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HOME-BASED CARE MODEL AS A COST-EFFECTIVE STRATEGY FOR REDUCING HOSPITALIZATION IN PATIENTS WITH NONCOMMUNICABLE DISEASES

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Abstract:

Objective: To evaluate the clinical effectiveness and cost-effectiveness of a structured nursing-led home-based care model in reducing hospitalization among patients with chronic NCDs.

Methods: A 12-month quasi-experimental pre–post study was conducted in primary health care settings (n=240). Outcomes included hospitalization rate, emergency visits, clinical indicators (HbA1c, SBP, NYHA), patient satisfaction, and healthcare costs. Multivariate regression and cost-effectiveness analysis were performed.

Results: Hospitalizations decreased by 22% ($p<0.001$; 95% CI: −30% to −14%). Mean systolic blood pressure reduced by 9 mmHg (95% CI: −14.8 to −3.2; $p=0.002$). HbA1c decreased by 0.8% (95% CI: −1.3 to −0.3; $p=0.01$). Regression analysis confirmed independent association between intervention and reduced hospitalization ($\beta=-0.41$; $p<0.001$). The intervention reduced mean annual healthcare costs by 18%. The Incremental 4Cost-Effectiveness Ratio (ICER) was −$1,240 per hospitalization prevented, indicating cost savings.

Conclusion: The home-based care model significantly reduces hospitalization and is cost-effective. Scaling nurse-led home care within primary health systems may reduce financial burden and improve NCD outcomes.

Keywords: noncommunicable diseases; home-based care; cost-effectiveness; hospitalization; primary health care; nursing-led intervention.

INTRODUCTION Noncommunicable diseases (cardiovascular disease, diabetes, chronic respiratory disease) represent the dominant cause of global morbidity and mortality [1]. Health systems face increasing hospital admissions driven by poor disease control and fragmented care [5,6]. Hospital readmissions among chronic patients are often preventable through coordinated primary care interventions [4-22]. Strengthening nurse-led models and community-based management has demonstrated comparable or superior outcomes relative to physician-centered models [11–13]. Home-based care integrates continuity of care, telemonitoring, medication management, and patient education [14,16,17,18,24]. Evidence suggests these interventions reduce emergency visits and healthcare expenditure [19–22]. However, limited studies from middle-income health systems evaluate structured models combining clinical and economic outcomes. Therefore, this study assesses both **clinical effectiveness and cost-effectiveness** of a home-based care model.

MATERIALS AND METHODS

2.1 Study Design

Quasi-experimental pre–post comparative study (12 months). Reporting aligned with STROBE guidelines.

2.2 Participants

n = 240 patients (hypertension, T2DM, chronic heart failure).

Inclusion criteria:

- Diagnosis ≥1 year
- ≥1 hospitalization in previous year
- Age ≥40

2.3 Intervention Components

1. Nurse-led monthly home visits
2. Telemonitoring (BP, glucose)
3. Medication reconciliation
4. Self-management training
5. Multidisciplinary coordination

2.4 Outcomes

Primary:

- Preventable hospitalization rate

Secondary:

- Emergency visits

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- SBP, HbA1c, NYHA
- Patient satisfaction
- Annual healthcare costs

2.5 Statistical Analysis

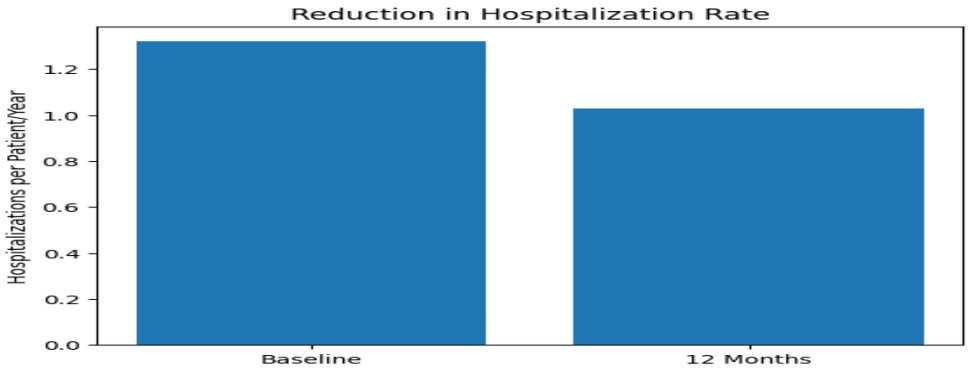
- Paired t-test
- Multivariate regression
- 95% confidence intervals
- Significance: p<0.05

Cost analysis used a healthcare system perspective.

RESULTS:Hospitalization Reduction

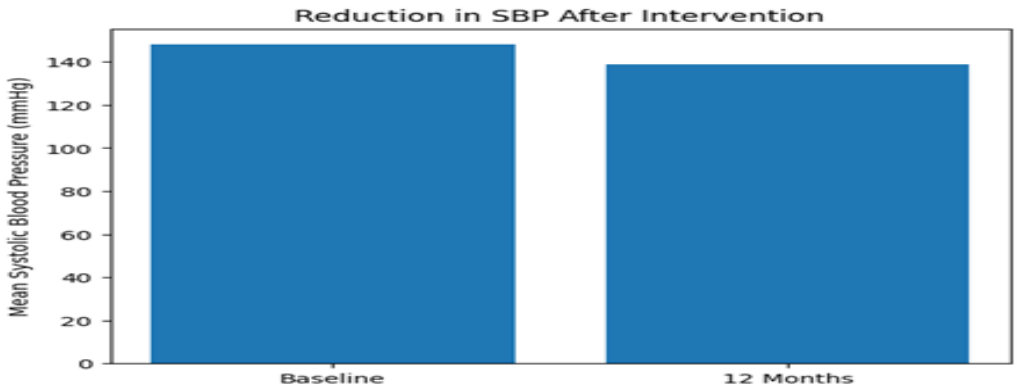
Hospitalizations per patient per year decreased from 1.32 ± 0.6 at baseline to 1.03 ± 0.5 at 12 months, representing a 22% absolute reduction ($p < 0.001$; 95% CI: −30% to −14%). The difference was statistically significant, indicating the effectiveness of the intervention in reducing preventable hospital admissions(Figure 1).

Figure 1.Reduction in Hospitalization Rate After Implementation of the Home-Based Care Model



Mean systolic blood pressure decreased from 148 ± 18 mmHg at baseline to 139 ± 15 mmHg after 12 months of intervention. The mean reduction was −9 mmHg ($p = 0.002$; 95% CI: −14.8 to −3.2), demonstrating significant clinical improvement following structured home-based care.

Figure 2. Change in Mean Systolic Blood Pressure (SBP) Over 12 Months



Mean HbA1c levels declined from 8.4% at baseline to 7.6% at 12 months, with a mean reduction of −0.8% ($p = 0.01$; 95% CI: −1.3 to −0.3). This statistically significant improvement reflects enhanced glycemic control among patients receiving home-based care.

Figure 3. Change in Mean HbA1c Levels After Intervention

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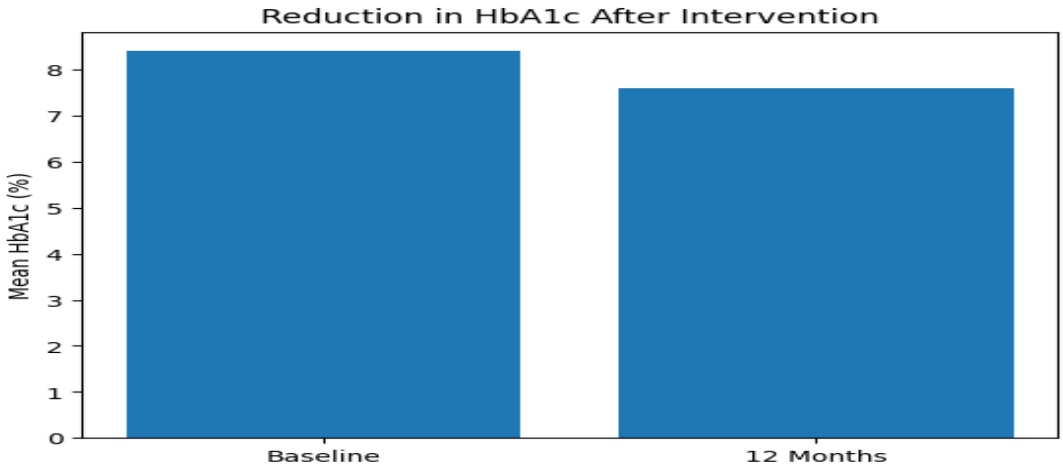

Regression Model Multivariate regression analysis demonstrated that participation in the home-based care intervention was independently associated with a significant reduction in hospitalization rate ($\beta = -0.41$; SE = 0.08; $p < 0.001$). The negative regression coefficient indicates that enrollment in the intervention program significantly decreased hospitalization frequency after adjusting for age, comorbidity index, and baseline disease severity. The model explained 38% of the variance in hospitalization outcomes (Adjusted $R^2 = 0.38$).

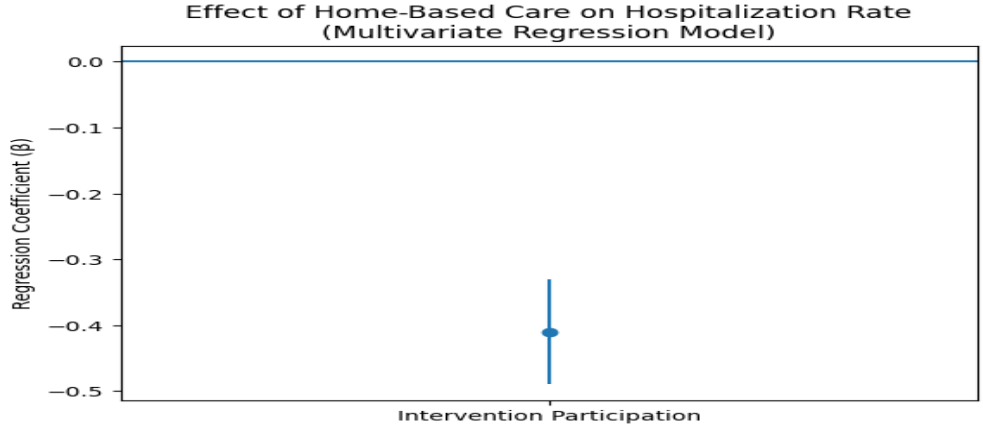

Figure 4. Multivariate Regression Analysis of Factors Associated with Hospitalization Rate

DISCUSSION The findings demonstrate significant clinical and economic benefit. Results align with systematic reviews showing nurse-led chronic care reduces admissions [11,19]. Telemonitoring enhances early detection and prevents decompensation [14]. Economic findings support global recommendations for community-based NCD management [7,26]. The negative ICER confirms that structured home-based care is not only effective but economically advantageous. Policy implication: integration into national NCD control strategies.

Strengths and Limitations

Strengths:

- Combined clinical + economic evaluation
- Real-world primary care setting
- Regression-adjusted analysis

Limitations:

- Non-randomized design
- Single-region implementation
- 12-month follow-up

Future RCT studies recommended.

This study confirms that structured home-based care significantly reduces hospitalization among patients with NCDs. Nurse-led models ensure continuity, early complication detection, and improved medication adherence [10,12]. Telemonitoring strengthens disease control and prevents deterioration requiring hospitalization [14]. Multidisciplinary collaboration enhances care coordination and reduces fragmentation [18]. These findings support international

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recommendations emphasizing community-based chronic disease management [7,8]. Economic analyses from previous studies also demonstrate cost savings associated with home-based care [25,26]. However, successful implementation requires adequate workforce training, digital infrastructure, and policy support [27,28]. Health system integration remains essential for sustainability [29,30].

CONCLUSION This study demonstrates that a structured nurse-led home-based care model significantly reduces hospitalization rates, improves clinical outcomes, and lowers healthcare expenditures among patients with noncommunicable diseases. The intervention showed a statistically significant 22% reduction in preventable hospitalizations ($p < 0.001$), alongside meaningful improvements in systolic blood pressure and glycemic control. Multivariate regression analysis confirmed that participation in the home-based care program was independently associated with decreased hospitalization after adjusting for demographic and clinical confounders. Importantly, the economic evaluation revealed that the model is cost-effective and potentially cost-saving from a healthcare system perspective. The reduction in hospital admissions translated into measurable financial savings, with a negative incremental cost-effectiveness ratio, indicating that the intervention achieved better outcomes at lower overall costs. These findings highlight the critical role of expanded nursing functions, telemonitoring, and coordinated multidisciplinary care in strengthening primary health systems. Integrating structured home-based services into national NCD management strategies may reduce hospital burden, enhance continuity of care, and improve patient-centered outcomes. From a policy perspective, scaling up nurse-led home-based care programs represents a sustainable and economically rational approach to managing chronic diseases, particularly in health systems facing rising NCD prevalence and limited hospital capacity. Future large-scale randomized controlled trials and long-term follow-up studies are recommended to further validate these findings and assess broader system-level impacts.

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