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Brief Communication

Implementing Occupational Therapy into an Acute Geriatric Ward: Effects on Patients' Functional Status at Discharge

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Abstract

Older patients face increasing challenges in preserving mobility during hospitalization. This retrospective cohort study aimed to evaluate the effect of an Occupational Therapy (OT) program on mobility at discharge in older patients admitted to an Acute Geriatric Unit (AGU). All patients aged ≥65 years consecutively admitted to the AGU in an 18-month period were included in the study if scoring <4 or ≥ 8 at the Clinical Frailty Scale. Overall, 807 patients (median age 85 years, 50.2% females) were included: 665 (82%) received OT, while 142 who did not receive OT were used as controls. The Cumulated Ambulation Scale (CAS) was used to assess mobility at discharge. By multivariable logistic regression, OT was independently associated with higher odds of achieving higher CAS score at discharge. These findings emphasize the potential benefits of OT in acute geriatric settings, providing valuable insights for preserving mobility of frail older individuals during hospitalization.

Key words: Hospital acquired disability, occupational therapy, frailty, older adults.

Introduction

The hospital acquired disability syndrome (HADS) is a condition characterized by a loss of independence in activities of daily living (ADLs) following acute hospitalization(1, 2). HADS predominantly develops due to patient-related and environmental factors (3, 4), whereby individuals at risk, typically frail older adults, may develop sarcopenia and loss of motor function (3, 5, 6). HADS may occur in approximately 30% of adults aged 65 years and older who are hospitalized in acute medical and surgical wards (7), and represents a global healthcare concern due to its association with several negative outcomes, including institutionalization, and mortality (8, 9).

Occupational therapy (OT) is defined as the therapeutic use of everyday life occupations with persons, groups, or populations (i.e., clients) for the purpose of enhancing or enabling participation (10). OT holds great potential to mitigate HADS within the context of an Acute Geriatric Unit (AGU), since it can provide targeted interventions to individuals at risk, improving mobility and cognition throughout patient's hospital stay (11). However, there is limited evidence regarding the efficacy of OT approach in acute hospitals. A systematic review was conducted to evaluate the effectiveness of specific OT programs for older people hospitalized for acute medical conditions (12). Out of six studies meeting the eligibility criteria, only three studies were conducted in an AGU, including one randomized controlled trial and two smaller observational investigations. The overall findings suggest that OT was significantly effective in reducing delirium and improving cognitive function among AGU patients. However, regarding activities of daily living (ADL) functionality, the evidence supporting an efficacy of OT interventions compared to the control group was inconclusive, as not all studies reached statistical significance. This lack of significance can be attributed to the limited methodological quality of the analyses conducted.

Therefore, there is an opportunity for further clinical studies in this area. This paper seeks to evaluate the impact of an OT intervention on the mobility of a cohort of older and frail patients upon their discharge from an Acute Geriatric Unit (AGU). The impact of OT intervention on mobility was juxtaposed with a group of patients possessing analogous characteristics who were admitted to the AGU before the integration of an occupational therapist into the AGU.

Methods

Participants

The IRCCS San Gerardo de Tintori is a 700-beds hospital located in the city of Monza. Within the hospital, the AGU is a 32-beds ward, discharging approximately 900 patients yearly, with 99% of admissions originating from the Emergency department. Common reasons for AGU admission include infections, cardiorespiratory symptoms and signs, delirium, cognitive impairments, falls, and other geriatric syndromes.

This retrospective cohort study included all the older (>65 years) patients consecutively admitted to theis AGU from 1st January 2021 to 30th, June 2022.

Patients were excluded from this study if they scored <4 or ≥ 8 at the Clinical Frailty Scale (CFS). The CFS is a nine-point scale which is based on the clinical evaluation of symptoms, mobility, physical activity, and function (13). A

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Table 1. Occupational therapy protocol

Occupational therapy protocol
Day 1: **Multidimensional geriatric assessment:** Comprehensive evaluation, encompassing functional, physical, and cognitive assessments conducted by a geriatrician. Upon meeting the inclusion criteria, the patient is subsequently referred to the occupational therapy program.
Day 2: **Occupational Therapy Assessment:** • Initial interview (OPHI II Interview from the MOHO Occupational Therapy Model). • Functional assessment using CAS and Katz Index.
Day 3 until discharge: **Occupational Therapy Intervention:** • ADL training (dressing, hygiene at the sink, feeding, postural/transfers, and ambulation). • Non-pharmacological treatment for behavioral disorders (based on the TAP). • Interview with the caregiver Discussion with other team members to implement specific non-pharmacological strategies (promoting mobilization, extending the presence of the patient's family during the day, suggesting meaningful activities to be done with caregivers, promoting mobilization, and performing daily activities independently).

OPHI: Occupational Performance History Interview; MOHO: Model of Human Occupations; CAS: Cumulated Ambulation Score; ADL: Activities of Daily Living; TAP: Tailor Activity Program

score of 1 indicates a very fit person, whereas a score of 9 identifies a terminally ill patient. Additional exclusion criteria comprised individuals who were bedridden in the 15 days prior to hospitalization, those with COVID-19 disease or a positive SARS-CoV-2 nasopharyngeal swab result, individuals with multiple admission to our AGU, those facing acute life-threating conditions, those with bone fractures and those who, subsequent to occupational therapist's integration into the team, did not undergo OT intervention within the study period due to AGU organizational factors.

Data collection

Demographic characteristics and clinical history were retrospectively collected. Upon admission, patients were assessed by a geriatrician through a Comprehensive Geriatric Assessment, including sociodemographic (sex, age, living status), functional (ADLs), nutritional (Mini-nutritional assessment short form, MNA-SF) and clinical status (Modified Cumulative Illness Rating Scale-Geriatrics, CIRS-G comorbidity) (14–16). MNA-SF was categorized into three groups, i.e., malnourished, at risk of malnourishment and well nourished, according to its well-known cutoffs and the CIRS-G were calculated.

Geriatricians assessed patients' pre-hospital need for walking aids and reported history of falls within the last year. Moreover, they assessed the total number of prescribed medications, frailty status by CFS, and the counted the number of hospitalizations that occurred in the previous year. Dementia was diagnosed if documented in the medical records, and/or the patient was receiving acetylcholinesterase inhibitors or memantine. Throughout hospitalization, the attending physicians reported any intercurrent falls and assessed the presence of delirium using the 4AT (17).

Upon discharge, the functional and motor skills of each patient was assessed through ADLs and the Cumulated Ambulation Score (CAS) (18). The CAS is a straightforward tool used to monitor daily mobility levels during hospital stays, particularly for patients with hip fractures, including those with cognitive impairments. The CAS evaluates the patient's autonomy in three activities: transitioning in and out of bed, moving from sitting to standing and back to sitting in a chair, and walking. Each activity is rated on a three-point ordinal scale from 0 to 2 (0 = Unable to perform, even with human assistance and verbal cues; 1 = Able to perform with assistance and/or verbal cues from one or more individuals; 2 = Able to perform safely without assistance or verbal cues, with the use of a walking aid permitted). This yields a daily CAS score ranging from zero to six.

Finally, data regarding the length of hospital stay and discharge placement were also collected.

OT intervention

The OT intervention involved a daily 30-min session, scheduled between 8 am and 3 pm, Monday through Friday, for the duration of hospitalization. All OT intervention's participants received an average of 5 sessions during hospitalization. Pre- and post- intervention assessment was performed by direct observation within the first 48h of hospitalization and on the day of discharge, respectively. The OT was trained by a professor in OT and by the AGU geriatricians (CS and MCF) who supervised the entire process.

Before undergoing OT, all patients received a medical visit to identify any conditions that might affect their mobility and consequently hinder the provision of nonpharmacological interventions. Such conditions could include suspected fractures or acute illnesses that compromise clinical stability.

The OT activities are displayed in Table 1 and included: (i) Occupational Therapy Assessment with interviews and functional evaluations; ii) Occupational Therapy Intervention including ADL training, non-pharmacological interventions, caregiver interviews, and team discussions, emphasizing mobilization, family involvement, meaningful activities, and independence promotion. During the weekend, nurse staff facilitated patients' mobilization to the armchair, while no OT was provided.

Table 2. Demographic and clinical characteristics of the whole sample and according to the OT intervention, upon AGU admission, during hospitalization and at discharge

	Whole sample (n = 807)	OT intervention (n = 665)	Standard care (n = 142)	p-value
Variables collected upon AGU admission				
Age (years), median (IQR)	85 (80-89)	85 (81-89)	83 (79-87)	0.0031
Gender female, n (%)*	407 (50.4)	352 (53)	55 (38.7)	0.0023
Source of admission, n (%)				
Home	784 (97.2)	651 (97.9)	131 (93.6)	
LTC facility (nursing home, rehabilitation)	23 (2.8)	14 (2.1)	9 (6.3)	0.0162
CFS score, median (IQR)	6 (6-7)	6 (6-7)	6 (4-7)	0.0077
Number of drugs, n (%)				
0 – 4 drugs	206 (25.5)	173 (26.0)	33 (23.2)	0.3678
4-10 drugs	488 (60.5)	404 (60.8)	84 (59.2)	
> 10 drugs	113 (14.0)	88 (13.2)	25 (17.6)	
CIRS-C severity index, median (IQR)	4 (3-5)	4 (3-5)	4 (3-5)	0.7845
Heart disease, n (%)	418 (51.8)	343 (51.5)	75 (52.8)	0.3472
Vascular disease, n (%)	691 (85.7)	569 (85.6)	122 (85.9)	0.9752
Hematopoietic disease, n (%)	144 (17.8)	111 (16.7)	33 (23.3)	0.1195
Respiratory disease, n (%)	211 (26.2)	174 (26.2)	37(26.1)	1.0000
EET disease, n (%)	228 (28.3)	185 (27.8)	43 (30.3)	0.4089
Upper GI disease, n (%)	190 (23.5)	152 (22.9)	38 (26.7)	0.1854
Lower GI disease, n (%)	86 (10.6)	71 (13.7)	15 (10.6)	0.2932
Liver, pancreas and biliary disease, n (%)	75 (9.3)	61 (9.2)	14 (9.8)	0.0340
Renal disease, n (%)	182 (22.5)	150 (22.6)	32 (22.5)	0.0362
Genitourinary disease, n (%)	455 (56.4)	380 (57.2)	75 (52.8)	0.2882
Musculoskeletal and skin disease, n (%)	431 (53.4)	369 (55.5)	62 (43.7)	0.0660
Neurologic disease, n (%)	380 (47.1)	319 (48)	61 (43)	0.1905
Endocrine and breast disease, n (%)	264 (32.7)	221 (33.2)	43 (30.3)	0.1078
Psychiatric disease, n (%)	108 (13.4)	94 (14.1)	14 (9.8)	0.3783
Dementia, n (%)*	279 (34.6)	231 (34.7)	48 (33.8)	0.9226
ADL, median (IQR)	4 (2-6)	4 (2-5)	5 (1-6)	0.2200
Walking status, n (%)				
No aid	405 (50.2)	324 (48.7)	81 (57)	0.1186
Aid	143 (17.7)	125 (18.8)	18 (12.7)	
History of falls in the previous year, n (%)*	347 (43)	298 (44.8)	49 (34.5)	0.0252
Albumin levels, (%)				
<3.5 g/dL	480 (59.6)	393 (59.1)	87 (61.9)	0.5022
MNA, n (%)				
malnourished	201 (24.9)	160 (24.1)	41 (28.9)	0.0796
at risk of malnourishment	410 (50.8)	350 (52.6)	60 (42.2)	
good nutritional status	196 (24.3)	155 (23.3)	41 (28.9)	
Variables collected during AGU stay				
Intercurrent delirium, n (%)*	295 (36.6)	251 (37.7)	44 (31)	0.1498
Intercurrent falls, n (%)*	23 (2.85)	21 (3.2)	2 (1.4)	0.4032
Variables collected at discharge				
ADL, median (IQR)	3 (1-5)	3 (1-5)	2 (0-6)	0.4774
CAS total score, median (IQR)	4 (3-6)	4 (3-6)	3 (1-6)	0.0043
Length of stay, median (IQR)	12 (9-16)	12 (9-16)	11 (8-14)	0.0131
Discharge placement, n (%)				
Home	587 (71.6)	500 (75.2)	78 (54.9)	<.0001
LTC facility (nursing home, rehabilitation))	229 (28.4)	165 (24.8)	64 (45.1)	

* Fisher exact test; IQR: interquartile range; AGU: Acute Geriatric Unit; LTC: Long-Term Care; CIRS-G: Comorbidity illness rating scale geriatric; EET: eyes, ear, nose, throat and larynx; GI: gastrointestinal; ADL: activities of daily living; CAS: Cumulated ambulation score; CFS: clinical frailty scale; MNA: mini nutritional assessment.

Conventional treatment

Data from patients in the control group, who were admitted to the Acute Geriatric Unit (AGU), were retrospectively and consecutively collected beginning on January 1st, 2021, which was three months prior to the introduction of an occupational therapist to our AGU. Patients in the control group underwent standard care provided by nurses and geriatricians, who prescribed and adjusted pharmacological and non-pharmacological treatments daily during their stay, with physiotherapy requested as needed by geriatricians, and then confirmed by a physiatrist. No additional physical or cognitive therapy was administered to these patients.

Statistical Analysis

Descriptive statistics were used to report participants' characteristics. Means and standard deviations (SD) or medians and interquartile ranges (IQR), after checking for normality distribution, were used for continuous, and frequencies and percentages for categorical variables. Wilcoxon test and chi-square tests (or Fisher test when appropriate) were used for multiple comparisons.

A multivariable ordinal-added logistic analysis was performed using OT (as exposure variable) and CAS (as outcome variable); accounting as covariates all the variables (i.e, age, gender, falls prior to hospitalization, ADL, CIRS-G, MNA, intercurrent delirium, length of stay, walking status) which might have influenced patient's mobility status at discharge. In this analysis, we estimated the likelihood of achieving higher CAS level at discharge, compared with a lower adjacent score, and reported the corresponding Odds Ratio (OR) and 95% confidence intervals (CI). All hypothesis tests were two-sided and a $p < 0.05$ was considered as significant.

Analyses have been carried out using SAS software, version 9.4 (SAS Institute Inc., Cary, NC).

Results

Study flowchart is presented in Supplementary Figure 1 and Table 2 provides the key characteristics of the enrolled patients. Overall, 807 eligible patients were recruited, with a median age of 85 years, evenly distributed between males and females. Most of patients were directly admitted from home, whereas a minority came from nursing homes or rehabilitations. The median CFS score was 6, suggesting that half of patients had moderate to severe frailty, while the median CIRS-G (4; IQR 3 – 5) indicated a high prevalence of comorbidities. Just over one third of patients had dementia and the median ADL score indicated moderate disability. Upon admission, nearly 50% of patients could walk without aids and 43% reported at least one fall in the previous year. Only 24.3% of patients had a good nutritional status as assessed by MNA; accordingly, 59.6% of the whole cohort showed albumin levels lower than 3.5 g/dl, suggesting a high prevalence of malnutrition. During their stay in the AGU, 36.6% of patients experienced delirium and 2.85% falls. At discharge, the ADL median score was lower than on admission, suggesting an overall decline in patients' functional status, and the median CAS score was 4. The median length of stay was 12 days, and most patients were discharged home (71.6%) whereas 28.4% to long-term care facilities.

In total, 665 (82.4%) patients received OT, while 142 did not (17.6%). The adherence rate to the OT intervention reached approximately 95%, indicating that only a small proportion of patients (i.e., those who refused to participate in the OT program for at least one day) did not fully adhere. None of the patients declined the intervention for the entire duration of their hospital stay. Patients undergoing OT interventions were older (median [IQR] 85 [81-89] vs 83 [79-87] years, p=0.0031), more frequently females (53% vs. 38.7%, p=0.0023) and more frequently admitted from home (97.9% vs 93.6%, p=0.0162) than their counterparts. Additionally, they were slightly less frail (median [IQR] 6 [6-7] vs 6 [4-7] CFS scores, p=0.0077). There was no difference in the median number of drugs, the CIRS-G median score, the proportion of demented individuals, those with ADL impairment and the use of walking aids between patients undergoing OT interventions and others. However, patients undergoing OT interventions were more likely to report history of falls (44.8% vs. 34.5 %, p=0.0252) than their counterparts. At discharge, patients undergoing OT interventions had a higher CAS score (median [IQR] 4 [3-6] vs 3 [1-6], p=0.0043), a longer hospital stay (median 12 [9-16] vs 11 [8-14] days, p = 0.00131) and were more commonly discharged home (75.2% vs 54.9%, p<0.001) compared to their counterparts.

In a multivariable ordinal logistic regression (Supplemental Table 1), OT intervention was independently associated with an increased odd of having a higher CAS level at discharge compared to a lower adjacent level, after adjustment for age, sex, ADL, CIRS-G, occurrence of delirium and length of stay. Of note, the likelihood of being in a higher CAS level at discharge between individuals who did not undergo OT intervention and walked with aids on admission was lower (OR: 0.45, 95% CI: 0.34–0.61) than the reference group, while was higher in those who underwent OT, both if they were walking without aid upon admission (OR: 1.38, 95% CI: 1.12–1.01) or without aid (OR: 1.30, 95% CI: 1.04–1.61).

Discussion

In a cohort of very old patients admitted to an AGU with moderate-to-severe levels of frailty, those undergoing OT exhibited an increased likelihood of achieving a higher CAS level as compared to those not receiving it. This association remained significant after adjustment for multiple variables, including age, sex, ADL score, CIRS-G, intercurrent delirium and length of AGU stay. Noteworthy, we observed a significant impact of OT on mobility status of patients utilizing walking aids. Specifically, individuals who did not undergo OT and walked with aids upon admission had a diminished likelihood of attaining higher CAS level at discharge compared to their counterparts undergoing OT.

Overall, this study suggest that OT intervention should be useful in preventing mobility decline in patients at risk, particularly in those requiring walking aids. Our findings align with a recent systematic review (12), evaluating the effectiveness of specific OT interventions in older individuals hospitalized for acute medical conditions. However, among the six studies analyzed, only three were conducted into an AGU, with one of them including only 15 patients (19), and another including 51 patients (20). The sole study that enrolled a substantial sample of patients (n=400) found significant improvement in ADL recovery from admission to discharge, but only when the authors considered the subgroup of patients admitted due to cardiopulmonary issues (21). To our knowledge, our represents the largest cross-sectional investigation conducted in an AGU examining mobility outcomes for frail patients following OT intervention. Of further importance, none of the above-mentioned studies targeted frail patients. Indeed, the impact of OT on frail patients is still debated (22), and therefore focusing on the frailest patients (excluding those with reduced life expectancy due to terminal illnesses) could provide novel insights into the effects of OT in this group of individuals. Thus, the present study further advances current understanding of the positive impact of implementing OT in an acute geriatric ward for older patients with moderate to severe frailty.

Additionally, our results corroborate previous studies identifying the factors that hinder patient's mobility outcomes at discharge, including age, previous falls, length of hospital stay and delirium (23, 24). Nonetheless, the length of hospital stay for those in the OT group was marginally longer by one day. One likely explanation could be that individuals assigned to the OT program pursued the objective of attaining the highest possible functional capability in a more systematic manner, leading to a slightly extended hospitalization compared to individuals in the control group. Consistent with these considerations, patients in the OT group were more likely to return their homes, whereas the others were more likely to be transferred to long-term care facilities, aligning with a prior study (11).

Remarkably, the likelihood of having a positive mobility outcome upon discharge was reduced in patients who used walking aids on admission but did not undergo OT intervention. Mahoney et al. demonstrated that patients requiring walking aids before admission to an acute hospital ward were at higher risk to develop new mobility impairments (25). The reasons for this could lie in the presence of both undiagnosed sarcopenia and gait disorders that may render the patients more vulnerable to poor mobility inputs, possibly leading to HADS. Thus, the use of walking aids upon admission could be seen as a risk factor for experiencing unfavorable mobility outcomes (26). Hence, our results support the benefit of an OT intervention for patients utilizing walking aids. In this group, we observed a 30% higher probability of attaining a higher CAS compared to an immediately lower level upon discharge, suggesting that these distinctive patients may retain sufficient motor capacity to sustain their residual independence and mitigate the burden of hospitalization.

The study's strengths include broad inclusion criteria covering patients of varying frailty degrees, use of validated scales for the comprehensive geriatric assessment as well as the quantification of mobility status by the CAS. However, there are limitations to consider. The retrospective nature of the study restricts the ability to assess the real effect of the OT intervention, as it lacks an untreated simultaneous, randomized control group. This limitation impedes direct comparisons between treated and untreated groups, impacting the ability to establish causal relationships effectively. Moreover, the study specifically examines individuals with very mild to severe frailty. Consequently, further research is required to assess the effectiveness of OT in enhancing ambulatory performance across a spectrum of patients, ranging from robust to highly frail individuals. Additionally, the study primarily focuses on in-hospital assessments and outcomes at discharge. However, a lack of long-term follow-up data limits the ability to assess sustained improvements in mobility and functional outcomes beyond the hospital stay. These limitations emphasize the need for cautious interpretation and consideration of the study findings, recognizing its specific patient population and timeframe. Addressing these potential limitations in future research endeavors is therefore crucial.

Nevertheless, given the encouraging findings of our study, we propose that the implementation of an OT program into an AGU team has the potential to significantly mitigate the risk of mobility-HADS, especially in frail older patients who rely on walking aids for ambulation. Future longitudinal studies are required to further expand our scientific understanding of the effectiveness of OT intervention on the health status of older patients, and to outline their paths toward HADS avoidance.

Conclusions

In conclusion, OT intervention significantly impact patient's walking capabilities, providing valuable insights for the effective management of older individuals admitted to acute hospital with moderate to severe frailty levels. Early identification of patients at risk of developing HADS and the provision of an individualized interventions, including OT, could potentially mitigate the negative consequences of the hospitalization in older patients admitted to an AGU for medical causes.

Competing interests: All authors declare no competing interests.

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