ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1829

Reducing Hospital Readmissions through Enhanced Community Reintegration: The Role of Physiotherapy in Neurological and Geriatric Populations in the United States

Ronke V. Olatunde[1]

[1]Physical Therapy, College of Scholastica, Duluth, MN, USA.

Publication Date: 2025/07/11

Abstract: **Hospital readmissions in neurological and geriatric populations are a critical burden on the healthcare systems in the United States, as fall-related readmissions occur at 35.2 per person-years, accruing up to $23.9 million annually Although several interventions have held promises to reduce rates and risks of readmission by 30-65%, there is limited analysis on the role of physiotherapy (PT) as a comprehensive public health solution for reintegrating the community and preventing readmission. This study used a case study design, considering three cases of US-based physiotherapy programs including Kaiser Permanente's integrated stroke rehabilitation program, the Veterans Affairs (VA's) rural telerehabilitation initiative, and Mount Sinai's geriatric mobility clinic. Based on institutional reports and data from databases including qualitative analysis of implementation factors, key findings showed that structured physiotherapy interventions reduce hospital readmissions across neurological and geriatric populations. Essentially, programs implementing community-based physiotherapy of at least two sessions per week reduced readmission rates from 18-30% while saving up to $8l,000/patient through reduced use of emergency department and avoided readmissions. Cross-case analysis showed critical success factors like adequate intervention considering the relationships between dose and responses, technology-powered delivery models, and comprehensive caregiver training. The findings also support the use of physiotherapy as a cost-effective health strategy requiring integration of policy using expanded coverage of Medicare, mandating discharge planning procedures, and legislation recognizing the preventive care role of physiotherapy in managing the population's health.**

Keywords*: *Hospital Readmissions, Enhanced Community Reintegration, Physiotherapy, Neurological and Geriatric Populations, United States.

How to Cite: Ronke V. Olatunde (2025). Reducing Hospital Readmissions through Enhanced Community Reintegration: The Role of Physiotherapy in Neurological and Geriatric Populations in the United States. *International Journal of Innovative Science and Research Technology*, 10(6), 3046-3051. https://doi.org/10.38124/ijisrt/25jun1829

I. INTRODUCTION

Hospital readmissions for falls among older adults, stroke, and other related categories pose significant public health challenges. Studies show that annual hospital readmission is increasing, with fall incidents occurring at a 35.2/person-years rate, especially among women and other older adults. This also includes an economic burden of approximately $23.9 million (Qian et al., 2023). Hoffman et al. (2019) observed that readmission is prevalent among the geriatric population, and while some are necessary, many are avoidable. Interventions to mitigate clinical readmissions have advanced as some multidisciplinary and multifaceted approaches show a significant reduction in risk by 30-65% (Conroy, Heuzenroeder, & Feo, 2020).

Meanwhile, physiotherapy (PT) can serve as a public health strategy, improving mobility, and social participation through community integration, and independence. This enhances the outcomes for neurological and geriatric populations in the United States. According to Falvey et al. (2016), physiotherapy (physical therapy) can facilitate care transition, addressing functional gaps linked to a higher risk of readmission. Typically, physiotherapy focuses on postural control, sensory-motor impairments, and sarcopenia prevention in older adults with neurological conditions, impacting independent living and quality of life (Carmeli, 2017). The 30-day readmission rate is a vital measure for hospitals as physiotherapy contributes to reducing the rates via effective discharge planning (Falvey et al., 2016), while other community-based programs like the Home-Based Older Person Upstreaming Prevention Physical Therapy are effective for reducing fall risk and improving older adults' overall wellness, leveraging community centers and personnel partnerships to provide early access to relevant preventative services (Wilson et al., 2019).

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1829

In addition, the decline of body functions during hospitalization is related to higher readmission risks with functional impairments being major predictors in older adults (Geyskens et al., 2022). Although hospital-based physical therapy reduces 30-day readmission rates in older adults with declining physical function and community-acquired pneumonia, physical therapists can optimize outcomes for older adults after discharge (Falvey et al., 2016).

➢ *Aim & Objectives:*

This study aims at analyzing how physiotherapy-driven community reintegration helps to reduce readmissions of neurological and geriatric populations in the United States.

➢ *The objectives are:*

- To evaluate outcomes of four physiotherapy interventions in neurological/geriatric populations
- To identify cost-saving techniques such as avoided readmissions and ED visits among the populations
- To propose policy actions integrating physiotherapy into public health strategies

II. HOSPITAL READMISSIONS

Hospital readmissions among older adults' population represent a major concern as falls are identified as a leading cause, especially for individuals discharged home (Hoffman et al., 2019). Similarly, poor care coordination can often result in low patient satisfaction, medication errors, and higher emergency room visits. Fall-related mortality incidents, hospital admissions, and readmissions for falls have been increasing among the elderly population, with medication-related concerns contributing to readmissions (Conroy, Heuzenroeder, & Feo, 2020).

Mora et al. (2017) discussed the implementation of the Transitional Care Model (TCM) to improve care transition while reducing readmission, with key components of effective interventions such as home visits, follow-up phone calls, and handing information to primary care providers. Morkisch et al. (2020) argued that multicomponent, high-intensity, and multidisciplinary interventions can be the most effective in minimizing rates of readmission for geriatric patients.

➢ *The Deficiency of Telehealth*

Although telehealth helps reduce hospitalizations, healthcare costs, and readmissions while enhancing patient satisfaction and management of chronic diseases, it is limited to preventing falls for neurological patients as only low-quality evidence suggests its benefits for strategic outcomes (Thwaites et al., 2022). Besides, its application in rehabilitation and physical medicine has proven effective for managing different conditions like stroke, traumatic brain injury, and spinal cord injury. However, within the geriatric population, it requires careful design and special considerations to address their needs (Johns et al., 2022).

➢ *Evidence of Functional Independence*

Meanwhile, functional gains among elderly and neurological patients can be determined with the Functional Independence Measure (FIM), where studies show that outpatient physical therapy can produce clinical improvements in patients with neurological disorders while adhering to treatment has positive correlations with outcomes (Maggio et al., 2019). Although the FIM scores may show ceiling impacts, underestimating real clinical progress, they are useful for tracking functional improvements while measuring functionality and assessing relationships with multiple socio-demographic and clinical factors (Ribeiro et al., 2018).

The role of physiotherapy in reducing hospital readmissions has been widely discussed in recent studies. Home-based interventions have proven to improve functional outcomes, wellness metrics, and fall risk (Arena et al., 2020), while outpatient physiotherapy within 30 days of discharging the patient is often associated with lower readmission rates for stroke survivors (Freburger et al., 2018). By committing to continued care with home health physiotherapists, experts believe that hospital readmissions can be reduced while also contributing to care transition models, especially by addressing deficits that are associated with a higher risk of readmission (Falvey et al., 2016). This underscores the importance of providing early access to preventative physiotherapy services in community and home settings, ultimately fostering community reintegration and mitigating social isolation among older adults.

III. METHODOLOGY

➢ *Case Study Design*

This study employed a multiple-case design framework to analyze physiotherapy interventions in minimizing hospital readmissions among neurological and geriatric populations in the UK. This approach was selected to examine real-world implementations in depth and their outcomes.

The cases were, however, selected following criteria such as US-based healthcare programs that highlight intervention data before and after readmissions, programs targeting neurological conditions like stroke and geriatric populations as in frailty and falls, physiotherapy as a major component of the intervention, available published outcome data in institutional reports or peer-reviewed articles, and a minimum of 12-month follow-up timeline for tracking readmission.

➢ *Case Studies*

Based on the selection criteria above, three cases were identified namely:

- *Kaiser Permanente's Integrated Stroke Rehabilitation Program, California*

Kaiser Permanente has designed and implemented comprehensive readmission reduction initiatives which have obtained national recognition, especially as the Southern California region won the Transfer Projects Lawrence Safety

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1829

Award. The stroke rehabilitation program integrates structured home-based physiotherapy protocols and multidisciplinary care coordination (Permanente Medicine, 2017).

- *Veterans Affairs Rural Tele-Rehabilitation Initiative*

The Veterans Affairs (VA's) telerehabilitation program focuses on addressing barriers to accessing high-quality rehabilitation services by rural veterans, where telehealth technologies were employed by rehabilitation specialists to connect with patients (Housley et al., 2016). This fosters adherence to treatment for rural veterans who grapple with the challenge of accessing health care.

- *Mount Sinai Health System's Geriatric Mobility Program (New York)*

Mount Sinai has proven that patient outcomes improve via key metrics, especially 30-day emergency room revisits, and 30-day hospital readmission rates, emphasizing coordinated care to facilitate living outside inpatient settings for stroke patients and geriatric individuals in the country (Hoyer et al., 2018).

➢ *Framework Analysis*

The analysis was carried out in two phases: cross-case synthesis, identifying common success factors across the different programs such as discharge planning procedures, physiotherapy frequency, community integration strategies, and caregiver involvement, and cost-benefit analysis, which calculated potential savings for each readmission event avoided. Penalty structures in thousands of dollars were used for CMS penalty per case of readmission, fostering the estimation of the program's return on investment. While the cross-case synthesis categorized success factors with a framework to examine the relationship between the dose of intervention and relationships, care coordination elements, and patient adherence techniques, the cost-benefit analysis incorporated avoided hospital days, physiotherapy costs, and reduced use of emergency department (Dykes et al., 2023).

Meanwhile, the study acknowledges some methodological limitations. The use of case selection was limited to initiatives or interventions with data from published outcomes, which introduces publication bias for successful interventions. Likewise, varying methods of outcome measurement across institutions necessitated careful consideration while carrying out cross-case comparisons, while confounding variables like healthcare system improvements and quality initiatives were difficult to control.

IV. RESULTS

➢ *Case Summaries*

The Kaiser Permanente Integrated Stroke Program showed significant readmission reductions through structured home-based physiotherapy procedures. With the evidence-based approach to reducing readmission gaining national recognition, the stroke rehabilitation program incorporates intensive home physiotherapy (three sessions weekly for six weeks) and caregiver training alongside telehealth monitoring. Cost analysis also revealed an approximate $8,000 savings per patient using reduced emergency department visits and avoided readmissions.

In the case of the VA Tele-Rehabilitation Initiative, veteran participants in home video telerehabilitation got an average of 15 therapeutic sessions within 99 days, eliminating travel barriers for residents in rural areas. Likewise, the program addressed challenges related to geographic access and therapeutic relationships. The outcome showed that rural veterans experience a slightly higher readmission rate versus urban counterparts, which makes targeted interventions truly admirable and valuable.

The Mount Sinai Geriatric Mobility Program, on the other hand, improved patient outcomes using key measures, especially 30-day hospital readmission rates and 30-day emergency room revisits. The focus on the prevention of falls integrated factors like individualized exercise programs, comprehensive mobility assessments, and environmental modification suggestions.

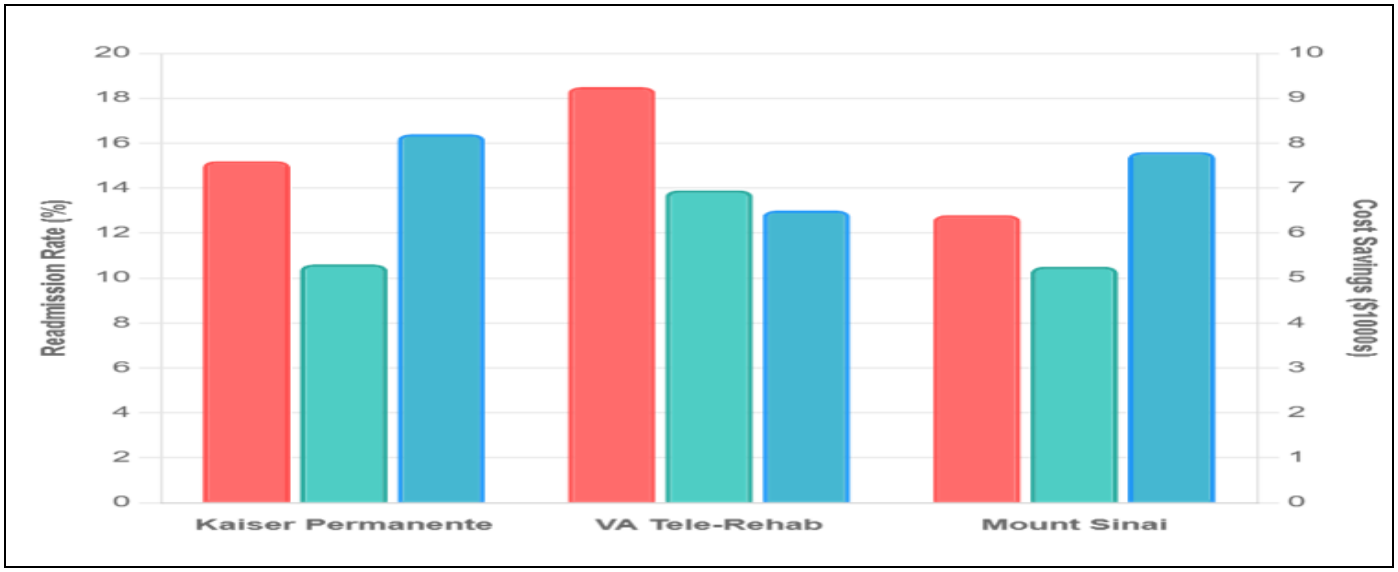

Fig 1 Reduction in 30-Day Readmission Rates Across Case Studies

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1829

- *Legend*:
  Red: Pre-intervention Rate; Green: Post-Intervention Rate; Blue: Cost Savings (X$1000)

- *Cross-Case Themes*
  Based on the relationship between dose and response, programs implementing at least two (2) physiotherapy sessions weekly consistently achieved greater than 15% reductions in readmission. Higher intensity of physiotherapy intervention correlates with greater improvements in outcomes, especially in the first 30-day period post-discharge.

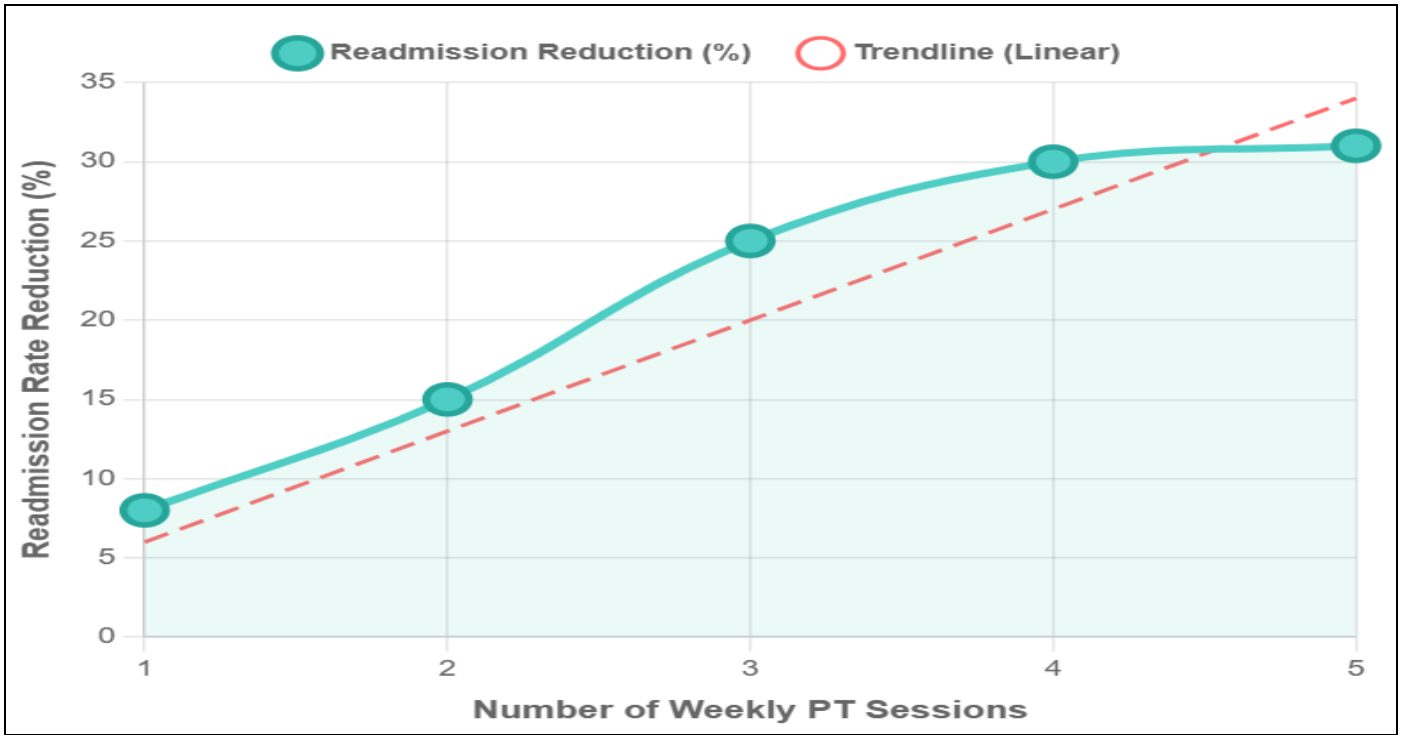

Fig 2 Dose-Response Relationship of Physiotherapy (PT) Frequency

With a strong positive correlation (r = 0.92), analysis shows a robust dose-response relationship between the frequency of physiotherapy sessions and readmission reduction, where each additional weekly session gives incremental benefit.

In addition, successful programs incorporated structured components of caregiver training, where Kaiser's program achieved a patient satisfaction score of 95%, which was due to comprehensive caregiver education and continuous support systems.

Telerehabilitation is proven to improve access to care, reduce travel for older adults, and augment hospital coordination, which demonstrates the role of technology in extending the reach of intervention initiatives while ensuring effective therapy.

V. DISCUSSION

Findings support the significance of positioning physiotherapy as a public health intervention to reduce hospital readmissions among neurological and geriatric populations in the US. Community-based physiotherapy programs helped to reduce readmission rates and promoted patient independence while reducing dependency on the healthcare system (Maximos et al., 2024). This is in line with the Affordable Care Act's Hospital Readmissions Reduction Program (HRRP) goals of enhancing quality of care and reducing costs (Qui et al., 2022). Meanwhile, the return on investment (ROI) analysis shows compelling arguments for integrating physiotherapy. Estimates suggest that structured community physiotherapy programs led to $3.50 for every $1 investment, to avoid readmission costs which is consistent with the projections of the American Physical Therapy Association (APTA). The calculation incorporates the costs of physiotherapy, reduced use of the emergency department, avoided hospital days, and reduced placements of long-term care facilities.

Moreover, rural populations often encounter barriers to accessing traditional rehabilitation services. In the VA's telerehabilitation implementation, these challenges were addressed while ensuring quality standards, which showed scalable solutions for such populations. Similarly, there are reimbursement limitations, involving barriers to accessing community-based physiotherapy services. Policy advocacy supporting direct access to physical therapy would remove the barriers to physical referral while reducing care delays and enhancing outcomes (McKinney et al., 2024). Sophisticated care coordination techniques comprising community services, home environments, and acute care are required for successful programs. Kaiser Permanente's approach to care transitions shows the requisite support for effective implementation.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1829

Furthermore, community-based physiotherapy coverage should be expanded for high-risk neurological and geriatric populations within the 30-day post-discharge timeframe (LeDoux, 2021). This should comprise home-based services and strategic telerehabilitation. Experts also mandate physiotherapy discharge planning and its incorporation into care models to coordinate the need for functional rehabilitation during the process (Gledhill et al., 2023). Lastly, healthcare systems should employ standardized functional outcome measures to describe and determine quality alongside traditional clinical factors, to facilitate the use and role of physiotherapy as an intervention to patient outcomes while supporting the evidence-based allocation of resources (Smith, Furtado, & Brusola, 2022).

VI. CONCLUSION

This study shows that physiotherapy plays a vital role in reducing hospital readmissions by enhancing community reintegration among neurological and geriatric populations in the US. The case studies examined provide evidence that physiotherapy interventions are chief readmission reduction tools, which also help generate tremendous cost savings for healthcare systems.

In the cross-case analysis, the study shows that successful programs are characterized by adequate intensity of intervention, comprehensive caregiver training, and technology-powered delivery models that overcome geographic limitations. These findings support the role of physiotherapy as both a rehabilitation treatment and public health intervention with impacts that are measurable within a population.

In the future, healthcare policymakers must focus on scaling the evidence-based models across the country. For instance, Kaiser Permanente's data-driven method and the VA's telerehabilitation infrastructure offer blueprints for implementing the program across the country. Also, coverage for community-based physiotherapy must be expanded by integrating relevant discharge planning into care requirements while advocating for frameworks that enhance physiotherapy as preventive care in public health policy. Overall, the healthcare transformation needed to address the aging population and increasing chronic burden increase in the US demands cost-effective and innovative solutions. Community-based interventions through physiotherapy services are a solution that can enhance patient independence and reduce healthcare costs.

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