n = 0]	240 (57.3) [missing data n = 0]	p = 0.935
Frailty Median (IQR)	6 (5-6) [missing data n = 51]	6 (5-6) [missing data n = 27]	p = 0.736
AMT4 Median (IQR)	4 (2-4) [missing data n = 163]	4 (2-4) [missing data n = 138]	p = 0.514
ED-MEWS Median (IQR)	3 (2-4) [missing data n = 3]	3 (2-4) [missing data n = 5]	p = 0.947
C-reactive protein Median (IQR)	17.1 (4.2 – 62.7) [missing data n = 42]	19.9 (4.6 – 66.5) [missing data n = 30]	p = 0.459
Charlson Comorbidity Index Median (IQR)	2 (1 -3) [missing data n = 6]	2 (1 – 4) [missing data n = 6]	p = 0.464

Falls in last 12 months Median (IQR)	1 (0-3) [missing data n = 31]	1 (0-3) [missing data n = 37]	p = 0.530
Able to walk 6m on initial assessment Count (%)	318 (56.5) [missing data n = 21]	219 (56.2) [missing data n = 29]	p = 0.920
Admission walking speed* (m/s) Median (IQR)	0.31 (0.20-0.45) [missing data n = 21]	0.31 (0.24-0.47) [missing data n = 29]	p = 0.435
Admission EMS Median (IQR)	10 (3-16) [missing data n = 21]	10 (4-15) [missing data n = 30]	p = 0.787
Formal package of care on admission Count (%)	295 (50.8) [missing data n = 3]	211 (50.4) [missing data n = 0]	p = 0.897

Abbreviations: IQR, interquartile range; SD, standard deviation; m/s, metres/second.

*only those able to mobilise 6m on admission

Table 3. Comparison of specific co-morbidities between early and late assessment groups.

Condition	**Early assessment** n = 584	**Late assessment** n = 419	**p for difference**
Parkinson's disease Count (%)	23 (4.0%) [data missing n = 6]	11 (2.7%) [data missing n = 6]	p = 0.274
Atrial Fibrillation Count (%)	161 (27.9%) [data missing n = 6]	133 (32.5%) [data missing n = 6]	p = 0.115
Depression Count (%)	34 (5.9%) [data missing n = 6]	41 (10.0%) [data missing n = 6]	**p = 0.016**
Anxiety Count (%)	31 (5.4%) [data missing n = 6]	21 (5.1%) [data missing n = 6]	p = 0.874
Myocardial Infarction Count (%)	71 (12.3%) [data missing n = 6]	70 (17.1%) [data missing n = 6]	**p = 0.033**
Congestive Heart Failure	117 (20.2%) [data missing n =	116 (28.4%) [data missing n =	**p = 0.003**

Count (%)	6]	6]	
Peripheral Vascular Disease Count (%)	37 (6.4%) [data missing n = 6]	27 (6.6%) [data missing n = 6]	p = 0.900
Stroke Count (%)	87 (15.1%) [data missing n = 6]	61 (14.9%) [data missing n = 6]	p = 0.952
Dementia Count (%)	108 (18.7%) [data missing n = 6]	79 (19.3) [data missing n = 6]	p = 0.803
Chronic Pulmonary Disease Count (%)	140 (28.9%) [data missing n = 6]	114 (27.9%) [data missing n = 6]	p = 0.727
Connective Tissue Disease Count (%)	38 (6.6%) [data missing n = 6]	26 (6.4%) [data missing n = 6]	p = 0.891
Peptic Ulcer Disease Count (%)	3 (1.0%) [data missing n = 6]	2 (0.5%) [data missing n = 6]	p = 0.948
Chronic Liver	6 (0.6%)	1 (0.2%)	p = 0.143

Disease Count (%)	[data missing n = 6]	[data missing n = 6]	
Diabetes (non complicated) Count (%)	143 (24.7%) [data missing n = 6]	80 (19.6%) [data missing n = 6]	p = 0.055
Diabetes (complicated) Count (%)	13 (2.2%) [data missing n = 6]	8 (2.0%) [data missing n = 6]	p = 0.753
Paraplegia Count (%)	9 (1.6%) [data missing n = 6]	12 (2.9%) [data missing n = 6]	p = 0.140
Chronic Renal Disease Count (%)	138 (23.9%) [data missing n = 6]	97 (23.7%) [data missing n = 6]	p = 0.954
Cancer (non-metastatic) Count (%)	48 (7.1%) [data missing n = 6]	33 (7.5%) [data missing n = 6]	p = 0.894
Cancer (metastatic) Count (%)	18 (3.1%) [data missing n = 6]	24 (5.9%) [data missing n = 6]	**p = 0.035**
Severe Liver	2 (0.3%)	0 (0.0%)	p = 0.234

Disease Count (%)	[data missing n = 6]	[data missing n = 6]	

Table 4: Comparison of outcomes between early and late assessment groups

Outcome Measures	**Early assessment**	**Late assessment**	**p for difference**
Length of Stay* (days) Median (IQR)	6.7 (3.1 – 13.7) [missing data n = 0]	10.0 (4.2 – 20.1) [missing data n = 0]	**p < 0.001**
Able to walk 6m at discharge* Count (%)	363 (78.9) [missing data n = 86]	253 (76.9) [missing data n = 67]	p = 0.500
Discharge walking speed[†] (m/s) Median (IQR)	0.33 (0.21 – 0.51) [missing data n = 86]	0.32 (0.23 – 0.50) [missing data n = 67]	p = 0.837
Discharge Elderly Mobility Scale* Median (IQR)	14 (9-18) [missing data n = 78]	14 (8-17) [missing data n = 62]	p = 0.623
Change in Elderly Mobility Scale discharge minus admission* Median (IQR)	0 (0-3) [missing data n = 85]	0 (0-3) [missing data n = 78]	p = 0.833
New institutionalization* Count (%)	22 (4.1) [missing data n = 0]	26 (6.7) [missing data n = 0]	p = 0.073

New package of care* Count (%)	110 (20.3) [missing data n = 0]	105 (27.0) [missing data n = 0]	**p = 0.016**
Inpatient mortality Count (%)	41 (7.0) [missing data n = 0]	30 (7.2) [missing data n = 0]	p = 0.932

Abbreviations: IQR, interquartile range; SD, standard deviation; m/s, metres/second.

* excluding those who died during hospital
† only those able to mobilise 6m on discharge

Table 5: Results of the Cox proportional hazards regression model

Covariates	**Number analysed**	**Number of 'events'**	**HR 95% CI**	**p value**
-	1003	826	1.29 (1.12 – 1.48)	**p < 0.001**
Age, sex	1003	826	1.29 (1.12 – 1.48)	**p < 0.001**
Age, sex, ED-MEWS	995	820	1.31 (1.14 – 1.51)	**p < 0.001**
Age, sex, ED-MEWS, CCI, EMS on admission	932	768	1.34 (1.16 – 1.55)	**p < 0.001**

Abbreviations: HR, Hazzard Ratio; CI: Confidence Intervals; ED-MEWS, Emergency Department Modified Early Warning Score; CCI: Charlson Comorbidity Index; EMS, Elderly Mobility Scale;