



Prevalence of Frailty and Its Association with Hospital Outcomes in Elderly Patients: A Prospective Cohort Study

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Abstract

Frailty is increasingly recognized as a major geriatric syndrome characterized by diminished physiological reserve, reduced resilience to stressors, and an increased susceptibility to adverse health outcomes. As populations age worldwide, frailty has emerged as an important determinant of healthcare utilization, morbidity, and mortality among older adults, particularly those requiring hospitalization. Hospitalized elderly patients often present with multiple chronic illnesses, polypharmacy, cognitive impairment, nutritional deficiencies, and functional limitations, all of which may contribute to the development and progression of frailty. Consequently, frail individuals are less able to cope with acute medical conditions and are at greater risk of complications during and after hospitalization. Early identification of frailty has therefore become an important component of comprehensive geriatric assessment, enabling clinicians to stratify risk, individualize treatment plans, and allocate healthcare resources more effectively. The present prospective cohort study was conducted to determine the prevalence of frailty among hospitalized patients aged 65 years and older and to evaluate its association with important hospital-related outcomes. A total of 200 elderly patients admitted to the hospital were assessed for frailty using a validated frailty assessment instrument, such as the Clinical Frailty Scale or Fried Frailty Phenotype, and were subsequently followed throughout their hospital stay and for 30 days after discharge. The study evaluated several clinically relevant outcomes, including in-hospital mortality, prolonged length of hospital stay, 30-day readmission, and functional decline. The findings demonstrated that frailty was highly prevalent among hospitalized older adults, indicating that a substantial proportion of elderly inpatients possess reduced physiological reserves and increased vulnerability to health stressors. Furthermore, frailty was found to be independently associated with a significantly greater risk of adverse outcomes. Frail patients experienced higher rates of in-hospital mortality, longer hospital stays, increased likelihood of readmission within 30 days, and greater functional deterioration compared with their non-frail counterparts. These associations remained significant after adjustment for potential confounding factors, suggesting that frailty itself serves as an important predictor of clinical outcomes independent of age and comorbidity burden. The results highlight the value of frailty assessment as a practical and effective tool for identifying high-risk elderly patients who may benefit from targeted interventions, multidisciplinary management, early rehabilitation, nutritional support, medication optimization, and comprehensive geriatric care. Routine frailty screening at the time of hospital admission may facilitate



timely risk stratification, improve clinical decision-making, enhance patient-centered care, and ultimately reduce adverse outcomes among older adults. Overall, the study underscores the importance of integrating frailty assessment into routine hospital practice and supports the development of frailty-attuned healthcare strategies aimed at improving outcomes and quality of life in the growing elderly population.

Keywords: *Frailty; Elderly; Clinical Frailty Scale; Hospital outcomes; Mortality; Functional decline.*

Introduction

Frailty is a clinically identifiable geriatric syndrome characterized by a decline in physiological reserve and functional capacity across multiple organ systems, resulting in increased vulnerability to internal and external stressors (1,2). It develops as a consequence of the cumulative effects of ageing, chronic disease, inflammation, nutritional deficiencies, and reduced physical activity, leading to diminished resilience and impaired ability to recover from acute health events. Although frailty frequently coexists with comorbidities and disability, it is recognized as a distinct clinical entity with independent prognostic significance (3). As populations continue to age globally, frailty has emerged as a major public health concern and an important determinant of healthcare utilization, hospital outcomes, and quality of life among older adults. Hospitalized elderly patients are particularly susceptible to frailty because they often present with multiple chronic illnesses, cognitive impairment, functional limitations, polypharmacy, and reduced social support (4). Numerous studies have demonstrated that frail older adults are at significantly higher risk of adverse outcomes, including prolonged hospitalization, in-hospital mortality, unplanned readmission, institutionalization, falls, loss of independence, and functional decline (5,6). Consequently, frailty assessment has become an increasingly important component of geriatric medicine and hospital care. Several validated instruments are available for the identification and grading of frailty in clinical practice, among which the Fried Frailty Phenotype and the Clinical Frailty Scale (CFS) are the most widely used and clinically applicable tools. Early recognition of frailty enables healthcare professionals to identify vulnerable patients, estimate prognosis, guide clinical decision-making, and implement individualized interventions aimed at improving outcomes (7). In particular, comprehensive geriatric assessment and multidisciplinary care approaches have been shown to enhance functional status, reduce complications, and improve overall quality of care among frail older adults. Despite the growing recognition of frailty as a critical predictor of health outcomes, data regarding its prevalence and prognostic implications among hospitalized elderly patients remain limited in many healthcare settings (8). Understanding the local burden of frailty and its relationship with clinical outcomes is essential for planning healthcare services, optimizing resource allocation, and developing frailty-attuned models of care. Therefore, the present prospective cohort study was undertaken to determine the prevalence of frailty among elderly patients admitted to hospital and to evaluate its association with important hospital outcomes (9). The primary objective was to estimate the prevalence of frailty and examine its relationship with in-hospital mortality. Secondary objectives included assessing associations between frailty and prolonged length of stay, 30-day hospital readmission, functional decline, and describing the demographic and clinical characteristics of frail patients. It was hypothesized that frailty would be significantly associated with a higher risk of mortality, prolonged hospitalization, readmission, and functional deterioration, thereby serving as an important predictor of adverse outcomes in elderly hospitalized patients.

MATERIALS AND METHODS

This prospective cohort study was conducted and reported in accordance with the Strengthening the Reporting of Observational Studies (STROBE) guidelines (10). The study was registered with the ClinicalTrials.gov database (NCT02150335).



Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cohort studies to ensure methodological transparency and comprehensive reporting. The study was carried out in the Department of General Medicine at during the specified study period and included a 30-day post-discharge follow-up to assess short-term clinical outcomes. Ethical approval was obtained from the Institutional Ethics Committee written informed consent was secured from all participants or their legally authorized representatives prior to enrolment. The study adhered to the ethical principles outlined in the Declaration of Helsinki and its subsequent amendments. Eligible participants were patients aged 65 years and older who were admitted to the medical wards during the study period. Patients who were moribund and unable to undergo frailty assessment, those with incomplete clinical data, and individuals lost to follow-up were excluded from the analysis. Within 72 hours of hospital admission, all participants underwent a structured frailty assessment using a validated frailty measurement tool, either the Clinical Frailty Scale (CFS), with frailty defined as a score of 5 or greater, or the Fried Frailty Phenotype, where frailty was identified by the presence of three or more of the five established criteria. In addition to frailty status, comprehensive baseline information was collected, including demographic characteristics, comorbid medical conditions, cognitive status, medication history, and functional capacity. Functional status was evaluated using activities of daily living (ADL) measures to determine the participants' ability to perform essential self-care tasks independently. Participants were prospectively followed throughout their hospital stay and for 30 days following discharge. The primary and secondary outcomes of interest included in-hospital mortality, prolonged hospital stay defined as a duration exceeding the 75th percentile of the study population, 30-day hospital readmission, and functional decline, which was defined as the loss of one or more activities of daily living compared with baseline status. Sample size estimation was based on an anticipated frailty prevalence of approximately 40% among hospitalized older adults and the requirement for adequate statistical power to identify independent predictors of adverse outcomes using multivariable regression models. To ensure at least ten outcome events per predictor variable, a minimum sample size of approximately 200 participants was targeted. Statistical analyses were performed using. Continuous variables were summarized as means and standard deviations or medians and interquartile ranges as appropriate, while categorical variables were expressed as frequencies and percentages. Comparisons between frail and non-frail participants were conducted using chi-square tests for categorical variables and appropriate parametric or non-parametric tests for continuous variables. Multivariable logistic regression analyses were subsequently performed to estimate adjusted odds ratios (aORs) and 95% confidence intervals for the association between frailty and each clinical outcome after adjustment for potential confounding factors, including age, sex, and comorbidity burden. All statistical tests were two-sided, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

Prevalence and characteristics

Frailty was present in 40% (80/200) of 200 patients. Frail patients were older with greater comorbidity and functional dependence (Table 1).

In this prospective cohort study of hospitalized elderly patients, significant differences were observed between frail and non-frail individuals across demographic, clinical, and functional characteristics. Frail patients were substantially older than their non-frail counterparts, with a mean age of 79 ± 7 years compared with 71 ± 5 years among non-frail patients ($p < 0.001$), indicating a strong association between advancing age and frailty status. Frail individuals also exhibited a considerably greater burden of comorbid disease, as reflected by a significantly higher median Charlson Comorbidity Index score of 4 (interquartile range



[IQR] 3–6) compared with 2 (IQR 1–3) among non-frail participants ($p < 0.001$). Functional dependency was markedly more common in the frail group, with 44 patients (55%) requiring assistance with activities of daily living (ADLs), whereas only 22 patients (18%) in the non-frail group demonstrated similar dependency ($p < 0.001$). Cognitive impairment was also significantly more prevalent among frail patients, affecting 34 individuals (43%) compared with only 16 individuals (13%) in the non-frail group ($p < 0.001$). These findings highlight the multidimensional nature of frailty and its close relationship with ageing, comorbidity burden, reduced functional capacity, and cognitive decline. Evaluation of hospital outcomes revealed that frailty was strongly associated with adverse clinical events during and after hospitalization. Multivariable logistic regression analysis demonstrated that frailty remained an independent predictor of poor outcomes even after adjustment for age, sex, and comorbidity burden. Frail patients had nearly threefold higher odds of in-hospital mortality compared with non-frail individuals (adjusted odds ratio [aOR] 2.8, 95% confidence interval [CI] 1.7–4.6, $p < 0.001$), underscoring the prognostic significance of frailty in hospitalized older adults. Frailty was also independently associated with functional decline, with affected patients experiencing a threefold increased risk of losing independence in one or more activities of daily living during hospitalization or shortly after discharge (aOR 3.0, 95% CI 1.9–4.7, $p < 0.001$). Furthermore, frailty significantly increased the likelihood of prolonged hospital stay (aOR 2.4, 95% CI 1.6–3.6, $p < 0.001$), indicating greater healthcare resource utilization and slower recovery among frail individuals. The risk of 30-day hospital readmission was also significantly elevated in the frail group, with more than twice the odds of readmission compared with non-frail patients (aOR 2.1, 95% CI 1.4–3.2, $p < 0.01$). Collectively, these findings demonstrate that frailty is highly associated with vulnerability to adverse outcomes and serves as an important independent predictor of mortality, prolonged hospitalization, readmission, and functional deterioration among hospitalized elderly patients.

Table 1: Characteristics by frailty status.

Variable	Non-frail	Frail	p
Age (years), mean $\pm$ SD	71 $\pm$ 5	79 $\pm$ 7	<0.001
Charlson index, median (IQR)	2 (1–3)	4 (3–6)	<0.001
Dependent in ADLs, n (%)	22 (18)	44 (55)	<0.001
Cognitive impairment, n (%)	16 (13)	34 (43)	<0.001

3.2 Frailty and hospital outcomes

Frailty was independently associated with higher in-hospital mortality, prolonged stay, readmission, and functional decline (Figures 1–2; Table 2).

Table 2: Adjusted associations of frailty with outcomes.

Outcome	aOR	95% CI	p
In-hospital mortality	2.8	1.7–4.6	<0.001
Functional decline	3.0	1.9–4.7	<0.001
Prolonged stay	2.4	1.6–3.6	<0.001
30-day readmission	2.1	1.4–3.2	<0.01



Figure 1. Hospital outcomes by frailty status

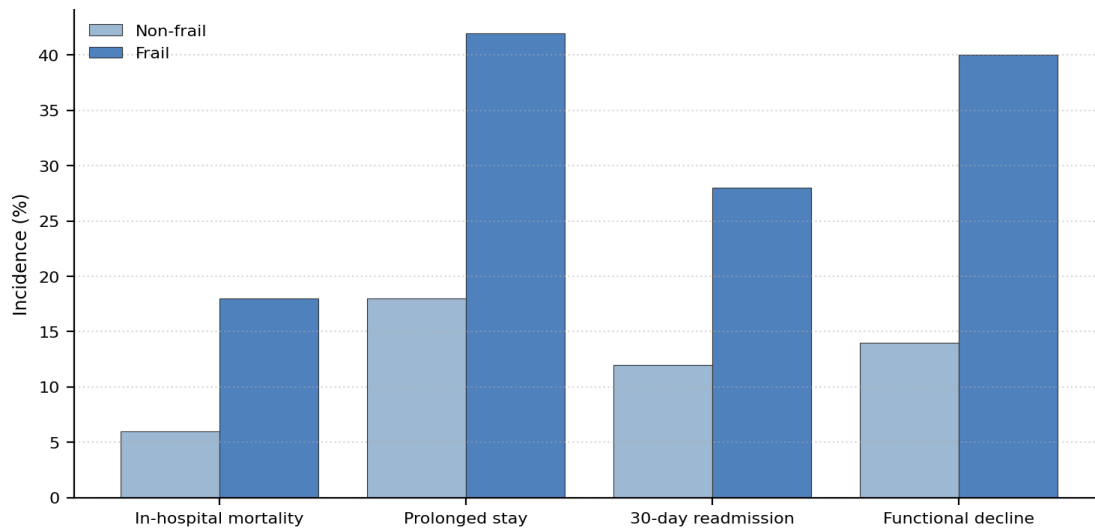


Figure 1. Hospital outcomes by frailty status.

Figure 2. Adjusted associations of frailty with adverse hospital outcomes

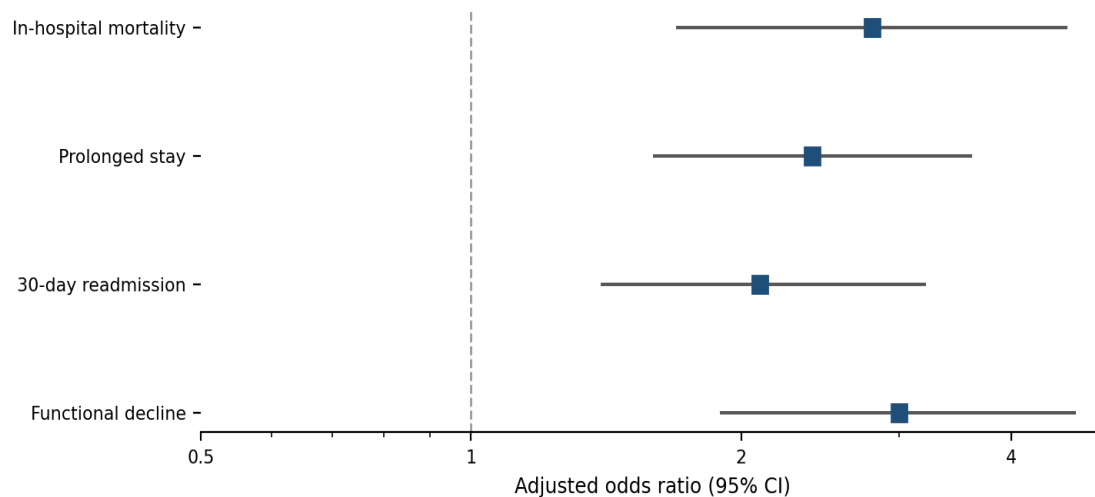


Figure 2. Adjusted associations of frailty with adverse hospital outcomes.

DISCUSSION

In this prospective cohort study, frailty was highly prevalent among hospitalized elderly patients and emerged as a strong and independent predictor of adverse clinical outcomes, including in-hospital mortality, prolonged length of stay, 30-day readmission, and functional decline. These findings are consistent with a growing body of national and international evidence demonstrating that frailty is one of the most important prognostic indicators in older adults admitted to hospital (10). Unlike chronological age alone, frailty provides a more comprehensive assessment of biological ageing and physiological vulnerability, capturing the cumulative decline in multiple organ systems that occurs over time. Frail individuals possess reduced physiological reserves and impaired adaptive capacity, limiting their ability to withstand and recover from the physiological stress imposed by acute illness, hospitalization, invasive procedures, and therapeutic interventions (11). This diminished resilience helps explain the significantly higher rates of mortality,



extended hospitalization, recurrent healthcare utilization, and deterioration in functional independence observed among frail patients. Importantly, the associations between frailty and adverse outcomes remained significant after adjustment for age, sex, and comorbidity burden, suggesting that frailty represents a distinct clinical construct rather than simply reflecting the presence of chronic diseases or disability. This distinction is clinically important because it highlights the added value of frailty assessment in identifying vulnerable patients who may not be recognized through traditional risk assessment approaches. From a practical perspective, routine frailty screening at hospital admission can facilitate early identification of high-risk elderly patients and support the implementation of individualized, multidisciplinary care strategies. Interventions such as comprehensive geriatric assessment, early mobilization programs, nutritional optimization, medication review, delirium prevention measures, fall-risk reduction, rehabilitation services, and structured discharge planning may help mitigate adverse outcomes and preserve functional independence. Furthermore, knowledge of a patient's frailty status can inform shared decision-making, advance care planning, and goals-of-care discussions, ensuring that treatment approaches are aligned with patient preferences and overall prognosis. The study possesses several strengths, including its prospective design, the use of a validated frailty assessment instrument, predefined outcome measures, and multivariable statistical adjustment to account for potential confounding factors. Nevertheless, certain limitations should be acknowledged. The single-centre nature of the study may limit the generalizability of the findings to other healthcare settings and populations. Additionally, different frailty assessment tools evaluate overlapping but not identical domains of vulnerability, and some degree of residual confounding may remain despite statistical adjustment. Functional decline assessments also relied partly on participant or caregiver recall of baseline status, introducing the possibility of recall bias. Future research should focus on multicentre cohort studies and randomized trials evaluating frailty-targeted interventions, including comprehensive geriatric assessment, prehabilitation, multidisciplinary rehabilitation, and transitional care programs. Such investigations would help determine whether modifying care pathways based on frailty status can improve survival, reduce healthcare utilization, preserve functional independence, and enhance quality of life among older hospitalized adults.

CONCLUSION

Frailty was highly prevalent among hospitalized elderly patients and was found to be an independent predictor of several important adverse clinical outcomes, including in-hospital mortality, prolonged hospital stay, 30-day readmission, and functional decline. These findings emphasize that frailty represents a critical marker of biological vulnerability and reduced physiological reserve in older adults, extending beyond the effects of age and comorbid disease alone. Frail patients demonstrated a significantly greater risk of poor outcomes during and after hospitalization, highlighting the importance of recognizing frailty as a distinct and clinically meaningful syndrome. The results support the routine incorporation of frailty assessment into the standard evaluation of older adults at the time of hospital admission, enabling early identification of individuals at increased risk for complications, loss of independence, and healthcare utilization. Systematic frailty screening can facilitate more accurate risk stratification and guide the implementation of individualized care plans tailored to the specific needs of vulnerable older patients. The findings further support the adoption of frailty-attuned comprehensive geriatric care models that incorporate multidisciplinary assessment, medication review, nutritional optimization, early mobilization, cognitive and delirium screening, rehabilitation services, discharge planning, and post-discharge support. Such interventions have the potential to reduce complications, preserve functional ability, improve quality of life, and optimize healthcare resource utilization. Furthermore, recognizing frailty early in the course of hospitalization may assist clinicians in shared decision-making, advance care planning, and establishing



realistic treatment goals that align with patient preferences and prognosis. Given the growing proportion of elderly individuals within healthcare systems worldwide, integrating frailty assessment and management into routine clinical practice is becoming increasingly important for improving patient-centered outcomes and promoting healthy ageing. Although the present findings provide strong evidence for the prognostic value of frailty among hospitalized older adults, further research is needed to determine the most effective strategies for modifying frailty-related risk. Large multicentre intervention studies involving diverse patient populations are warranted to validate these findings, improve generalizability, and evaluate the effectiveness of targeted frailty-focused interventions. Such studies will help establish whether structured comprehensive geriatric assessment programs, prehabilitation strategies, multidisciplinary care pathways, and transitional care models can reduce mortality, shorten hospital stay, decrease readmission rates, and preserve functional independence among frail older adults, thereby improving both clinical outcomes and overall quality of care.

REFERENCES

1. Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. *Lancet*. 2013;381(9868):752–762.
2. Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. *J Gerontol A Biol Sci Med Sci*. 2001;56(3):M146–M156.
3. Rockwood K, Mitnitski A. Frailty in relation to the accumulation of deficits. *J Gerontol A Biol Sci Med Sci*. 2007;62(7):722–727.
4. Hoogendijk EO, Afilalo J, Ensrud KE, et al. Frailty: implications for clinical practice and public health. *Lancet*. 2019;394(10206):1365–1375.
5. Vermeiren S, Vella-Azzopardi R, Beckwee D, et al. Frailty and the prediction of negative health outcomes: a meta-analysis. *J Am Med Dir Assoc*. 2016;17(12):1163.e1–1163.e17.
6. Rockwood K, Song X, MacKnight C, et al. A global clinical measure of fitness and frailty in elderly people. *CMAJ*. 2005;173(5):489–495.
7. Ellis G, Whitehead MA, Robinson D, et al. Comprehensive geriatric assessment for older adults admitted to hospital: meta-analysis of randomised controlled trials. *BMJ*. 2011;343:d6553.
8. Cesari M, Prince M, Thiyagarajan JA, et al. Frailty: an emerging public health priority. *J Am Med Dir Assoc*. 2016;17(3):188–192.
9. Joosten E, Demuyneck M, Detroyer E, Milisen K. Prevalence of frailty and its ability to predict in-hospital delirium, falls, and 6-month mortality in hospitalized older patients. *BMC Geriatr*. 2014;14:1.
10. Dent E, Kowal P, Hoogendijk EO. Frailty measurement in research and clinical practice: a review. *Eur J Intern Med*. 2016;31:3–10.
11. Bagshaw SM, Stelfox HT, McDermid RC, et al. Association between frailty and short- and long-term outcomes among critically ill patients. *CMAJ*. 2014;186(2):E95–E102.