Investigation and Analysis of Frailty Status in Elderly Inpatients in Tertiary Grade A General Hospitals in Beijing (Postprint)

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Abstract

Objective To investigate the frailty status of elderly hospitalized patients in Beijing, analyze its associated factors, provide clinical evidence for health assessment of elderly hospitalized patients, and offer guidance for selecting appropriate nursing care methods for frail elderly hospitalized patients and improving nursing quality. Methods Using convenience sampling, elderly hospitalized patients admitted to three tertiary grade-A general hospitals in Beijing from April to May 2021 were selected and assessed using the Tilburg Frailty Indicator (TFI) scale. Results The total frailty index score of elderly hospitalized patients was (5.34$±$2.99) points, with frail individuals accounting for approximately 57.99% (98/169). Items with lower scoring rates were "living alone" (13.02%), "cognitive status" (13.02%), and "coping ability" (18.93%); items with higher scoring rates were "physical health status" (68.05%), "walking difficulty" (55.03%), and "fatigue" (49.70%). The degree of frailty was associated with "age" , "presence of two or more chronic diseases" , and "life events in the past year" among elderly hospitalized patients (P<0.05). Conclusion The incidence of frailty among elderly hospitalized patients in tertiary grade-A general hospitals in Beijing is relatively high. In nursing practice, close attention should be paid to elderly hospitalized patients, providing them with scientific and reasonable nursing services to facilitate better adaptation to hospital life.

Full Text

Preamble

Investigation and Analysis of Frailty Status Among Elderly Inpatients in Beijing Tertiary Hospitals

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Abstract

Objective: To investigate the frailty status of elderly inpatients in Beijing and analyze its associated factors, thereby providing clinical evidence for health assessment and informing the development of appropriate nursing care strategies to improve care quality for this population.

Methods: Using convenience sampling, elderly inpatients from three tertiary general hospitals in Beijing were selected between April and May [year]. The Tilburg Frailty Indicator (TFI) was used to assess frailty status.

Results: The total frailty score among elderly inpatients was [score]. Items with lower scores included "living alone" ([%]), "cognitive status" ([score]), and "coping ability" ([%]), while items with higher scores included "physical health status" ([%]), "difficulty walking" ([%]), and "fatigue" ([%]). Approximately [%] of participants were identified as frail. Frailty was significantly associated with age, presence of two or more chronic diseases, and major life events in the past year ($P <$ [value]).

Conclusion: Frailty is highly prevalent among elderly inpatients in Beijing tertiary hospitals. Nursing practice should prioritize comprehensive assessment and scientifically-based care to help elderly inpatients better adapt to hospitalization and mitigate adverse outcomes.

Keywords: frailty; elderly inpatients; Tilburg Frailty Indicator; assessment tool

1. Introduction

Population aging represents a dynamic process characterized by an increasing proportion of older adults in the total population. According to the *Research Report on the Development Trend of Population Aging in China*, the proportion of elderly individuals in China is projected to exceed [percentage] by [year]. This demographic shift presents profound challenges for geriatric healthcare. Within the constraints of limited medical resources, maintaining quality of life and maximizing social and economic benefits for disabled, semi-disabled, and frail

older adults should be a central focus of geriatric clinical practice, research, and education.

The concept of frailty was first introduced at the 2001 U.S. Conference on Aging to describe older adults with cumulative health problems requiring long-term supportive services for daily living. Frailty is defined as a clinical syndrome resulting from decreased physiological reserve and increased vulnerability, characterized by reduced ability to maintain homeostasis. It represents a transitional state between independence and death, serving as a precursor to disability. Compared with non-frail older adults, frail older adults face a significantly increased mortality risk, with frailty contributing to [percentage] of deaths among older adults. However, appropriate preventive interventions can delay the progression of frailty. As the elderly population grows rapidly, increasing numbers of older adults consume substantial healthcare resources, imposing greater burdens on families and society. Frailty elevates risks for negative outcomes including death, disability, delirium, and falls among hospitalized patients. Early identification of frail elderly inpatients through effective screening enables timely interventions to prevent or delay adverse outcomes.

Various frailty assessment tools exist internationally, incorporating both subjective and objective measures, yet no gold standard has been universally accepted. The simplest approach involves self-assessment by older adults. Nursing research on frailty in China remains in its early stages, primarily focusing on concept analysis and tool introduction rather than prevalence studies. The Tilburg Frailty Indicator (TFI), developed by Dutch scholar Gobbens et al. in [year] based on an integrated conceptual model of frailty, demonstrates good reliability and validity for elderly patients with chronic diseases. Xi Xing et al. validated the Chinese version of TFI, confirming its psychometric properties. This study aims to investigate the frailty status of elderly inpatients in Beijing, analyze associated factors, and provide clinical evidence for health assessment and nursing care optimization.

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2. Materials and Methods

2.1 Study Design and Participants

This descriptive study employed convenience sampling to recruit elderly inpatients from three tertiary general hospitals in Beijing between April and May [year]. A total of [number] questionnaires were distributed, with [number] returned (response rate: [%]). After excluding incomplete responses, [number] valid questionnaires remained (effective rate: [%]).

Inclusion criteria: (1) Age $\geq$ 60 years; (2) Adequate comprehension and communication abilities; (3) Basically self-sufficient with stable condition; (4) Voluntary participation with informed consent from patient and family.

Exclusion criteria: (1) Inability to obtain valid clinical information for frailty

assessment; (2) Severe cognitive impairment or psychiatric disorders; (3) Refusal to participate.

2.2 Assessment Instrument

The TFI assessment scale was used for data collection, comprising two sections:

Section 1: General Information. Based on literature review and interviews with healthcare providers and patients, this section included potential frailty-associated factors such as demographics (sex, age, height, weight, education, occupation), living situation, socioeconomic status, and medical history.

Section 2: TFI Scale. The TFI includes three dimensions with 15 items: physiological (8 items: physical health, unintentional weight loss, walking difficulty, balance, hearing, vision, grip strength, fatigue), psychological (4 items: cognition, depressive symptoms, anxiety, coping ability), and social (3 items: living alone, social relationships, social support). Items use positive and negative scoring, with total scores ranging from 0 to 15. Participants were categorized as frail (score ≥ 5) or non-frail (score < 5), with higher scores indicating greater frailty severity .

2.3 Data Collection Procedure

After obtaining approval and support from hospital administrative departments, trained investigators administered the TFI to eligible participants based on the inclusion/exclusion criteria. Fully independent patients completed the questionnaire themselves, while partially dependent patients responded to investigator queries to ensure responses reflected their own perspectives. Completed questionnaires were reviewed immediately for completeness and stored securely.

2.4 Statistical Analysis

Data were analyzed using SPSS software. Descriptive statistics (frequencies, percentages, means $\pm$ standard deviations) characterized participant demographics and TFI scores. Univariate analysis (variance homogeneity tests) examined associations between frailty and categorical variables. Multiple linear regression identified independent predictors of frailty scores. Statistical significance was set at $P < 0.05$.

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3. Results

3.1 Participant Characteristics

Among 169 elderly inpatients surveyed, [number] (%) were male and [number] (%) were female. Most participants were of Han ethnicity (%), local Beijing residents (%), and had no religious affiliation (%). Participants represented diverse occupational backgrounds including civil service (%), with monthly incomes

ranging from [amount] to [amount] RMB. The most common income bracket was [amount] RMB/month (%).

3.2 Frailty Prevalence and Dimension Scores

The mean total frailty score was [score] points. [Number] (%) participants were classified as frail, while [number] (%) were non-frail. Dimension-specific scores were: physiological ([score]), psychological ([score]), and social ([score]). Items with lower endorsement rates included "living alone" (%), "cognitive status" (), and "coping ability" (%). Items with higher endorsement rates included "physical health" (%), "difficulty walking" (%), and "fatigue" (%) .

3.3 Univariate Analysis

Variance homogeneity tests revealed no significant differences in frailty by sex, BMI, ethnicity, birthplace, religion, education level, occupation, or family relationships ($P > 0.05$). However, significant differences emerged for age, marital status, family structure, neighborhood relationships, income level, number of chronic diseases, and experience of major life events ($P < 0.05$).

3.4 Multivariate Regression Analysis

Multiple linear regression analysis was conducted with frailty score as the dependent variable and age, marital status, family situation, neighborhood relationships, income, chronic disease count, and major life events as independent variables. Age, presence of two or more chronic diseases, and major life events in the past year were significant predictors of frailty ($P < 0.05$) . The model explained [value]% of variance (r^2 = [value]).

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4. Discussion

4.1 High Prevalence of Frailty Among Elderly Inpatients

Frailty represents a nonspecific state of decreased physiological reserve and increased vulnerability, with reduced stress resistance as its core characteristic. It serves as a predictor for serious adverse outcomes including readmission, mortality, iatrogenic complications, and nursing home placement, thereby informing prognosis and treatment strategies. Our findings demonstrate that over half of elderly inpatients experience frailty, primarily manifesting as physiological decline. However, psychological and social factors also contribute significantly. Lower scores on "living alone," "cognitive status," and "coping ability" reflect deficits in psychosocial support, while higher scores on "physical health," "difficulty walking," and "fatigue" underscore physiological impairments. These results indicate that declining physiological reserve most strongly influences self-perceived frailty status. Nursing care should therefore prioritize pain and symp-

tom management while simultaneously assessing psychological well-being and social support systems to comprehensively address frailty and its consequences.

4.2 Factors Associated with Frailty

As population aging intensifies, frailty has gained increasing attention in medical research. Our study found approximately [%] of elderly inpatients were frail, with relatively moderate severity likely attributable to ongoing hospital treatment. This prevalence aligns partially with Dutch research reporting [%] frailty among hospitalized elders. Frailty severity increased progressively with age, particularly among those over [age] years. Marital status and living arrangements significantly influenced frailty, with unmarried and widowed elders lacking family companionship showing markedly higher frailty levels compared to those living with spouses or children. Poor neighborhood relationships and inadequate social support also substantially impacted frailty. Regarding income, patients earning $\leq$ [amount] RMB/month experienced greater frailty due to financial barriers to optimal treatment, while those earning $>$ [amount] RMB/month often pursued aggressive interventions like surgery that could inadvertently increase frailty. Chronic disease burden proved critical, with [%] of participants having two or more conditions severely impacting frailty. Additionally, elders who experienced loss of loved ones or personal health crises in the past year demonstrated more pronounced frailty, highlighting the need for enhanced psychological support.

4.3 Clinical Implications

Our results demonstrate positive correlations between frailty severity and age, multimorbidity, and major life events. As age increases, frailty worsens; multiple chronic diseases impose dual physiological and psychological burdens; and major life events inflict psychosocial and physical harm. Comprehensive geriatric assessment represents a powerful clinical tool for identifying geriatric syndromes affecting functional status and quality of life, enabling targeted interventions that can slow frailty progression and guide nursing care. By providing appropriate nursing strategies for frail elderly inpatients, healthcare providers can reduce adverse events, improve care quality, and enhance patient satisfaction and adaptation to hospitalization.

4.4 Limitations and Future Directions

This descriptive study has several limitations. The relatively small sample size and short survey period restricted subgroup analyses by department, disease type, and disease awareness. Additionally, potentially relevant factors such as education level, occupation, and family relationships did not show significant associations, possibly due to limited sample size and geographic scope. Future research should expand sample sizes, conduct longitudinal follow-up studies, and incorporate more comprehensive variables to elucidate relationships between hospitalization and frailty more thoroughly.

Conflict of Interest Statement

The authors declare no conflicts of interest.

References

[1] Hua Q Z, Hu X Y. Geriatric Nursing[M]. 4th ed. Beijing: People' s Medical Publishing House, 2017. (in Chinese)

[2] Yu P L, Wang J Y. Emphasis on prevention and treatment of frailty syndrome[J]. Chin J Geriatr, 2015, 34(7): 721-722. (in Chinese)

[3] Rockwood K, Fox R A, Stolee P, et al. Frailty in elderly people: an evolving concept[J]. CMAJ, 1994, 150(4): 489-495.

[4] Morley J E, Perry H M, Miller D K. Editorial: something about frailty[J]. J Gerontol A Biol Sci Med Sci, 2002, 57(11): M698-M704.

[5] Shamliyan T, Talley K M C, Ramakrishnan R, et al. Association of frailty with survival: a systematic literature review[J]. Ageing Res Rev, 2013, 12(2): 719-736.

[6] Fried L P, Ferrucci L, Darer J, et al. Untangling the concepts of disability, frailty, and comorbidity: implications for improved targeting and care[J]. J Gerontol A Biol Sci Med Sci, 2004, 59(3): 255-263.

[7] Walston J, Hadley E C, Ferrucci L, et al. Research agenda for frailty in older adults: toward a better understanding of physiology and etiology: summary from the American Geriatrics Society/National Institute on Aging Research Conference on Frailty in Older Adults[J]. J Am Geriatr Soc, 2006, 54(6): 991-1001.

[8] Gobbens R J, van Assen M A, Luijkx K G, et al. Testing an integral conceptual model of frailty[J]. J Adv Nurs, 2010, 66(11): 2527-2538.

[9] Xi X, Guo G F, Sun J. The connotation of weakness and its conceptual framework[J]. Pract Geriatr, 2012, 26(6): 503-506. (in Chinese)

[10] Xi X, Guo G F, Sun J. Reliability and validity of Chinese version of Tilburg frailty indicator[J]. J Nurs, 2013, 20(7): 1-4. (in Chinese)

[11] Gobbens R J J, van Assen M A L M, Luijkx K G, et al. The Tilburg frailty indicator: psychometric properties[J]. J Am Med Dir Assoc, 2010, 11(5): 344-355.

[12] Santiago L M, Luz L L, Mattos I E, et al. Psychometric properties of the Brazilian version of the Tilburg frailty indicator (TFI)[J]. Arch Gerontol Geriatr, 2013, 57(1): 70-78.

[13] Dong B R. Research progress of senile debilitating syndrome[J]. Chin J Health Care Med, 2015, 17(1): 1-3. (in Chinese)

[14] Kang L, Zhu M L, Liu X H, et al. Correlation between frailty and coronary heart disease in the elderly[J]. Chin J Geriatr, 2016, 35(1): 45-48. (in Chinese)

[15] Markle-Reid M, Browne G. Conceptualizations of frailty in relation to older adults[J]. J Adv Nurs, 2003, 44(1): 58-68.

[16] Feldman R S. Development Across the Life Span[M]. Translated by Su Y J, et al. Beijing: World Publishing Corporation, 2013. (in Chinese)

[17] Lin Y, Wang L Y, Wang Z, et al. Effects of comprehensive geriatric assessment and health intervention on outcome in discharged patients[J]. Chin J Geriatr, 2016, 35(2): 123-126. (in Chinese)

[18] Parlevliet J L, Buurman B M, Pannekeet M M, et al. Systematic comprehensive geriatric assessment in elderly patients on chronic dialysis: a cross-sectional comparative and feasibility study[J]. BMC Nephrol, 2012, 13: 30.

[19] Li J, Zou J H, Ren L Q. Effects of comprehensive geriatric assessment intervention on depression and anxiety in patients with benign prostatic hyperplasia[J]. Chin J Geriatr, 2016, 35(3): 234-237. (in Chinese)

[20] Ensrud K E, Ewing S K, Cawthon P M, et al. A comparison of frailty indexes for the prediction of falls, disability, fractures, and mortality in older men[J]. J Am Geriatr Soc, 2009, 57(3): 492-498.

[21] Aucella F, Stoico L, Cichella A, et al. Comprehensive geriatric assessment in the hemodialysis elderly population[J]. J Nephrol, 2014, 27(3): 319-325.

[22] Zhao Q H, Wang Q, Wu W, et al. Association between frailty index and blood pressure in elderly patients[J]. Chin J Geriatr Heart Brain Vessel Dis, 2016, 18(5): 456-459. (in Chinese)

Note: Figure translations are in progress. See original paper for figures.