

Original Research Article

Frailty, multimorbidity and adverse hospitalization outcomes: a cross-sectional study of geriatric patients in a low-resource setting

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ABSTRACT

Background: As the global population ages, frailty has emerged as a critical predictor of adverse hospitalization outcomes. In low-resource settings like Bangladesh, socioeconomic barriers frequently lead to Discharge Against Medical Advice (DAMA), yet the specific role of frailty in driving these premature discharges remains poorly understood.

Methods: A cross-sectional study was conducted at Sir Salimullah Medical College Mitford Hospital, Dhaka, involving 250 inpatients aged ≥ 50 years. Frailty was assessed using the 9-point Clinical Frailty Scale (CFS), categorized into three tiers: Low Risk/Vulnerable (CFS 2-4), Moderately Frail (CFS 5-6), and Severely/Terminally Frail (CFS 7-9). Multimorbidity and hospitalization outcomes (mortality, length of stay, and DAMA) were analyzed using Pearson's Chi-square and binary logistic regression.

Results: High levels of frailty were observed, with 60% of the cohort classified as moderately to severely frail. Multimorbidity was prevalent, led by diabetes (53.6%), hypertension (50.0%), and anemia (49.6%). The DAMA rate was alarmingly high at 61.6%. Logistic regression identified moderate frailty as a primary predictor of DAMA (AOR = 2.66, 95% CI: 1.26-5.64, $p = 0.011$), while severe frailty did not reach statistical significance ($p = 0.313$). Patients identified home health monitoring (81.2%) and financial support (57.2%) as the most critical needs to reduce future hospitalizations.

Conclusions: Moderate frailty serves as a critical tipping point where clinical needs and caregiver burden intersect, significantly increasing the risk of DAMA. Addressing geriatric outcomes in Bangladesh requires integrating clinical frailty assessments with socioeconomic support and home-based care strategies to mitigate premature hospital discharge.

Keywords: Frailty, Clinical frailty scale, Discharge against medical advice, Geriatrics, Bangladesh, Multimorbidity

INTRODUCTION

The global demographic shift toward an aging population has profound implications for healthcare systems worldwide. The World Health Organization (WHO) projects that by 2050, the number of individuals aged 60 years and older will more than double, reaching approximately 2.1 billion, with particularly significant impacts on low and middle-income countries (LMIC) such as Bangladesh, where the geriatric population is rapidly increasing.^{1,2} Concurrently, hospitalizations among older adults are rising, correlating with increased morbidity and mortality rates attributed to chronic diseases and acute health issues prevalent in this age group.³ This trend not only places enormous strain on healthcare resources but also highlights the urgent need for effective management strategies tailored to the geriatric demographic.

Frailty, a syndrome characterized by decreased physiological reserve and increased vulnerability to stressors, has emerged as a key predictor of adverse health outcomes in older adults, including prolonged hospital stays, increased readmission rates, and heightened risk of mortality.^{4,5} The Clinical Frailty Scale (CFS) is widely adopted for assessing frailty in clinical settings; it categorizes patients based on their level of fitness and function, enabling healthcare providers to tailor interventions accordingly.^{6,7} Studies have demonstrated that frailty significantly impacts hospitalization outcomes by predicting clinical deterioration and non-home discharge, reinforcing the necessity for comprehensive geriatric assessments both pre- and post-hospitalization.^{8,9}

The phenomenon of Discharge Against Medical Advice (DAMA) is particularly prevalent among older adults, exacerbated in resource-limited settings where socio-economic constraints often compromise decision-making regarding hospitalization.^{10,11} Factors driving DAMA include inadequate family support, financial barriers, and patients' own perceptions of their health status.¹² Understanding these underlying determinants is crucial for improving care delivery and reducing adverse health consequences post-discharge. Given the complex interplay between socio-economic factors, family dynamics, and individual attitudes towards hospitalization, elucidating these relationships is vital for formulating effective interventions.¹³

In Bangladesh, there exists a substantial knowledge gap concerning the distribution of frailty among hospitalized geriatric patients and its influence on hospitalization outcomes, including the determinants of DAMA.¹⁴ This study aims to address these gaps by conducting a cross-sectional descriptive analysis of geriatric inpatients at Sir Salimullah Medical College Mitford Hospital, focusing on the prevalence of frailty and its association with hospitalization outcomes. Specifically, our objectives are to delineate the frailty distribution, investigate its correlation with adverse outcomes, and identify factors influencing DAMA among older adults in this setting. By

doing so, we aspire to contribute valuable insights to the field of geriatric medicine in Bangladesh.

METHODS

Study design and setting

This cross-sectional descriptive study was conducted in the Department of Medicine at Sir Salimullah Medical College Mitford Hospital, Dhaka, over a six-month period (January to June 2025).

Sampling and participant selection

The study included patients aged 50 years and older who were admitted during the study period and provided informed consent. The inclusion of the 50–59 age bracket was chosen to account for the "early-aging" phenomenon and high chronic disease burden prevalent in low-resource settings. Patients admitted to non-medical departments, those refusing consent, or cases with incomplete data were excluded.

A total of 250 patients were enrolled using consecutive convenience sampling. This exceeded the initial power calculation requirement ($N = 218$), which was based on a 95% confidence level, 50% assumed prevalence, and 7% margin of error, adjusted for a 10% non-response rate.

Data collection and instruments

Data were collected via structured interviewer-administered questionnaires and medical record reviews. Key variables included demographics, living situations, comorbidities, and hospitalization history.

Frailty was assessed using the 9-point Clinical Frailty Scale (CFS). For the purpose of statistical comparative analysis and to ensure adequate cell counts for Chi-square testing, CFS scores were collapsed into three distinct clinical tiers: Low Risk/Vulnerable (CFS 2–4); Moderately Frail (CFS 5–6); Severely/Terminally Frail (CFS 7–9).

Statistical analysis

Data was analyzed using STATA software. Descriptive statistics (frequencies, percentages, and means) summarized baseline characteristics. Associations between the three-tiered frailty categories and hospitalization outcomes (mortality, length of stay, and DAMA) were assessed using Pearson's Chi-square tests.

Binary logistic regression was performed to identify independent determinants of Discharge Against Medical Advice (DAMA). Adjusted Odds Ratios (AOR) with 95% Confidence Intervals (CI) were reported, using the "Low Risk/Vulnerable" group as the reference category. Ethical approval was obtained from the institutional Ethical Review Board.

RESULTS

Table 1 summarizes the baseline characteristics of the 250 hospitalized geriatric patients. Most patients were aged 60-69 years (32.4%) or 70-79 years (30.4%), with 14.4% over 80 years.

Males accounted for 52.0% and females for 48.0%. The majority lived with family (66.4%), while 33.2% lived alone. Nearly half of the cohort previously engaged in

community roles (44.0%), followed by general labor (22.8%) and professional occupations (18.8%).

Frailty levels were notably high, with more than 60% of patients classified as moderately to severely frail (CFS 6–8). Moderately frail patients (CFS 6) constituted the largest group (25.2%), followed by severely frail (CFS 7) at 23.2% and very severely frail (CFS 8) at 13.2%. Only 3.6% were well or managing well. Smoking was reported by 28.0% (Table 1).

Table 1: Baseline characteristics of hospitalized geriatric patients (n=250).

Characteristics	Subcategories	N (%)
Age (in years)	50-59	57 (22.8)
	60-69	81 (32.4)
	70-79	76 (30.4)
	>80	36 (14.4)
Gender	Male	130 (52.0)
	Female	120 (48.0)
Living Situation	Living alone	83 (33.2)
	Living with family	166 (66.4)
	Other	1 (0.4)
Occupation	Professional	47 (18.8)
	Skilled trade	28 (11.2)
	General labour	57 (22.8)
	Community roles	110 (44.0)
	Unemployed	10 (4.0)
Clinical frailty scale (CFS)	Low risk/vulnerable (CFS 2–4)	42 (16.8)
	2 (well)	4 (1.6)
	3 (managing well)	5 (2.0)
	4 (vulnerable)	33 (13.2)
	Moderate (CFS 5–6)	104 (41.6)
	5 (mildly ill)	41 (16.4)
	6 (moderately ill)	63 (25.2)
	Severe/Terminal (CFS 7–9)	104 (41.6)
	7 (severely ill)	58 (23.2)
	8 (very severely ill)	38 (15.2)
	9 (terminally ill)	8 (3.2)
Behavioural risk factor	Smoker	70 (28.0)
	Alcoholic	5 (2.0)

As shown in Table 2, multimorbidity was common. Diabetes mellitus (53.6%), hypertension (50.0%), and anemia (49.6%) were the most frequent chronic conditions. Additional prevalent conditions included

weight loss (26.4%), fluid and electrolyte imbalance (20.0%), prior stroke (19.2%), renal disease (13.6%), and myocardial infarction (12.0%). Many patients had multiple concurrent illnesses.

Table 2: Frequency of pre-existing conditions (n=250).

Pre-existing conditions	N (%)
Diabetes Mellitus (DM)	134 (53.6)
Hypertension (HTN)	125 (50.0)
Anemia	124 (49.6)
Weight loss	66 (26.4)
Fluid and electrolyte imbalance	50 (20.0)
History of stroke	48 (19.2)
Renal disease	34 (13.6)
Myocardial infarction (MI)	30 (12.0)

Continued.

Pre-existing conditions	N (%)
Tuberculosis (TB)	30 (12.0)
Cardiovascular disease (CVD)	29 (11.6)
Obesity	25 (10.0)
Peptic ulcer disease (PUD)	19 (7.6)
Chronic obstructive pulmonary disease (COPD)	18 (7.2)
Chronic infection	17 (6.8)
Bronchial Asthma	13 (5.2)
Congestive cardiac failure (CCF)	13 (5.2)
Hypothyroidism	11 (4.4)
Parkinson's disease	10 (4.0)
Malignancy	9 (3.6)
Chronic liver disease (CLD)	6 (2.4)
Cardiac arrhythmia	6 (2.4)
Malabsorption	5 (2.0)

Note: The sum of individual condition frequencies (n) is greater than the total number of patients (n=250) because patients may have multiple concurrent conditions.

Hospitalization patterns in Table 3 revealed that 60.8% had been hospitalized within the past year. Length of stay was calculated for 145 patients with available records, showing that the majority (72.4%) stayed between 4 and 7 days. The most striking finding was the high rate of

Discharge Against Medical Advice (DAMA), which accounted for 61.6% of all outcomes, exceeding both standard discharge (27.6%) and in-hospital mortality (10.8%).

Table 3: Admission patterns and in-hospital outcomes.

Metrics	Categories	N	%
Outcome of hospital admission	Discharged against medical advice	154	61.6
	Discharged with advice	69	27.6
	Death	27	10.8
Prior hospitalization (last 1 year)	Yes	152	60.8
	No	98	39.2
Number of hospitalizations (last 1 year)	Never	111	44.4
	Once	126	50.4
	2–3 times	11	4.4
	>3	2	0.8
Duration of hospital stay*	≤3 days	22	15.2
	4–7 days	105	72.4
	>7 days	18	12.4

*Length of stay was calculable for 145 patients with available records; data were missing for the remainder

Frailty was significantly associated with adverse hospitalization metrics in Table 4. For these analyses, the Clinical Frailty Scale (CFS) scores were grouped into three tiers: Low Risk (CFS 2–4), Moderately Frail (CFS 5–6), and Severely Frail (CFS 7–9), to ensure sufficient

statistical power (df = 2). Higher CFS categories were linked to prior hospitalization ($\chi^2 = 28.528$, $p < 0.001$), prolonged hospital stays ($\chi^2 = 13.565$, $p = 0.009$), and in-hospital mortality ($\chi^2 = 15.688$, $p = 0.0004$).

Table 4: Association between clinical frailty scale (CFS) and hospital admission outcomes.

Associations	Chi-square statistic	Degrees of freedom	P value
CFS vs. prior hospitalization	28.528	2	<0.001
CFS vs. prolonged hospital stay	13.565	4	0.009
CFS vs. in-hospital mortality	15.688	2	0.0004

The binary logistic regression analysis (Figure 1) identified clinical frailty as a primary predictor of Discharge Against Medical Advice (DAMA). Patients categorized with Moderate Frailty (CFS 5–6) were significantly more likely to undergo DAMA compared to

the Low Risk (CFS 2–4) reference group (AOR = 2.66, 95% CI: 1.26–5.64, $p = 0.011$). While the Severe Frailty group (CFS 7–9) also showed an increased trend toward DAMA (AOR = 1.46), this did not reach statistical significance ($p = 0.313$).

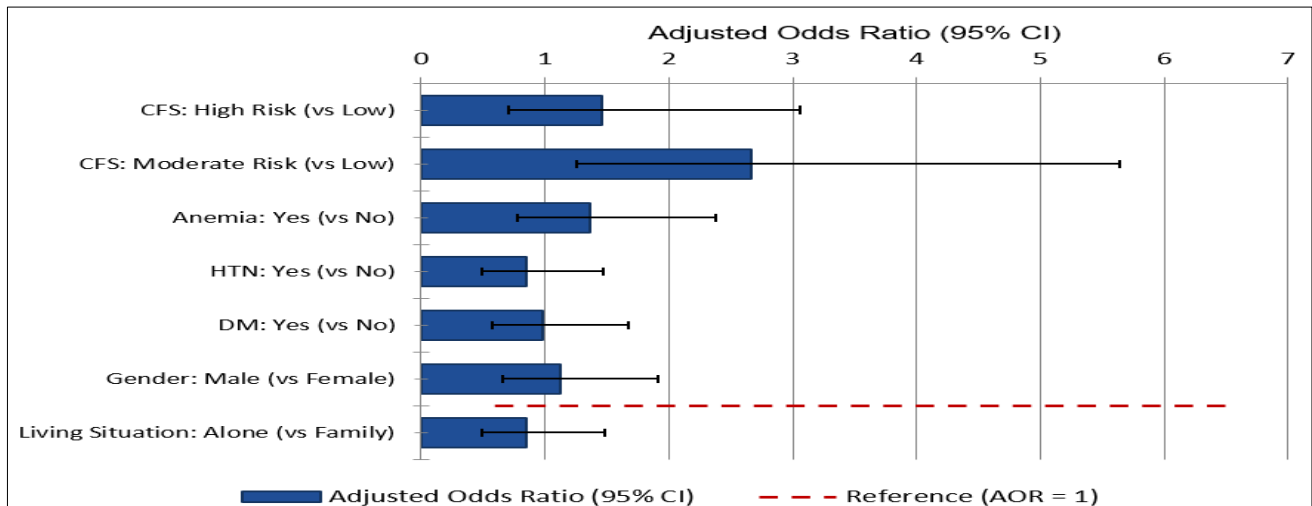


Figure 1: Binary logistic regression for determinants of discharge against medical advice (DAMA). Adjusted odds ratios (AOR) with 95% confidence intervals are shown for the Moderately Frail (CFS 5–6) and Severely/Terminally Frail (CFS 7–9) groups relative to the Low Risk/Vulnerable (CFS 2–4) reference category.

Patient-reported strategies to reduce hospital visits in Figure 2 prioritized home-based and clinical interventions: regular home health monitoring (81.2%) and better family support at home (72.0%) were the highest-ranked needs

identified by patients. Clinical and socioeconomic interventions, such as improved primary healthcare services (57.6%) and financial support for treatment costs (57.2%), were also frequently selected as key factors for reducing hospital admissions.

Table 5: Exact adjusted odds ratios (AOR), 95% confidence intervals and p values for Figure 1.

Predictors	AOR	95% CI	P value
CFS: High Risk (vs Low)	1.46	0.70–3.06	0.313
CFS: Moderate Risk (vs Low)	2.66	1.26–5.64	0.011
Anemia: Yes (vs No)	1.36	0.78–2.38	—
HTN: Yes (vs No)	0.85	0.49–1.47	—
DM: Yes (vs No)	0.98	0.57–1.67	—
Gender: Male (vs Female)	1.12	0.66–1.91	—
Living Situation: Alone (vs Family)	0.85	0.49–1.48	—

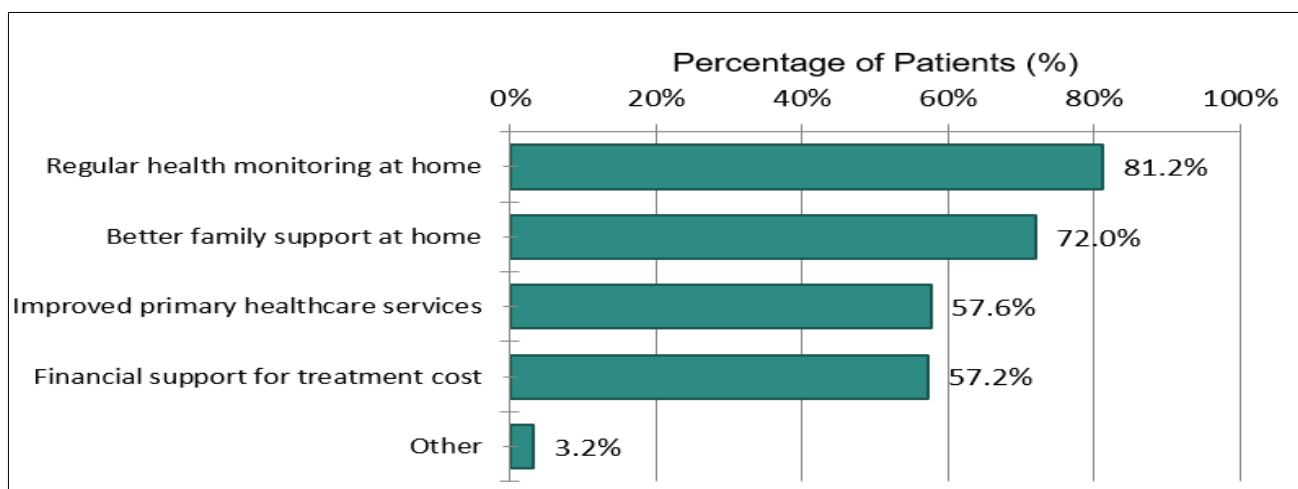


Figure 2: Patient-identified factors to reduce hospital visits. Bars represent the proportion of patients (%) who identified each factor as important for reducing future hospital admissions.

DISCUSSION

The interpretation of results from this study concerning hospitalized geriatric patients underscores several crucial aspects related to frailty, multimorbidity, and their influence on hospitalization outcomes within the Bangladeshi context.

Prevalence and clinical impact of frailty and multimorbidity

The cohort's demographic details are indicative of the progressive aging of the population, with a significant representation of older adults aged 60–79 and a nearly balanced gender distribution (52.0% male). These findings align with existing literature highlighting the increasing prevalence of chronic conditions and frailty in this demographic.^{15,16}

When contextualizing the findings within a global framework, the prevalence of frailty and multimorbidity among our inpatients mirrors trends observed in other low-resource settings. Recent literature indicates that geriatric populations in South Asia, particularly in Bangladesh, demonstrate frailty rates that are concerning high. For instance, a study in India reported frailty rates around 52% among hospitalized older adults, which supports our findings in the Bangladeshi context.¹⁷ This comparability suggests systemic risks associated with aging populations across South Asia, whereby healthcare systems often lack necessary resources and integrated care approaches.

Despite extensive literature on frailty and hospitalization, this study contributes critical insights into the prevalence and impact of frailty within a Bangladeshi context, highlighting gaps regarding local healthcare practices and outcomes. A concerning finding is the high prevalence of frailty, with 60% of patients classified as moderately to severely frail (CFS 6–8). This observation is significant in light of global findings that suggest frailty significantly correlates with adverse outcomes.¹⁸ Our bivariate analysis confirmed these links, showing statistically significant associations between frailty level and prior hospitalization ($\chi^2 = 28.528$, $p < 0.001$), prolonged hospital stay ($\chi^2 = 13.565$, $p = 0.009$), and in-hospital mortality ($\chi^2 = 15.688$, $p = 0.0004$). These associations resonate with findings from studies in other settings that link frailty to increased mortality and length of hospital stays.^{19,20} Notably, prior hospitalization serves as a critical indicator of subsequent healthcare needs, suggesting that frailty may lead to recurrent admissions, thereby straining already limited healthcare resources.²¹ These results reinforce previous literature that links increased frailty to a higher frequency of readmissions and unfavorable clinical outcomes.^{7,22,23}

The study also documents high multimorbidity rates, supporting the observation that geriatric populations often face compounded health challenges.^{7,24,25} Chronic conditions such as diabetes mellitus (53.6%) and hypertension (50.0%) were particularly prevalent among

participants.²⁶ The burden of multimorbidity reported (DM 53.6%, HTN 50.0%) also merits discussion, as it significantly contributes to geriatric health trajectories in South Asia.²⁷ This complex interrelation between multimorbidity and frailty is known to intensify its effects and increase healthcare resource utilization.^{28,29} Multimorbidity in older adults has been established as a risk factor for a range of negative health outcomes, reiterating the need for integrated care plans that address both physical and psychosocial aspects of health.³⁰

Determinants of adverse discharge outcomes (DAMA)

The observed 10.8% mortality rate and the alarming 61.6% rate of Discharge Against Medical Advice (DAMA) underscore significant systemic challenges. The exceptionally high DAMA rate identified in our study is particularly alarming. It aligns with observations from other low-resource settings, where socioeconomic barriers heavily influence care pathways. The high DAMA rate further resonates with findings in low-resource contexts that highlight social, economic, and health system hurdles contributing to premature discharge decisions.³¹

The logistic regression analysis provided critical insight into the factors driving DAMA. In case of CFS and DAMA, we observed a statistically significant positive association, where patients with moderate frailty were over two times more likely to be discharged against medical advice compared to those in the low-risk/vulnerable category (CFS 2–4) (AOR = 2.66, $p = 0.011$). This finding suggests that moderate frailty may represent a critical tipping point in the care continuum. While these patients require significant clinical support, the mounting financial and familial pressures associated with their care may eventually eclipse the perceived benefits of hospitalization.³²

Unlike "Low Risk" patients who recover quickly, or "Severely Frail" patients who may be too unstable to move, the "Moderately Frail" require intensive, long-term assistance. In Bangladesh's out-of-pocket healthcare system, the mounting financial burden and physical strain on families likely reach a breaking point, making DAMA a socio-economic necessity rather than a clinical choice. This aligns with the evidence from a recent study which identifies patient and relative fatigue, alongside financial burden, as the primary catalysts for DAMA.³³

Regarding clinical comorbidities, the presence of anemia was not found to be a statistically significant predictor of DAMA in this cohort (AOR = 1.36, $p = 0.279$). This contrasts with previous assumptions that acute physiological needs, such as those associated with severe anemia, necessarily increase patient compliance or caregiver concern.³⁴

Other factors like living arrangements (living alone vs. with family) showed non-significant predictive capabilities, raising concerns about how factors such as

socioeconomic status, despite their perceived importance, influence the final discharge decision.

Socioeconomic and systemic factors

Patient-reported strategies to reduce hospital visits prioritized a combination of home-based monitoring and socioeconomic support. The highest-ranked needs identified by patients were regular home health monitoring (81.2%) and improved family support at home (72.0%). These findings align with existing literature indicating that environmental and socioeconomic factors are significant determinants of hospitalization outcomes.³⁵

Furthermore, the demand for improved primary healthcare services (57.6%) and financial support for treatment costs (57.2%) underscores socioeconomic constraints as primary barriers to healthcare access and key motivators for seeking reduced hospital stays. These results are congruent with earlier studies suggesting that economic challenges and gaps in social support significantly impede geriatric patients' access and adherence to necessary care.³⁶⁻³⁸

Importantly, the exploration of caregiver stressors and the implications of socioeconomic conditions remain under-explored in the literature, presenting a valuable area for future research.³⁹ The socioeconomic barriers highlighted in our findings, especially the urgent need for financial assistance, further emphasize how structural disadvantages shape hospitalization trajectories for frail older adults. Chronic shortages in healthcare funding, inadequate family support structures, and the high cost of medical care have been shown to contribute to increased rates of DAMA and reduced chances of recovery among emotionally and financially strained patients.⁴⁰ These systemic inequities likely compound caregiver burden, shaping decisions such as premature discharge and limiting continuity of care.

The alarmingly high DAMA rate, coupled with the lack of financial support, points to major systemic failures and is consistent with literature suggesting that financial constraints and inadequate support at home notably contribute to hospitalization avoidance strategies in older adults.⁴¹ Holistic interventions that target both medical needs and socioeconomic barriers are essential in fostering better health outcomes and patient satisfaction in geriatric care.^{38,42}

Limitations

This study has several limitations. First, its reliance on a single-center analysis with a comparatively smaller sample size may affect the generalizability of results to other low-resource settings. Second, the cross-sectional nature of the study precludes causal inference regarding the relationships between frailty, multimorbidity, and hospitalization outcomes. Third, a significant amount of data regarding duration of hospital stay was missing (42%), which may introduce bias into the stay-length

analysis. Critically, while this study identified a high prevalence of DAMA, it did not capture the specific qualitative determinants driving these decisions, such as the exact out-of-pocket costs, the availability of male versus female caregivers at home, or the specific reasons provided by families for premature discharge.

Furthermore, causative factors related to DAMA and frailty outcomes require further elucidation through longitudinal data.⁴³ Future multicenter longitudinal studies are needed to validate these findings across diverse healthcare settings in Bangladesh and beyond, ensuring that interventions adequately reflect the unique challenges faced by older adults in low-resource contexts.

CONCLUSION

In conclusion, our findings underscore the urgent need for healthcare systems in Bangladesh to address frailty and multimorbidity complexities among geriatric populations. Effective interventions must consider not only clinical requirements but also the socio-economic realities faced by patients and families to enhance hospital experiences and outcomes. Collaborative efforts across health sectors could potentially mitigate rates of DAMA and improve the quality of care for some of the most vulnerable members of society.

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