



Incidence and outcome of interrupted geriatric rehabilitation requiring acute hospital transfer

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Abstract

Background and aims Elderly rehabilitation programs provide a period of rehabilitation to optimize a safe home discharge after acute hospitalization of older adults. Often, these patients may have their rehabilitation interrupted when they become unwell and subsequently require transfer back to an acute hospital setting. We will look at the incidence and outcome of this interruption. This paper aimed to determine the incidence of interrupted post-acute geriatric rehabilitation requiring acute hospital transfer and to analyze the outcome of the transfers.

Methods An analysis of a retrospective cohort of elderly patients admitted into a 22-bed community-based geriatric rehabilitation unit over a 48-month period.

Results Five hundred thirty-nine patients were admitted for rehabilitation. Fifty (9.3%) patients had their rehabilitation interrupted and were transferred to an acute hospital setting. Sixty-six percent were females; mean age 82.1 ± 8.7 years. Final diagnosis was acute severe infections (44%), traumatic fracture secondary to fall (10%), intraabdominal complications (10%), cardiac complications (8%), and acute neurological event (6%). Of these patients, 42% had a fatal outcome while 32% returned for rehabilitation.

Conclusion Interrupted geriatric rehabilitation requiring acute hospital transfer occurred in 9.3% of patients; acute severe infection was the most common cause. These transfers were associated with significant mortality. Rehabilitation programs should focus improvement efforts on identifying suitable patients for rehabilitation, optimizing care transitions, and minimizing rates of transfers.

Keywords Comorbidity · Elderly · Patient transfer · Rehabilitation

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Background

Frail elderly patients after acute hospitalization are at risk of functional decline and loss of independence [1]. Rehabilitation with a specialist multi-disciplinary team for the older person improves functional outcome and increases the likelihood of discharge to home [2]. Provision of a period of rehabilitation to optimize a safe home discharge is the purpose of our facility and its effectiveness has been recently reported [3]. This unit has resident 24-h medical cover under consultant geriatrician supervision with specialist multi-disciplinary input, has onsite radiology during office hours, and can administer intravenous treatments. Older adults who may benefit from this service are screened in the acute setting by a geriatrician to ensure medical stability and overall suitability for rehabilitation. These patients may have their rehabilitation interrupted when they become unwell and subsequently require transfer back to an acute

Table 1 Baseline characteristics of patients whose rehabilitation was interrupted

	<i>n</i>
<i>n</i>	50
Age in years; mean \pm sd	82.1 \pm 8.7
Female; <i>n</i> (%)	33 (66%)
Charlson Comorbidity Index; CCI mean \pm sd	3.32 \pm 2.31

hospital setting. These rehabilitation program interruptions are undesirable outcomes which may affect patient outcomes and health care expenditure [4]. Our aim was to determine the incidence of interrupted geriatric rehabilitation requiring acute hospital transfer in our facility and to analyze the outcome of the transfers.

Methods

This was a retrospective analysis of patients admitted into a 22-bed community-based geriatric rehabilitation unit over a 48-month period from January 2012 to January 2016. Data was obtained from patient's medical notes and their comorbidities were scored using the Charlson Comorbidity Index (CCI). Results were expressed as mean (standard deviation; SD). Statistical tests used include *t* test for continuous variables and chi-square for categorical variables. Statistical significance level was set at $P < 0.05$.

Results

There were 539 patients admitted for rehabilitation over the study period. Of these patients, 50 (9.3%) patients had their rehabilitation interrupted and were transferred to an acute hospital setting. There were 33 (66%) females. Mean age 82.1 \pm 8.7 (range 51–95) years (Table 1).

Final diagnosis after acute hospital transfer included acute severe infections (22, 44%), traumatic fracture secondary to fall (5, 10%), intraabdominal complications (5, 10%), cardiac complications (4, 8%), acute neurological event (3, 6%),

Table 2 Diagnosis after acute hospital transfer

Final diagnosis	<i>n</i> (%)
Acute severe infections (pneumonia, sepsis, cellulitis, urinary tract infections, osteomyelitis)	22 (44%)
Traumatic fractures due to fall	5 (10%)
Intra-abdominal complications	5 (10%)
Cardiac complications (non-ST elevation myocardial infarction, acute heart failure)	4 (8%)
Acute neurological deficit	3 (6%)
Malignancy	3 (6%)
Other causes	4 (8%)
Unknown	4 (8%)

Table 3 Outcome of acute hospital transfer

Outcome	<i>n</i> (%)
Fatal outcome (died)	21 (42%)
Retransferred for rehabilitation	16 (32%)
Home discharge	5 (10%)
Residential care	4 (8%)
Unknown	4 (8%)

malignancy (3, 6%), others causes (4, 8%), and unknown (4, 8%) (Table 2).

Final patient outcomes after acute hospital transfer demonstrated that 21 (42%) had a fatal outcome, 16 (32%) returned for rehabilitation, 5 (10%) were discharged home, 4 (8%) were discharged to residential care, while the outcome was unknown for 4 (8%) (Table 3).

Patients with a fatal outcome had higher mean CCI compared to those who had a non-fatal outcome but, this was not statistically significant (Table 4).

Discussion

Over the study period, a total of 539 older adults were admitted into our rehabilitation unit with a mean CCI of 3.32 \pm 2.31. Of these, 50 (9.3%) had their rehabilitation interrupted necessitating an acute hospital transfer. The rates observed in our center are less than other centers with similar cohorts of patients in Ireland (22%) [5] and in Spain (19.2%) [6]. This may reflect an increased ability of our service to manage more complex medical illnesses as we have 24-h resident medical cover and can administer intravenous treatments.

Our findings show that acute severe infections are the most common cause of interrupted geriatric rehabilitation having occurred in 44% of cases. This finding compares similarly to other studies [5, 6]. Infections of less severity are managed at our facility. Falls are also common and despite targeted multidimensional intervention are not always avoidable in this setting [7]. Ongoing review of our falls prevention program

Table 4 Comparison of outcome of acute hospital transfer

	Fatal outcome	Non-fatal outcome	<i>P</i> value ^a
<i>n</i>	21	25	
Age in years; mean ± sd	84 ± 6.2	81.2 ± 10	0.27
Charlson Comorbidity Index; CCI mean ± sd	3.7 ± 2.5	3.1 ± 2.1	0.38

^a Unpaired *t* test

remains an ongoing priority in our facility. There was a fatal outcome in 21 (42%) patients. This suggests that interrupted geriatric rehabilitation carries a poor prognosis as also shown in other studies [6]. CCI was originally designed as a predictor of one-year mortality attributable to comorbidities in a longitudinal study of general hospitalized patients [8] and has since been validated in other patient cohorts. Our report showed that patients with a fatal outcome had higher mean CCI compared to those who had a non-fatal outcome but, this was not statistically significant. The clinical relevance of this in patient selection for rehabilitation remains to be studied in a larger population. Future research should focus on identifying modifiable risk factors for the outcomes which will allow for targeted preventive measures [9].

Following acute hospital transfer, 16 (32%) patients returned for rehabilitation. This implies a high rate of care transitions which should be done seamlessly for optimal patient care. Collective improvement of an integrated care approach can reduce the risk of adverse outcomes after hospitalization in frail older adults [10].

To our knowledge, this is the first Irish study looking at the outcomes of acute hospital transfer following interrupted geriatric rehabilitation. Rehabilitation program interruption may be more reflective of quality of care than post-discharge readmission rates [9]. Information obtained from this study may help inform physicians, patients and caregivers' decisions regarding accessing post-acute geriatric rehabilitation and acute hospital transfer when required. We have since introduced the national early warning score and sepsis screening pathway which may contribute to earlier detection of acute deterioration with early initiation of treatment and subsequent reduction in requirement for transfer.

The findings of our study may not be generalizable for rehabilitation of older adults undergoing rehabilitation for neurological conditions such as stroke.

Conclusion

Interruption of geriatric rehabilitation with acute hospital transfer occurred in 9.3% of patients with acute severe infection being the most common cause. These transfers are associated with high mortality. There will be an ongoing need for facilities such as ours given the ongoing pressures on acute hospital services; therefore, these

facilities and associated rehabilitation programs should focus quality improvement efforts on identifying suitable patients for rehabilitation, minimizing rates of transfer and optimizing care transitions with the goal of a more integrated approach when transfer is required.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Informed consent For this type of study, formal consent is not required.

Ethical approval For this service evaluation study, ethical approval was not required in our institution.

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