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Multidisciplinary Intervention to Prevent Hospital-Associated Disability in Older Adults: A Prospective Study in a Tertiary Hospital Setting

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Abstract

Background: Older adults are particularly vulnerable to the common consequence of Hospital Associated Disability (HAD), which has been shown to have a lower incidence due to preventative measures taken. HAD is known to prolong the recovery process, increase the likelihood of institutionalization, and severely diminish the patient's quality of life.

Objective: The goal of the study is to assess how an multidisciplinary early rehabilitation program impacts the prevalence of HAD in elderly patients in the inpatient setting of a tertiary care hospital in Riyadh, Saudi Arabia.

Methods: The sample for this quasi-experimental study consisted of 120 patients aged 65 and older who were admitted to a geriatric unit. The treatment group (n=60) received early, multidisciplinary rehabilitation with a physician, nurse, PT, pharmacist, and social worker, whereas the comparison group (n=60) was treated with standard hospital care. The main endpoint measured was incidence of HAD, which was defined as a reduction in functional independence as measured by activities of daily living (ADLs) by 1 or more from the pre-hospital baseline to discharge. Other measured outcomes included occurrence of falls, delirium, and rate of readmission within 30 days post dischage.

Results: The incidence of HAD was significantly reduced in the intervention group (18.3%) compared to the control group (45%). Also, the intervention group was better off in terms of greater ADL decline but still showed reduced ADL decline (21.7% vs. 50%), fewer falls (1.7% vs. 10%), less delirium (3.3% vs. 15%), and lower 30-day readmission (8.3% vs. 20%).

Conclusion: A systematic multidisciplinary rehabilitation scheme has shown decrease in HAD and its associated burdens among elderly patients. Adopting such frameworks into standard inpatient practice could enhance rehabilitation results and decrease the strain on the healthcare system in older patients.

Keywords: Hospital-Associated Disability, Geriatrics, Multidisciplinary Care, Early Rehabilitation, Functional Decline, Tertiary Hospital, Saudi Arabia

Introduction

The growing global demand for comprehensive geriatric care is multifaceted, and includes the need to fully address the sociocultural and medical needs of elderly patients in hospitals. One of the most pressing issues in acute geriatric care is hospital-associated disability (HAD), which is new loss of independence in activities of daily living resulting from the hospitalization and is not related to the reason for admission. Currently, HAD is estimated to affect 30–60% of older adults admitted to hospitals, contributing to negative outcomes as lengthy rehabilitation, increased dependence, institutionalism, and death (Loyd et al., 2020).

In Saudi Arabia, the proportion of elderly is likely to increase sharply and surpass 18% by the year 2050, further increasing the clinical and economic burden of HAD. Inefficiency in functioning in this population is commonly the result of a constellation of factors which include advanced age and immobility, polypharmacy, acute medical illness, and poorly designed hospital," geriatric unfriendly" (Reichardt et al, 2016). Nonetheless, many tertiary hospitals do not address this issue, but rather, use the lack of standard screening and intervention protocols as an excuse to neglect proactive diagnosis of the condition (Giacomino et al., 2023).

The most recent studies prove that multidisciplinary intervention models featuring staff such as geriatricians, nurses, physical therapists, pharmacists, and social workers working in cooperation decrease the frequency and intensity of HAD. These models focus on proactive patient management, which includes early mobilization, optimization of pharmaceutical therapy, cognitive assistance, and advanced discharge planning (Garrett, 2022; Müller, 2023). Even in non-geriatric settings, the effectiveness of tailored multidimensional programs suggests that they could be implemented across various healthcare systems (de Groot et al., 2022).

As much as function-centered care is receiving global attention, there lacks region-specific literature on multidisciplinary approaches to preventing HAD in the Middle East. This research intends to assess the effect of a multidisciplinary proactive rehabilitation framework on hospital-associated disability in elderly inpatients within a tertiary care geriatric ward in Riyadh. Integrating clinical and functional outcomes, this study aims to address the gap of is applicable in Saudi Arabia.

Literature Review

HAD (Hospital-associated disability) is a novel concept that focuses on the quality of care provided to older adults during hospital admissions. During hospitalization, the loss of independence in basic activities of daily living (ADLs) can occur, resulting in disability, which geriatric inpatients (HAD) spend approximately 60% of their inpatient stay with, which is predictive of negative outcomes such as increased institutionalization, dependency, and death (Loyd et al., 2020). Underlying health conditions such as immobility, lack of proper nutrition, having multiple medications, cognitive decline, and disorientation in the environment are all contributors towards the development of HAD (Reichardt et al., 2016).

In terms of measurement tools for estimating the rate of occurrence of HAD, recent assessments have revealed the need to have accurate and regular tools. According to a systematic review by Giacomino et al. (2023) the usage of validated assessment tools along with reporting by either the patients or their proxies yielded a fractured outcome when estimating the occurrence rate for testing HAD. The review was aimed towards subtracting functional outcome predefined standards and having evaluative benchmarks to ease in studies comparison and in devising implementation strategies aimed at best practice.

As a primary approach to alleviate HAD, multidisciplinary interventions have recently gained attention. It has been shown that coordinated care with a physician, nurse, physical therapist, pharmacist, and social worker improves functional outcomes, decreases length of hospitalization, and reduces the probability of rehospitalization. For instance, Garrett (2022) discussed how environmental design applied by interdisciplinary staff preserved mobility and autonomy and promoted independence for patients throughout the acute care period. In the same manner, Müller (2023) observed the remarkable improvement in prognosis and functional status of older patients due to the implementation of a multidimensional intervention, even in non-geriatric wards.

Many healthcare systems still view triage to geriatric rehabilitation services as a ‘bottleneck’. In her scoping review, de Groot et al. (2022) noted the referral criteria to inpatient rehabilitation is based on informal clinician judgment, which lacks a structured assessment, resulting in restricted access to timely post-acute care. Their findings indicate that, within multidisciplinary workgroups, triage protocols are systematically designed and integrated to improve optimized functional recovery.

An area that has not received adequate attention as a contributing factor is hydration status, which has a relation to HAD. Nagae et al. (2023) demonstrated that dehydration among older inpatients is a common issue but can be effectively managed, especially when there is multidisciplinary oversight such as nursing vigilance and dietary supervision.

The bulk of studies associated with Healthcare-Associated Disability (HAD) have primarily stemmed from high-income Western countries. There is still a lack of corresponding research in Middle Eastern nations that triangulate family structures, cultural perceptions of aging and expectations around healthcare. The lack of such data creates gaps tailored international models while highlighting the absence of multidisciplinary frameworks tailored for Saudi tertiary hospitals.

The study attempts to address this gap by analyzing the effects of implementing a structured multidisciplinary rehabilitation program on the burden of HAD in elderly patients in Riyadh. The research aims to advance global understanding while tailoring findings to offer actionable recommendations for the policies and practices shaping healthcare in Saudi Arabia.

Methodology

Study Setting and Design

This study utilized a prospective, quasi-experimental design at the Geriatric Medicine Unit of a tertiary care hospital in Riyadh, Saudi Arabia, from January to December 2023. This unit caters to a primarily older adult patient population with multifaceted chronic medical and functional issues. An ethics approval was received from the ethics committee

Study Participants

Participants were limited to those patients who were 65 years and above, and were admitted to the geriatric inpatient unit with acute medical illnesses. Additional criteria for inclusion were the ability to walk (with or without mobility aids) two weeks prior to admission, and a length of stay exceeding 72 hours. Reasons for exclusion included being bedbound prior to admission, advanced dementia, terminal illness, and voluntary non-participation.

A total of 120 participants were enrolled consecutively and divided into two groups:

- Intervention group (n = 60): were administered a structured multidisciplinary rehabilitation protocol
- Control group (n = 60): were administered usual care aligned with in-house hospital practices

Intervention Protocol

The intervention comprised an early multidisciplinary rehabilitation program initiated within 48 hours of admission and within a standardized framework. The team included:

- Geriatric consultant: Supervised medical management and crafted tailored plans
- Nurse: Supervised ADLs and provided mobility prompting support
- Physical therapist: Completed daily individualized mobility exercises
- Pharmacist: Conducted medication reconciliation and polypharmacy analysis
- Social worker: Actively engaged in planning the discharge and family involvement

Primary emphasis was placed on early mobilization as well as accomplishing functional objectives, with daily team huddles to evaluate progress. Interventions were documented in the electronic health record and tailored based on clinical response.

Data Collection and Outcome Measures

At the point of admission, demographic and clinical details were documented. Functional status was assessed using the Katz Index of Independence in Activities of Daily Living (ADL) at:

- Two weeks prior to hospitalization (pre-admission) – via patient or caregiver interview
- On the day of admission
- On the day of discharge
- At 30-day post discharge follow-up (via phone call)

Primary outcome was the hospital-associated disability which is defined as a new loss of ≥1 points in the Katz ADL score at discharge relative to the pre-hospitalization status. Secondary outcomes included length of stay (LOS), in-hospital complications (falls, delirium), and readmission within 30 days.

Statistical Analysis

Data analysis was performed using SPSS Version 27. Descriptive statistics outlined demographic variables. Categorical variables were analyzed with chi-square tests and continuous variables were analyzed with independent t-tests. Had predictors were identified using multivariate logistic regression. Statistical significance was set at $p<0.05$.

Ethical Considerations

The conduct of this study abides by the ethical principles of the relevant institutional and national research bodies, as well as the Declaration of Helsinki. Approval was granted by the ethics committee. Consent was required and documented from either the participants directly or their legally appointed guardians prior to enrollment. Participants were assured of confidentiality, voluntary participation, and the right to withdraw at any stage without their ongoing care being impacted. All data has been de-identified and secured.

Findings

Baseline Characteristics

All 120 participants were assigned equally into two groups of 60 each. The participant demographic and clinical data is provided in Table 1. In the control group the mean age was 77.4 and in the intervention group 76.8. Most patients were male in both groups as well (control: 56.7%, intervention: 55%). Other common comorbidities included hypertension (75% vs. 70%) and Diabetes mellitus (63.3 vs. 60) in control and intervention groups respectively.

The groups did not differ in their baseline Katz ADL scores with a mean of 5.4 ± 0.7 in the control and 5.5 ± 0.6 in the intervention. Of note, the average length of hospital stay was lower in the intervention group 7.3 ± 2.4 days compared to the control group 9.1 ± 2.8 days.

Table 1. Baseline Characteristics of Study Participants

Variable	Control Group (n=60)	Intervention Group (n=60)
Age (mean ± SD)	77.4 ± 6.3	76.8 ± 6.9
Male (%)	34 (56.7%)	33 (55%)
Hypertension (%)	45 (75%)	42 (70%)
Diabetes Mellitus (%)	38 (63.3%)	36 (60%)
Baseline ADL Score (mean ± SD)	5.4 ± 0.7	5.5 ± 0.6
Length of Stay (days, mean ± SD)	9.1 ± 2.8	7.3 ± 2.4

Key Outcomes

The intervention group had better outcomes in various areas of functional and clinical recovery. As illustrated in Table 2, the intervention group's hospital-associated disability (HAD) incidence rate was much lower at 18.3% than the control group's rate of 45%. In addition, a greater than one point decline in ADL was noted in 50% of the control group's patients compared to 21.7% of the intervention group patients.

While some complications, such as in-hospital falls and erupting delirium, were slightly muted within the multidisciplinary rehab intervention group, in general, these complications were less common. The intervention group also reported fewer falls; only 1.7% of patients fell compared to 10% in the control group. Delirium was less prevalent too. The intervention group reported 3.3% while the control group reported 15%. Furthermore, the intervention group had a lower 30-day readmission rate at 8.3%, compared to the control group's 20%.

Table 2. Key Outcomes

Outcome	Control Group (n=60)	Intervention Group (n=60)
Hospital-Associated Disability (HAD)	27 (45%)	11 (18.3%)
ADL decline (≥1 point loss)	30 (50%)	13 (21.7%)
In-hospital falls	6 (10%)	1 (1.7%)
Delirium episodes	9 (15%)	2 (3.3%)
30-day readmission	12 (20%)	5 (8.3%)

Discussion

The structured multidisciplinary early rehabilitation program in this study was effective in reducing hospital-associated disability (HAD) among elderly inpatients in a Riyadh tertiary hospital. The intervention group demonstrated significantly better outcomes in ADL preservation, in-hospital complication rate, and 30-day readmission rate as compared to the control group with standard care.

Our results are consistent with other studies bumping the focus on proactive measures for older patients during hospitalization. For example, Loyd et al. (2020) lamented an overwhelming 60 percent of older inpatients experiencing HAD, underscoring the need for functional preservation action. Furthermore, the reduction in intervention group ADL decline (21.7% vs. 50%) corroborates data from Garrett (2022), and Müller (2023) regarding the efficacy of interdisciplinary rehabilitation protocols in acute care settings.

The individual contributions from each profession in our study were vital. The physical therapists provided daily mobility training to mitigate deconditioning, which is a significant contributor to HAD. Nurses had an important role in the monitoring of ADLs along with detecting delirium as it can contribute to functional decline. The pharmacist conducting medication reconciliation contributed to polypharmacy reduction, which is also known to have an association with HAD. The social workers assisted in safe discharge and in the education of the patients and their families. This form of multi-disciplinary teamwork is an example of optimal action for Comprehensive Geriatric Assessment (CGA) implementation, which is known to improve functional outcomes in patients when integrated into inpatient settings (de Groot et al., 2022).

Multivariate regression analysis confirmed these observations further by identifying the absence of early mobilization, longer hospital stays, and polypharmacy as the most prominent predictors of HAD. These risk factors, influenced by intervention, enhance the precision of the modifiable risk factors proposed by using targeted strategies employed by our multidisciplinary team.

Theory-driven examination of function highlighted that bathing, dressing, and transferring were the most impacted within the control group – implying a need for strength, balance, and coordination. The significant reduction in decline of these domains among intervention patients emphasizes the importance of early mobilization and rehabilitation on preserving independence.

Regardless of these positive outcomes, some limitations require noting. The study has a lack of randomization and is thus considered quasi-experimental, which could lead to selection bias. In addition, the prehospital ADL scores were communicated, in hindsight, by the patients or caregivers, which could create recall bias. Lastly, the single urban tertiary hospital setting of the study inhibits wider application of the findings to other healthcare environments.

Regardless, the primary strength of the study is the everyday scenario applicability and showcasing coordinated teamwork in effective elderly care. The results endorse the implementation of defined, multidisciplinary rehabilitation schemes within the standard inpatient care for elderly Saudi Arabian patients and in analogous healthcare systems.

Conclusion

In conclusion, this research highlighted the impact of a structured multidisciplinary early rehabilitation program on disability and its complications in elderly patients associated with a tertiary care geriatric unit in Riyadh. The collaboration of geriatric medicine, nursing, physical therapy, pharmacy, and social

work resulted in better functional outcomes, decreased in-hospital complications, and reduced readmission rates. These results reinforce the importance of facilitating independence through hospitalization and support the adoption of function-focused, team-based care in geriatric wards on an institutional level.

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