

Clinical and Demographic Characteristics, Frequency, and Reasons for Emergency Department Visits Among Patients Receiving Home Health Care

✉ Sueda Zaman¹, ✉ Emrah Arı¹, ✉ Nureddin Servi¹, ✉ Merve Unutmaz²

¹Mamak State Hospital, Clinic of Emergency Department, Ankara, Türkiye

²Ankara Bilkent City, Clinic of Emergency Department, Ankara, Türkiye

Abstract

Aim: This study aimed to evaluate the demographic and clinical characteristics and reasons for emergency department (ED) visits among patients receiving home health care services and to investigate the impact of comorbidity burden on 30-day ED revisits.

Materials and Methods: This retrospective study was conducted in the ED of Mamak State Hospital. Patients receiving home health care services who presented to the ED between August 2023 and December 2024 were included. Demographic and clinical data of 299 patients were obtained from hospital records. Comorbidity burden was assessed using the Charlson Comorbidity index (CCI). The primary outcome was an ED revisit within 30 days. Statistical analyses included Mann-Whitney U test, chi-square test, ROC analysis, and logistic regression.

Results: Among 299 patients, 62 (20.7%) had a 30-day ED revisit. Patients with revisits had significantly higher CCI scores than those without revisits [median 6 (4-8) vs. 5 (3.5-6); $p < 0.001$]. ROC analysis showed that the CCI had moderate discriminative ability to predict revisits (area under the curve = 0.626). At a cut-off value of CCI > 6 , specificity was 78.1% and sensitivity was 40.3%. In multivariate analysis, CCI was an independent predictor of 30-day revisits (odds ratio: 1.231; 95% confidence interval: 1.075-1.410; $p = 0.003$). Infectious causes were more frequent among patients with revisits, although the difference was of borderline statistical significance ($p = 0.057$).

Conclusion: Comorbidity burden is an important predictor of 30-day ED revisits among patients receiving home health care services. The CCI may help identify high-risk patients and guide closer follow-up with the aim of reducing recurrent ED visits.

Keywords: Home care services, hospital, Charlson Comorbidity index, emergency department visits

Introduction

Home health care services are an important form of healthcare delivery, enabling individuals with chronic diseases and those requiring ongoing care to receive medical treatment in their homes rather than in hospitals. These services play a vital role particularly in the management of chronic diseases and in meeting long-term care needs, especially in parallel with the increasing elderly population (1). As the aging population continues to grow, the prevalence of chronic diseases also increases, leading to a greater demand for home health care services. Therefore, it is essential to further improve the infrastructure and expand the scope of healthcare services provided within home health care systems (2).

According to the regulations, the criteria for patients eligible to receive home health care services are defined as follows:

1. Individuals who are dependent on medical devices, bed, or home due to diagnosed diseases and/or who experience difficulty accessing healthcare services because of advanced age, and who request to receive healthcare services at their place of residence and whose request is deemed appropriate.
2. The following individuals may be included within the scope of home health care services,
 - a) All individuals aged 80 years and older who request the service,



Corresponding Author: Sueda Zaman MD, Mamak State Hospital, Clinic of Emergency Department, Ankara, Türkiye
E-mail: drsuedazaman@gmail.com ORCID ID: orcid.org/0000-0002-4830-9432

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b) Patients aged 65 years and older with a documented chronic disease confirmed by a medical board report and classified as fully dependent or severely dependent in terms of activities of daily living,

c) Patients who are dependent on medical devices and/or home due to their illness,

d) Patients who have received palliative care and whose medical care is considered appropriate to continue at home,

e) Patients for whom home health care services are deemed appropriate by the physician upon hospital discharge and who require continuous medical care according to a treatment plan,

f) Individuals who require medical care for up to thirty days following discharge from a healthcare facility (which may be extended for additional thirty-day periods when necessary by a physician) and who are determined to require temporary medical care at home are eligible for such care.

3. Patients with diabetes, heart failure, stroke, chronic obstructive pulmonary disease, Alzheimer's disease/dementia, neurodegenerative diseases, terminal-stage cancer, chronic diseases with multimorbidity, patients undergoing treatment and follow-up after hip/knee/shoulder fractures, and those requiring medical care due to amputation are prioritized for evaluation within the scope of home health care services (3).

The expansion of home health care services has contributed significantly to reducing hospital length of stay and lowering patient care costs. However, patients receiving these services may still present to hospitals again due to complications or inadequate access to healthcare services (4). The majority of patients receiving home health care services consist of geriatric individuals aged 65 years and older with chronic diseases (5). In this geriatric population, multiple comorbid conditions and polypharmacy are among the main factors that increase emergency department visit rates (6).

To reduce emergency department utilization, home care protocols should be tailored to patient profiles, and educational programs aimed at improving the prognosis of common chronic diseases should be implemented. Such approaches may contribute to reducing emergency department visits (7).

Although public health strategies have been implemented to increase access to home-based or community-based healthcare services in order to prevent overcrowding in emergency departments, scientific evidence regarding the relationship between home health care services and emergency department utilization remains surprisingly limited and controversial (8). In

geriatric patient groups with frequent emergency department visits, the Charlson Comorbidity index (CCI) is a validated, simple, and easily applicable method used to estimate the mortality risk associated with comorbid diseases and is widely utilized as a predictor of long-term prognosis and survival (9).

In this context, the present study retrospectively examined the demographic and clinical characteristics and the reasons for emergency department visits among patients receiving home health care services. In particular, the study aimed to evaluate the impact of comorbidity burden on emergency department revisits within 30 days.

Materials and Methods

This retrospective study was conducted in the Emergency Department of Mamak State Hospital. Patients who were receiving home health care services and who presented to the emergency department between August 2023 and December 2024 were included in the study. Prior to data collection, ethical approval was obtained from the Scientific and Ethical Evaluation Committee for Medical Research No. 2 of Ankara Bilkent (approval no: TABED 2-25-1114, date: 30/04/2025). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Patients who presented to the emergency department during the study period and who were registered in the home health care service program were included. Patients with missing clinical data were excluded. A total of 299 patients were included in the study.

Demographic and clinical characteristics of the patients were obtained retrospectively from hospital records, including age, sex, bedridden status, presence of pressure ulcers, and chronic comorbidities (diabetes mellitus, coronary artery disease, congestive heart failure, peripheral vascular disease, cerebrovascular disease, dementia, lung disease, liver disease, connective tissue disease, and malignancy). Additionally, information regarding the presence of nasogastric tube/percutaneous endoscopic gastrostomy, urinary catheter use, incontinence pad use, and oxygen concentrator use was recorded.

Furthermore, the diagnoses at the initial emergency department visit were categorized as infectious, cardiovascular, musculoskeletal, gastrointestinal, or other.

The comorbidity burden of the patients was assessed using the CCI. The primary outcome of the study was defined as a revisit to the emergency department within 30 days following the initial emergency department visit.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as median and interquartile range, whereas categorical variables were presented as numbers and percentages.

The Mann-Whitney U test was used to compare continuous variables between patients with and without revisits, and the chi-square test to compare categorical variables.

The discriminative ability of the CCI to predict 30-day emergency department revisits was evaluated by ROC curve analysis, and the area under the curve (AUC) was calculated. The optimal cut-off value was determined according to the ROC analysis.

Univariate logistic regression analysis was performed to identify factors associated with emergency department revisits within 30 days. Variables with $p < 0.10$ in the univariate analysis were included in the multivariate logistic regression model. The results were presented as odds ratio (OR) with 95% confidence interval (CI). A p value of < 0.05 was considered statistically significant in all analyses.

Results

Among the 299 patients included in the study, 62 (20.7%) revisited the emergency department within 30 days. Patients who revisited the emergency department had significantly higher CCI scores compared with those who did not [median 6 (4-8) vs. 5 (3.5-6), $p < 0.001$]. However, no significant differences were observed between the groups in terms of age, sex, or most clinical variables (Table 1).

When the distribution of diagnostic categories at the initial emergency department visit was examined according to revisit status, infectious causes were more frequent in the revisit group. However, the overall comparison remained at the borderline of statistical significance ($p = 0.057$) (Table 2).

ROC analysis demonstrated that the CCI had moderate discriminative ability for predicting 30-day emergency department revisits (AUC=0.626; 95% CI: 0.548-0.704; $p < 0.001$) (Figure 1).

At a CCI cut-off of > 6 , specificity was relatively high (78.1%), whereas sensitivity was lower (40.3%) (Table 3).

In the multivariate logistic regression analysis, CCI was the only independent predictor of 30-day emergency department revisits.

Variable	All patients n=299 (%)	No revisit within 30 days n=237 (79.3%)	Revisit within 30 days n=62 (20.7%)	p value*
Age	78 (67-84)	78 (65-84)	79 (74-84)	0.065
Female sex	200 (66.9%)	165 (69.6%)	35 (56.5%)	0.050
Bedridden status	36 (12%)	26 (11%)	10 (16.1%)	0.267
Pressure ulcer	14 (4.7%)	11 (4.6%)	3 (4.8%)	0.948
Diabetes mellitus	101 (33.7%)	73 (30.8%)	28 (45.2%)	0.034
Coronary artery disease	32 (9%)	20 (8.4%)	12 (19.4%)	0.013
Congestive heart failure	73 (24.4%)	56 (23.6%)	17 (27.4%)	0.537
Peripheral vascular disease	11 (3.7%)	7 (3%)	4 (6.5%)	0.193
Cerebrovascular disease	33 (11%)	22 (9.3%)	11 (17.7%)	0.059
Dementia	25 (8.4%)	21 (8.9%)	4 (6.5%)	0.542
Lung disease	68 (22.7%)	49 (20.7%)	19 (30.6%)	0.096
Liver disease	34 (11.4%)	24 (10.1%)	10 (16.1%)	0.186
Connective tissue disease	16 (5.3%)	9 (3.8%)	7 (11.3%)	0.020
Malignancy	20 (6.7%)	13 (5.5%)	7 (11.3%)	0.104
Nasogastric tube/percutaneous endoscopic gastrostomy	7 (2.3%)	6 (2.5%)	1 (1.6%)	0.671
Urinary catheter	14 (4.7%)	10 (4.2%)	4 (6.5%)	0.460
Incontinence pad use	115 (38.5%)	92 (38.8%)	23 (37.1%)	0.804
Charlson Comorbidity index	5 (4-7)	5 (3.5-6)	6 (4-8)	< 0.001
Oxygen concentrator use	12 (4%)	11 (4.6%)	1 (1.6%)	0.280

*Continuous variables are presented as medians (IQRs) The Mann-Whitney U test was used for continuous variables, and the χ^2 test was used for categorical variables

Table 2. Association between diagnostic categories at the initial emergency department visit and 30-day revisit

Diagnosis category	No revisit within 30 days n=237 (79.3%)	Revisit within 30 days n=62 (20.7%)	p value*
Infectious	65 (27.4%)	23 (37.1%)	0.057
Cardiovascular	45 (19%)	17 (27.4%)	
Musculoskeletal	66 (27.8%)	11 (17.7%)	
Gastrointestinal	26 (11%)	8 (12.9%)	
Other (allergy, migraine, vertigo, etc.)	35 (14.8%)	3 (4.8%)	

*Chi-square test

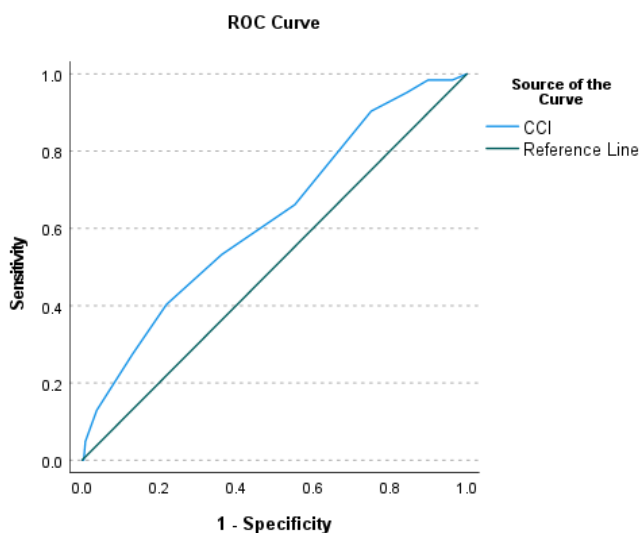


Figure 1. ROC curve for the Charlson Comorbidity index in predicting 30-day emergency department revisit (AUC=0.626)

AUC: Area under the curve, CCI: Charlson Comorbidity index

Each one-point increase in CCI was associated with approximately a 23% increase in the likelihood of a revisit (OR: 1.231; 95% CI: 1.075-1.410; p=0.003) (Table 4).

Discussion

In this study, the rate of emergency department revisits within 30 days among patients receiving home health care services was found to be 20.7%. Studies evaluating emergency department revisit rates in geriatric populations have reported that the revisit rate generally ranges between 15% and 25%. In particular, short-term emergency department revisits are more frequently observed among elderly patients with a high burden of chronic diseases (10-12). Similarly, studies examining emergency

department utilization among geriatric patients have shown that older adults have a high rate of recurrent emergency department visits, which constitutes a significant burden on the healthcare system (13,14). Recent studies have also demonstrated that emergency department revisits in the geriatric population not only increase healthcare system costs but are also associated with a higher risk of hospitalization and mortality (15,16).

In our study, CCI scores were found to be significantly higher among patients who revisited the emergency department. The CCI is a prognostic tool developed to measure comorbidity burden and is widely used in clinical research (17). Although it was initially developed to predict mortality, subsequent studies have shown that it is also associated with various clinical outcomes, including hospitalization, healthcare utilization, and emergency department revisits (18). Particularly in elderly patient groups, an increased comorbidity burden leads to a reduction in physiological reserves and results in greater clinical vulnerability during acute illnesses (19). Therefore, patients with multiple chronic conditions are more likely to experience emergency department visits and recurrent admissions (20). Consistent with the existing literature, our findings support these observations. Similarly, studies conducted among patients receiving community-based healthcare services have demonstrated that comorbidity burden is one of the key determinants of emergency department utilization (8,21). The identification of CCI as an independent risk factor in our multivariate analysis further supports these findings.

In the ROC analysis, the CCI demonstrated a moderate discriminative ability in predicting emergency department revisits (AUC=0.626). Several clinical risk models used in geriatric emergency department populations have also been reported to have a moderate predictive performance (16). One possible

Table 3. Diagnostic performance of the Charlson Comorbidity index in predicting 30-day emergency department revisits (ROC analysis)

Variable	AUC	95% CI	Cut-off value	Sensitivity (%)	Specificity (%)	PPV	NPV	LR+	LR-	p value
CCI	0.626	0.548-0.704	>6	40.32	78.06	32.5	83.3	1.84	0.76	<0.001

CCI: Charlson Comorbidity index, PPV: Positive predictive value, NPV: Negative predictive value, LR+: Positive likelihood ratio, LR-: Negative likelihood ratio, AUC: Area under the curve, CI: Confidence interval

Variable	Univariate OR (95% CI)	p value	Multivariate OR (95% CI)	p value
Charlson Comorbidity index	1.250 (1.095-1.426)	<0.001	1.231 (1.075-1.410)	0.003
Sex	1.768 (0.996-3.136)	0.051	1.678 (0.921-3.057)	0.091
Diagnosis at initial visit	1.068 (0.513-2.222)	0.075	1.034 (0.484-2.209)	0.218
Bedridden status	1.561 (0.708-3.438)	0.269		
Pressure ulcer	1.045 (0.282-3.865)	0.948		
Nasogastric tube/PEG	0.631 (0.075-5.341)	0.673		
Urinary catheter	1.566 (0.474-5.171)	0.462		
Incontinence pad use	0.929 (0.522-1.656)	0.804		

CI: Confidence interval, OR: Odds ratio, PEG: Percutaneous endoscopic gastrostomy

explanation is that clinical outcomes in the geriatric population are influenced not only by comorbidity burden but also by multiple factors such as functional status, cognitive status, social support, and care needs (19,20). Therefore, future risk models incorporating functional status and social determinants of health may achieve higher predictive accuracy.

Diabetes and cardiovascular diseases are among the most common chronic conditions in the geriatric population and significantly increase healthcare utilization (9). Similarly, in our study diabetes mellitus and coronary artery disease were more prevalent among patients receiving home health care services who presented to the emergency department. When diagnoses at the initial visit were evaluated, infectious causes were more frequently observed among patients who revisited; however, the difference remained of borderline statistical significance. Nevertheless, infections are well known to be one of the major causes of emergency department visits among geriatric patients. Age-related decline in immune system function and the presence of chronic diseases increase susceptibility to infections (22). In addition, infections in geriatric patients with a high comorbidity burden may lead to functional deterioration and increased care needs, thereby increasing healthcare utilization (13).

In our study, no significant association was found between either age or sex and emergency department revisits. Although some studies have reported that advanced age and male sex may increase healthcare utilization, these findings have not been consistently observed across all studies (12,16). Existing evidence suggests that in geriatric populations, clinical outcomes are more strongly influenced by factors such as comorbidity burden, functional dependency, and care needs rather than demographic characteristics (19,20).

Our findings suggest that systematic evaluation of comorbidity burden among patients receiving home health care services is clinically important. Identifying patients with high CCI scores

as high-risk during emergency department visits and planning closer follow-up for these individuals may help reduce recurrent visits. Furthermore, stronger coordination between home health care services and emergency departments may help reduce unnecessary hospital visits in this patient population (8,21).

Study Limitations

This study has several limitations. First, the retrospective design and the single-center setting may limit the generalizability of the findings. In addition, some geriatric variables such as functional status, social support, and medication burden could not be evaluated. Nevertheless, this study contributes to the literature as one of the few studies examining emergency department revisits and their relationship with comorbidity burden among patients receiving home health care services.

Conclusion

This study demonstrated that comorbidity burden is an important determinant of emergency department revisits within 30 days among patients receiving home health care services. The CCI may serve as a practical tool for identifying high-risk patients during emergency department visits. Early identification of high-risk patients using simple clinical tools such as the CCI may facilitate targeted interventions and improve healthcare resource utilization in this vulnerable population. Future multicenter prospective studies may contribute to developing effective strategies to reduce recurrent emergency department visits among patients receiving home health care services.

Ethics

Ethics Committee Approval: Prior to data collection, ethical approval was obtained from the Scientific and Ethical Evaluation Committee for Medical Research No. 2 of Ankara Bilkent (approval no: TABED 2-25-1114, date: 30/04/2025). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Informed Consent: This is retrospective study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: S.Z., N.S., Concept: S.Z., N.S., M.U., Design: S.Z., E.A., Data Collection or Processing: S.Z., N.S., Analysis or Interpretation: E.A., M.U., Literature Search: S.Z., N.S., Writing: S.Z., E.A.

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