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Original Research

RELATIONSHIP BETWEEN AGE, GENDER, AND MULTIMORBIDITY WITH LENGTH OF HOSPITAL STAY IN ELDERLY PATIENTS

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ABSTRACT: To evaluate the relationship between age, sex, and multimorbidity with hospital length of stay among elderly inpatients. A retrospective cross-sectional study was conducted on 507 medical records of patients aged ≥60 years admitted to the Senior Officer Department, 103 Military Hospital, between December 2022 and October 2024. Data were analyzed using SPSS version 26.0. One-way and two-way ANOVA were performed to examine the effects of age, sex, and comorbidity burden on hospital stay. Male patients had longer hospital stays (10.68 ± 6.24 vs. 9.40 ± 4.95 days) and a higher mean number of comorbidities (3.57 ± 1.70 vs. 3.26 ± 1.69; both $p < 0.05$) compared with females. Hospital stay increased with advancing age, from 9.27 ± 5.78 days in the 60–69 age group to 11.07 ± 5.54 days in the 80–89 age group ($p < 0.001$). Similarly, the number of comorbidities rose with age, from 2.84 ± 1.48 to 4.24 ± 1.93 ($p < 0.001$). Two-way ANOVA confirmed significant effects of both age ($p < 0.001$) and sex ($p = 0.033$) on comorbidity burden, whereas the interaction effect was not significant ($p = 0.091$). For hospital stay, comorbidity burden was the main determinant ($p < 0.001$), with no significant sex effect ($p = 0.09$). Patients with ≥6 comorbidities had markedly prolonged hospital stays, irrespective of sex. Age and multimorbidity are the principal determinants of hospital stay duration in elderly patients. While males showed a higher comorbidity burden, the effect of sex on hospital stay was largely explained by multimorbidity. These findings underscore the importance of comprehensive comorbidity management to reduce hospital stay and optimize care for older adults.

Keywords: Length of hospital stay, age, gender, multimorbidity, elderly patients.

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1. INTRODUCTION

The global population is aging rapidly, particularly in developing countries, including Vietnam. The increasing number of older adults poses major challenges to healthcare systems, especially in the management and treatment of chronic diseases and multimorbidity. According to the World Health Organization (WHO) [1], multimorbidity is a key factor contributing to higher healthcare costs and longer hospital stays, with substantial impacts on quality of life and economic burden.

International studies have demonstrated strong associations between age, sex, and multimorbidity with hospital length of stay. Older adults with multiple chronic conditions are more likely to experience prolonged hospitalizations and higher readmission rates, with variations across sex and age groups [2]. For instance, women are more likely to develop multiple chronic conditions at advanced ages, whereas men show higher prevalence of genitourinary disorders and have greater mortality when affected by multimorbidity [3].

In Vietnam, research examining the interplay of age, sex, and multimorbidity in relation to hospital length of stay remains limited, despite the rapid demographic transition. According to the General Statistics Office of Vietnam (2022) [4], individuals aged ≥60 years accounted for over 12% of the population, and this proportion is projected to increase further in the coming decades. While prior studies have addressed individual chronic diseases, few have investigated the combined impact of age, sex, and multimorbidity on hospitalization. To address this gap, the present study aimed to provide additional insights and clarify these relationships, thereby contributing to the development of more effective strategies for older adults and reducing the burden on healthcare systems and society.

2. MATERIALS AND METHODS

2.1. Study Population

A total of 507 medical records of patients aged ≥60 years hospitalized between December 2022 and October 2024 at the Senior Officer Department, 103 Military Hospital, were reviewed.

Inclusion criteria: Patients aged ≥60 years admitted to and discharged from the Senior Officer Department, with complete medical records and diagnoses coded according to ICD-10.

Exclusion criteria: Records of patients not hospitalized or discharged from the study department, or those with incomplete essential data.

2.2. Study Design

This was a retrospective cross-sectional descriptive study based on data extracted from inpatient medical records.

2.3. Study Procedures

Sample selection: Records meeting inclusion and exclusion criteria were coded and entered into the database.

Data collection: Extracted variables included admission and discharge dates, year of birth, sex, and ICD-10 coded diagnoses.

Data management: Data were initially entered into Excel, verified for completeness and accuracy, and subsequently analyzed using SPSS version 26.0.

2.4. Study Variables

Independent variables: Age: categorized into four groups (60–69, 70–79, 80–89, ≥90 years). Sex: male and female. Number of comorbidities: calculated as the total number of ICD-10–coded conditions, recorded in binary form (1 = present, 0 = absent). Conditions included hypertension, diabetes mellitus, arrhythmia, cardiovascular disease, dyslipidemia, heart failure, chronic kidney disease, stroke, gout, musculoskeletal disorders, neurological diseases, cachexia, and other conditions (e.g., thyroid disorders, previously treated malignancies).

Dependent variable: Length of hospital stay: calculated from admission to discharge and categorized into short, medium, and long hospital stays based on the median value.

2.5. Statistical Analysis

Data were analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize baseline characteristics. One-

way ANOVA was employed to compare differences in length of hospital stay and number of comorbidities across age groups. Two-way ANOVA was conducted to evaluate the independent effects of sex and age group on comorbidity burden and hospital stay, as well as to test for potential interaction effects. A p-value <0.05 was considered statistically significant.

2.6. Ethical Considerations

The study was conducted in accordance with the Declaration of Helsinki of the World Medical Association. All data were anonymized and contained no personally identifiable information. The study was approved by the Senior Officer Department, 103 Military Hospital. The authors declare no conflicts of interest.

3. RESULT

Male patients had significantly longer hospital stays and a higher mean number of comorbidities compared with female patients (both p < 0.05). No significant difference in age distribution was observed between the two groups (p > 0.05) (table 1).

Table 1. Comparison of hospital stay duration, number of comorbidities, and age between males and females

	n	Mean	± SD	p
Length of hospital stay (days)				
Female	257	9.40	4.95	< 0.05
Male	250	10.68	6.24	
Number of comorbidities (diseases)				
Female	257	3.26	1.69	< 0.05
Male	250	3.57	1.70	
Age (years)				
Female	257	73.82	9.81	> 0.05
Male	250	73.64	9.71	

Hospital stay duration increased significantly with advancing age, with patients aged 80–89 years showing the longest mean stay (p < 0.05). Similarly, the number of comorbidities rose progressively across age groups, from 2.84 in the 60–69 age group to over 4 in patients aged ≥80 years (p < 0.05) (table 2).

Table 2. Comparison of hospital stay duration and number of comorbidities across age groups

Age group (years)	n	Mean	± SD	p
Length of hospital stay (days)				
60–69	203	9.27	5.78	< 0.05
70–79	159	10.16	5.71	
80–89	105	11.07	5.54	
≥90	40	10.73	4.66	
Total	507	10.04	5.66	
Number of comorbidities				
60–69	203	2.84	1.48	< 0.05
70–79	159	3.45	1.50	
80–89	105	4.24	1.93	
≥90	40	4.03	1.79	
Total	507	3.41	1.70	

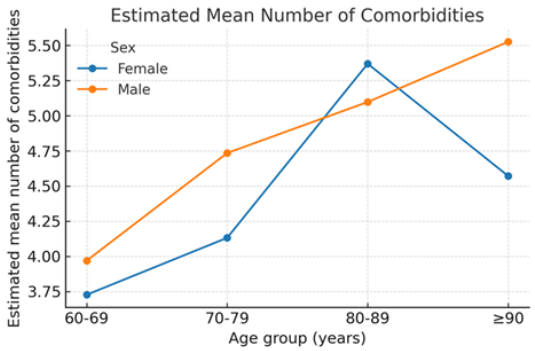

Figure 1. Association between age group, sex, and number of comorbidities

The mean number of comorbidities increased significantly with advancing age (p < 0.001). Male patients consistently exhibited a higher burden of comorbidities than females (p = 0.033). No significant interaction was found between age group and sex (p = 0.091), indicating that the effect of sex on multimorbidity was consistent across all age groups [Figure 1].

The mean length of hospital stay increased significantly with the number of comorbidities (p < 0.001). No significant differences were observed between sexes (p = 0.09), and there was no evidence of interaction between sex and comorbidity groups (p = 0.11). These findings indicate

that the burden of multiple comorbidities is the primary determinant of hospital stay duration, irrespective of sex [Figure 2].

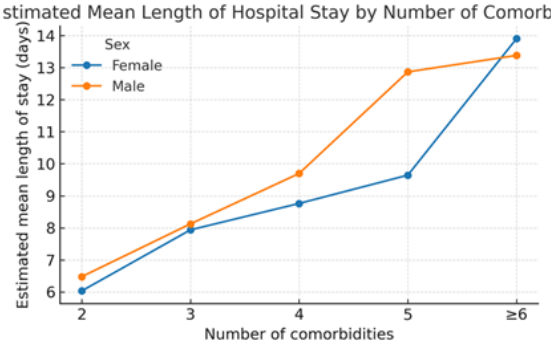

Figure 2. Association between number of comorbidities, sex, and mean hospital stay

4. DISCUSSION

This study shows that hospital length of stay (LOS) rises with advancing age and with greater multimorbidity; men, on average, had more comorbidities and longer LOS than women in unstratified analyses. When LOS was examined across comorbidity strata, sex differences were not statistically significant, indicating that the apparent male–female gap is largely explained by a higher comorbidity burden in men. LOS increased sharply once patients accumulated ≥5 conditions, consistent across age groups and most evident in older adults.

Our findings accord with prior literature. Rodrigues et al. reported that multimorbidity (≥2 conditions) was associated with hospitalization metrics and that age ≥75 years and male sex were important correlates, echoing our observation that age and sex patterns track with comorbidity load [2]. Alharbi et al. described substantial multimorbidity in older cohorts (mean ≈2.9 conditions), with sex differences in the distribution of chronic illnesses—again consistent with our data showing a higher comorbidity burden in men [3]. A systematic review also linked older age, multimorbidity, and male sex to increased service use and LOS among older adults [5], while subsequent studies confirmed age-graded rises in multimorbidity prevalence and sex-specific patterns (women older with greater functional decline; men accumulating more concurrent diseases) [6], [7], [8]. Taken together, these data and our results suggest that the pathway from sex to prolonged LOS is mediated primarily by disease burden, not sex per se.

Clinical implications. First, risk stratification and discharge planning should prioritize comorbidity burden (e.g., thresholds at ≥5 conditions) rather than sex alone. Second, proactive geriatric comorbidity management—hypertension, diabetes, cardiovascular disease, chronic kidney disease, and neurologic/musculoskeletal conditions featured prominently—may shorten LOS. Third, because age intensifies multimorbidity, integrating comprehensive geriatric assessment and transitional-care bundles for the oldest patients may curb prolonged stays and readmissions.

Strengths and limitations. Strengths include a relatively large single-center cohort (n=507), standardized ICD-10 coding, and prespecified analyses. Limitations include the retrospective design, single-site setting (generalizability), lack of disease-severity and functional-status measures, and potential organizational factors (e.g., bed management, social discharge barriers) that can influence LOS but were not modeled.

5. CONCLUSIONS

In elderly inpatients, age and multimorbidity are the principal determinants of LOS. The crude male–female difference attenuates after accounting for comorbidity, underscoring that interventions should target disease burden and complexity rather than sex itself. These insights can inform resource planning and geriatric-focused care pathways in Vietnamese hospitals and similar settings.

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