



Prevalence of geriatric syndromes and their association with age among older patients at Thai Nguyen National Hospital

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ABSTRACT

Objective: To determine the prevalence of geriatric syndromes and their association with age among older adults attending the Department of Geriatrics – Health Protection, Thai Nguyen National Hospital. **Subjects and Methods:** A cross-sectional descriptive study was conducted on 475 older patients. Data were collected through face-to-face interviews and medical records using validated instruments, including the Katz Activities of Daily Living (ADL) index, Lawton Instrumental Activities of Daily Living (IADL) scale, SARC-F questionnaire, 21-item Fall Risk Index (Fri-21), Mini-Mental State Examination (MMSE), Edmonton Frail Scale (EFS), and 15-item Geriatric Depression Scale (GDS-15) and analysed using SPSS 25.0, applying the Chi-square test and univariable logistic regression.

Results: Mean age was 76.83 ± 6.89 years. Most participants were aged ≥ 70 years, and females outnumbered males. The prevalence of geriatric syndromes was as follows: multimorbidity (67.4%), polypharmacy (66.7%), sarcopenia (44.8%), IADL impairment (46.5%), cognitive impairment (47.4%), frailty (36.8%), ADL impairment (36.6%), high risk of falls (33.1%), and depression (26.5%). Univariate logistic regression analysis showed that, compared with the 60–69 age group, those aged ≥ 80 had significantly higher odds of polypharmacy, frailty, sarcopenia, and multimorbidity, while in the 70–79 group only polypharmacy was significantly associated with age (OR 1.88 vs. 2.49 for the ≥ 80 group). **Conclusion:** Geriatric syndromes are highly prevalent among older adults. Comprehensive geriatric screening should be strengthened, especially for medication use, sarcopenia, and frailty in patients aged ≥ 80 years to enable timely and appropriate interventions.

Keywords: Geriatric syndromes; older adults; comprehensive geriatric assessment.

INTRODUCTION

Vietnam is one of the countries with the fastest-growing ageing populations in the world. In 2024, people aged 60 years and older accounted for approximately 14.05% of the total population, and this proportion is projected to exceed 25% by 2050 ¹. This

trend has led to an increasing number of older people seeking medical examination and treatment at healthcare facilities, placing considerable pressure on the healthcare system. It is also associated with a higher risk of hospitalization, longer hospital stays, poorer quality life, and increased rates of disability and mortality ².

Older people often have multiple chronic diseases and reduced function of several body systems, which increases the risk of developing geriatric syndromes such as multimorbidity, polypharmacy, cognitive impairment, frailty, sarcopenia, depression, sleep disorders, and limitations in daily activities ^{3, 4}. Early detection and comprehensive geriatric assessment of these syndromes not only helps identify underlying health problems at an early stage but also supports the development of individualized treatment and care plans, thereby improving functional status and quality of life among older patients ⁵.

Many studies worldwide and in Vietnam ³⁻⁸ polypharmacy, comorbidities, alcohol use, depression (quality of life in Alzheimer disease have reported a relatively high prevalence of geriatric syndromes among older people. However, the prevalence and associated factors vary across healthcare settings, geographical areas, and study populations. At Thai Nguyen National Hospital, data on the prevalence of geriatric syndromes among older patients treated in the Department of Geriatrics remain limited. Identifying the prevalence and associated factors may provide scientific evidence to support screening, prevention, and the development of appropriate intervention strategies for older patients.

Age is a fundamental factor associated with most geriatric syndromes. As people age, physiological reserves gradually decline, while chronic diseases and other stressors accumulate, leading to an increased risk of developing these syndromes ^{2, 4}. Unlike most other related factors, age is an objective and non-modifiable indicator that is available for every patient from the first clinical contact ². Grouping patients

into common age categories (60–69, 70–79, and ≥ 80 years), corresponding to the young-old, middle-old, and oldest-old groups. Among these, the oldest-old are generally recognized as having markedly increased frailty and multimorbidity ⁹. This stratification may help identify the stages of life at which the risk of each syndrome increases significantly, thereby helping to determine which groups should be prioritized for comprehensive geriatric assessment. Since no previous data were available from this hospital, we first described the changes in geriatric syndromes across different age groups.

Based on these considerations, we conducted this study with two objectives: (1) to determine the prevalence of selected syndromes among older patients at the Department of Geriatrics, Thai Nguyen Central Hospital, in 2026; and (2) to analyse their association with age in this population.

SUBJECTS AND METHODS

Study population

Inclusion criteria: Patients were included in the study if they met all of the following criteria: Aged ≥ 60 years; receiving inpatient and outpatient care at the Department of Geriatrics and Health Protection, Thai Nguyen National Hospital; and agreeing to participate in the study.

Exclusion criteria: Patients were excluded from the study if they met any of the following criteria: Patients with severe acute illness, serious medical conditions, malignant diseases, schizophrenia, bipolar disorder, or alcohol/ substance abuse; or patients who did not agree to participate after receiving an explanation of the study, or who were unable to understand or answer the questionnaires themselves.

Study period: From January 2026 to June 2026.

Study setting: Department of Geriatrics and Health Protection, Thai Nguyen National Hospital.

Study design: A descriptive cross-sectional study was conducted.

Sample size and sampling method

$$n = Z^2 x \frac{p(1 - p)}{e^2}$$

A total sampling method was used. The minimum required sample size was calculated using the following formula: where $Z = 1.96$, corresponding to a 95% confidence level; $e = 0.05$, representing the allowable margin of error; and $p = 0.834$, representing the prevalence of multimorbidity reported in a 2023 study of older outpatients at Nghe An General Hospital ¹⁰. The calculated minimum sample size was 213 participants. However, the study population in a single hospital department was relatively small and limited in size, so total sampling was used to reduce sampling error, all patients who met the eligibility criteria during the study period were included. Consequently, 475 patients were enrolled in the study.

Research instruments and study variables

Information was collected through face-to-face interviews using a standardized questionnaire. The study variables included:

- General characteristics: age (years), sex (male/ female), and BMI (underweight, normal weight, overweight/ obesity), place of residence (urban/rural), living arrangement (with family/ with a caregiver/ alone).

- Geriatric syndromes: nine geriatric syndromes were assessed as follows, Vietnamese versions of the GDS-15, SARC-F, and MMSE have been published and for the ADL, IADL, EFS, and FRI-21, we did not identify any published studies on their validation or standardization in Vietnamese; however, these instruments have been used in studies conducted in Vietnam:

Polypharmacy: Polypharmacy was defined as the use of ≥ 5 medications per day, while the use of fewer than 5 medications per day was considered non-polypharmacy¹¹.

Multimorbidity: Defined as the presence of ≥ 2 chronic conditions ¹².

Activities of Daily Living (ADL): ADL was assessed using six items covering eating, toileting, dressing, personal hygiene, mobility, and bathing. A score of 6 points indicated normal function, while a score of < 6 points indicated impaired activities of daily living ^{3, 4, 13} polypharmacy, comorbidities, alcohol use, depression (quality of life in Alzheimer disease).

Instrumental Activities of Daily Living (IADL): IADL was assessed using eight items related to daily activities involving the use of instruments or facilities, including telephone use, shopping, cooking, housekeeping, laundry, transportation, medication management, and financial management. A score of 8 points indicated normal function, while a score of < 8 points indicated impaired instrumental activities of daily living ^{3, 4, 14}.

Fall risk: The 21-item Fall Risk Index (FRI-21) was used to assess fall risk. The scale consists of 21 items related to personal characteristics, physical function,

psychological factors, and the living environment. A total score of ≥ 10 points indicated a high risk of falls ^{15,16}.

Cognitive function: Cognitive function was assessed using the Mini-Mental State Examination (MMSE). A total score of ≥ 23 points indicated no cognitive impairment ¹⁷.

Frailty: Frailty was assessed using the Edmonton Frail Scale (EFS), which covers ten domains and has the advantage of including social support in the assessment of frailty. A score of $\geq 7/17$ points indicated frailty ^{18,19} but it is an insensitive and non-specific measure for use in individual decision-making. Frailty has been emerging to take its rightful place as a better measure for over a decade ¹. Despite general consensus that the concept of frailty is clinically useful, the lack of agreement on its definition and the challenge of its measurement by front-line health providers mean that frailty remains only 'heir apparent' to chronological age as a criterion to select older persons at risk ². Frailty is multidimensional, heterogeneous and unstable, thus distinguishing it from disability or ageing alone ³. Rather, it is widely conceived of as a state of vulnerability. Frailty is measured in many ways, including 'rules based' instruments, summative impairment lists and algorithms derived from clinical judgement ⁴⁻⁶. However much these tools might have advanced research in frailty, most are impractical for bedside screening by front-line providers because they require the multidimensional clinical data that constitute a comprehensive geriatric assessment (CGA).

Depression: Depression was assessed using the 15-item Geriatric Depression Scale (GDS-15). A score of ≥ 6 points indicated depression ²⁰.

Sarcopenia: Sarcopenia was screened using the SARC-F questionnaire, which consists of five items assessing strength, assistance with walking, rising from a chair, climbing stairs, and falls. A score of ≥ 4 points indicated a positive screening result for sarcopenia ²¹.

Data collection: All participants were screened based on their medical records. General characteristics were collected, geriatric syndromes were assessed, and selected associated factors were identified. Data were collected by trained interviewers/research staff of the Department of Geriatrics and Health Protection through direct, face-to-face interviews with eligible patients using the standardized questionnaire described above. All instruments were completed by the patients themselves; proxy responses were not used. Information on patients' diagnoses, number of comorbid chronic conditions and medication use were obtained from medical records. Interviews were conducted in a private setting during the patient's hospital visit, and completed questionnaires were checked for completeness on the same day to allow missing or unclear information to be clarified promptly.

Data analysis: Data were processed and analysed using SPSS version 25.0 (IBM, NY, USA). Descriptive statistics included frequencies (n), percentages (%), means, and standard deviations (SD). The normality of continuous variables was assessed using the Shapiro–Wilk test before they were presented as mean $\pm$ standard deviation (SD). Differences in proportions between groups were assessed using the Chi-square test. Univariable logistic regression analysis was performed to identify factors associated with the study outcomes. A p-value < 0.05 was considered statistically significant.

Ethical considerations: The study complied with the ethical principles for medical research. The study was approved by the Ethics Committee of Thai Nguyen Central Hospital under Decision No. 430/QD-BV, dated 9 February 2026. Eligible patients provided informed consent after receiving information about the study. Participation was voluntary, and confidentiality was maintained throughout the study.

RESULTS

The study was conducted on 475 older patients.

Table 1. General characteristics of the study participants (n = 475)

	Characteristics	Number (n)	Percentage (%)
Age	Mean $\pm$ SD (years) : 76.83 $\pm$ 6.89		
	60- 69 years	71	14.9
	70-79 years	252	53.1
	$\geq$ 80 years	152	32.0
Sex	Male	196	41.3
	Female	279	58.7
BMI (kg/m ²)	Underweight (< 18.5)	39	8.2
	Normal weight (18.5 $\leq$ BMI < 23)	281	59.2
	Overweight/obesity (BMI $\geq$ 23)	155	32.6
Place of residence	Urban	290	61.1
	Rural	185	38.9
Living arrangement	Living with family	420	88.4
	Living with a caregiver	10	2.1
	Living alone	45	9.5

Abbreviations: SD, standard deviation; BMI, body mass index

The mean age of the study participants was 76.83 $\pm$ 6.89 years, ranging from 60 to 100 years. The majority of participants were aged 70 years or older (75.1%). More than half of the participants were female (58.7%), lived in urban areas (61.1%), lived with their families (88.4%), and the majority had a normal BMI (59.2%).

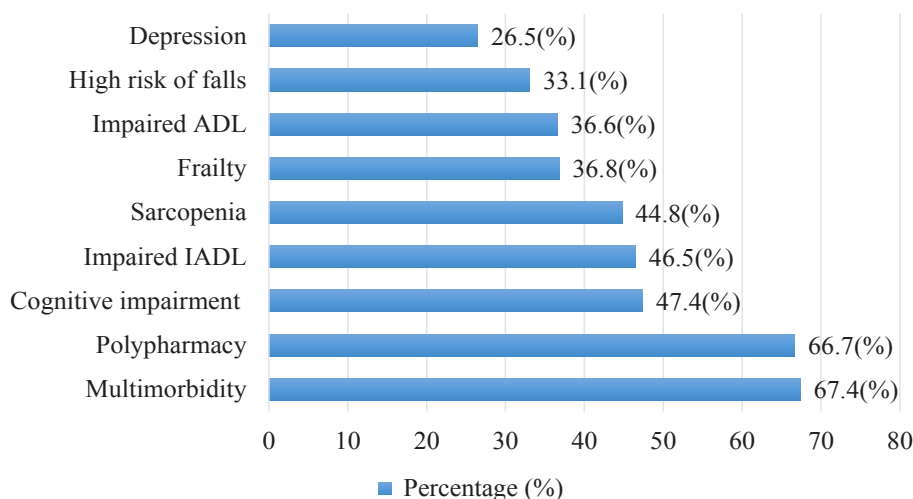


Figure 1. Prevalence of selected geriatric syndromes among the study participants (n = 475)

Abbreviations: ADL, Activities of Daily Living; IADL, Instrumental Activities of Daily Living.

Multimorbidity and polypharmacy were the most common geriatric syndromes, with prevalence rates of 67.4% and 66.7%, respectively. Sarcopenia, impaired IADL, and cognitive impairment each accounted for more than 40% of the participants. Depression had the lowest prevalence, at 26.5%.

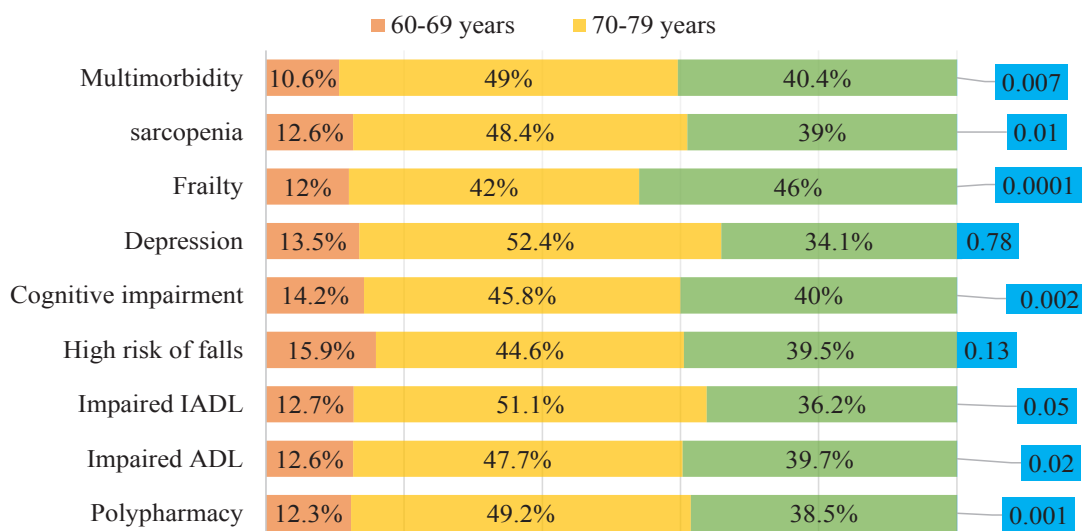


Figure 2. Age distribution of patients with selected geriatric syndromes (n = 475)

The prevalence of geriatric syndromes was generally higher in older age groups, particularly among those aged 70–79 years. Age was significantly associated with polypharmacy, impaired ADL, impaired IADL, cognitive impairment, frailty, sarcopenia, and multimorbidity ($p \leq 0.05$). No significant association was found between age and high risk of falls or depression ($p > 0.05$).

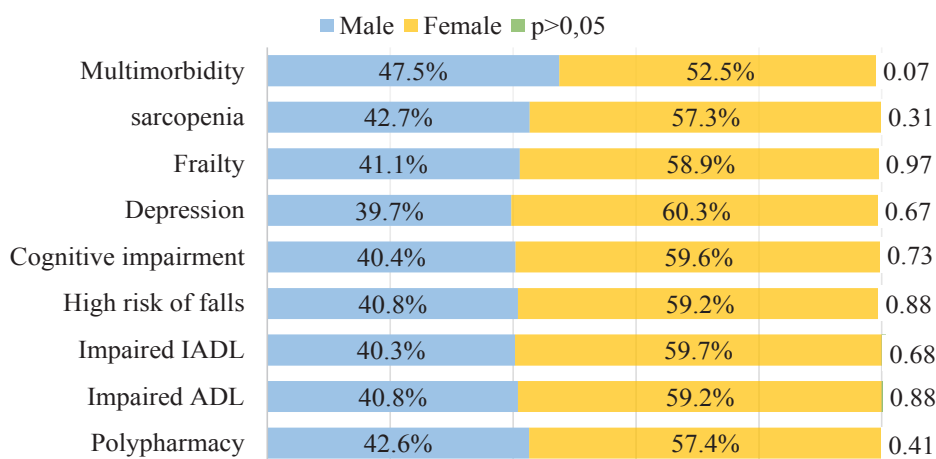


Figure 3. Sex distribution of patients with selected geriatric syndromes (n = 475)

The prevalence of geriatric syndromes was higher among female patients than among male patients. However, the difference was not statistically significant ($p > 0.05$).

Table 2. Association between age groups and selected geriatric syndromes based on univariable logistic regression analysis (n = 475)

Geriatric syndrome	70-79 years vs. 60-69 years OR (95% CI)	p	≥ 80 years vs. 60-69 years OR (95% CI)	p
Polypharmacy	1.88 (1.05 – 3.36)	0.03	2.49 (1.34 – 4.65)	0.01
Impaired ADL	1.15 (0.64 – 2.07)	0.64	1.76 (0.94 – 3.28)	0.08
Impaired IADL	1.38 (0.78 – 2.42)	0.27	1.68 (0.92 – 3.08)	0.09
Depression	1.25 (0.66 – 2.34)	0.49	1.23 (0.63 – 2.42)	0.54
Frailty	1.02 (0.56 – 1.86)	0.94	2.59 (1.38 – 4.86)	0.01
Sarcopenia	1.19 (0.68 – 2.11)	0.53	1.85 (1.01 – 3.39)	0.04
High risk of falls	0.72 (0.40 – 1.29)	0.26	1.13 (0.61 – 2.09)	0.69
Cognitive impairment	0.88 (0.51 – 1.51)	0.64	1.70 (0.95 – 3.06)	0.08
Multimorbidity	1.34 (0.71 – 2.53)	0.38	2.05 (1.05 – 3.99)	0.04

Note: Reference group: 60-69 years.

Univariate logistic regression was performed with the 60–69 age group as the reference. Most geriatric syndromes showed an increasing trend in odds with age. Compared with patients aged 60–69 years, those aged 70–79 years had significantly higher odds of polypharmacy (OR 1.88; 95% CI 1.05–3.36), while the associations with all other geriatric syndromes were not statistically significant ($p > 0.05$). Among patients aged ≥ 80 years, significant associations were observed for polypharmacy (OR 2.49; 95% CI 1.34–4.65), frailty (OR 2.59; 95% CI 1.38–4.86), sarcopenia (OR 1.85; 95% CI 1.01–3.39), and multimorbidity (OR 2.05; 95% CI 1.05–3.99). Polypharmacy was the only geriatric syndrome significantly associated with both older age groups.

DISCUSSION

In our study, the mean age of the 475 older patients was 76.83 ± 6.89 years, and the majority were aged 70 years or older (75.1%). This finding reflects the characteristics of patients attending a Geriatrics Department at a central-level hospital, where older patients with more advanced age and more complex health conditions are commonly treated ⁴. The higher proportion of female patients was also consistent with the general trend reported in many geriatric studies in Vietnam and other countries, as women generally have a longer life expectancy than men ¹. Most participants lived in urban areas (61.1%), while 38.9% lived in rural areas. This may be related to the location of the study hospital and easier access to healthcare services in urban areas. Most participants (88.4%) lived with their families, reflecting the important role of family in caring for older people in Vietnam. Only 9.5% lived alone and 2.1% lived with a caregiver, which is consistent with the common pattern

of older Vietnamese people living with and receiving support from family members ⁴.

Regarding the prevalence of geriatric syndromes, the high prevalence of multimorbidity and polypharmacy was consistent with the physiological and pathological characteristics of older people. Ageing is accompanied by a decline in the function of multiple organ systems, making older patients more likely to develop several chronic diseases and consequently require treatment with multiple medications ⁵. Our findings were consistent with a study conducted among older outpatients at Nghe An General Hospital, which reported a multimorbidity prevalence of up to 83.4%¹⁰. They were also similar to findings from a study at Military Central Hospital 108 involving 188 older inpatients, in which the prevalence of polypharmacy was 64.4% ⁶. Depression had the lowest prevalence in our study, which was considerably lower than that reported in some studies of patients with mild cognitive impairment, where the prevalence of depression could be as high as 80% ⁸. This difference may be explained by differences in study populations, screening tools, and underlying medical conditions across studies.

Univariable logistic regression analysis showed that the prevalence and odds of most geriatric syndromes increased with age. This finding is consistent with the physiological process of ageing. As people become older, physiological reserves decline, and the body's ability to respond to and compensate for internal and external stressors becomes weaker, resulting in a higher risk of geriatric syndromes ². Notably, among patients aged 70–79 years, only polypharmacy remained significantly associated with age, whereas among those aged ≥ 80 years, four geriatric syndromes were significantly associated

with age: polypharmacy, frailty, sarcopenia, and multimorbidity. This finding suggests that the effects of ageing on geriatric syndromes may accumulate gradually during the 70–79-year period and become more apparent after the age of 80. This may also explain why, although the prevalence of most geriatric syndromes differed across the three age groups, pairwise logistic regression analysis showed that most of these differences became statistically significant only among the oldest patients.

Polypharmacy was the only geriatric syndrome that remained statistically significant in both age-group comparisons, with the OR increasing with age, from 1.88 among patients aged 70–79 years to 2.49 among those aged ≥ 80 years. This finding indicates a clear association between polypharmacy and age and suggests that polypharmacy may be one of the earliest and most sensitive geriatric syndromes to change with increasing age. Our findings were consistent with a study by Daimaru et al. (2024) in Japan, which reported that polypharmacy increased with age and was closely associated with frailty²², as well as with a study by Mielke et al. (2024) among older patients with chronic kidney disease⁷.

Similarly, the prevalence of frailty was significantly higher among patients aged ≥ 80 years than among those aged 60–69 years. This finding is consistent with the pathophysiological mechanisms reported in the literature, including a decline in functional reserves across multiple organ systems, chronic low-grade inflammation, and a reduced ability to adapt to stress, all of which increase with age². Our findings were also consistent with a study by Liu Y et al. (2024) involving more than 24,000 older patients with diabetes, which identified

advanced age as one of the important independent risk factors for frailty²³.

Regarding sarcopenia, the prevalence was significantly higher among patients aged ≥ 80 years than among those aged 60–69 years. This finding is consistent with the recommendations of the Asian Working Group for Sarcopenia (AWGS 2019), which identify advanced age as one of the major risk factors for sarcopenia. It is also consistent with Prokopidis et al. (2023), who reported in a meta-analysis of 29 studies a strong association between sarcopenia and polypharmacy²⁴.

Multimorbidity also showed a clear association with age, with the risk being particularly higher among patients aged ≥ 80 years. This finding reflects the accumulation of chronic diseases as a natural consequence of biological ageing and may also help explain the parallel increase in polypharmacy among older patients⁵. In this study, the OR for multimorbidity increased from 1.34 in the 70–79-year age group to 2.05 in those aged ≥ 80 years ($p = 0.04$), indicating that statistical significance was reached only among the oldest age group. This pattern was similar to that observed for polypharmacy (ORs of 1.88 and 2.49, respectively), suggesting that the two syndromes changed in the same direction and at a similar rate with advancing age. The nearly identical prevalence of multimorbidity (67.4%) and polypharmacy (66.7%) further supports this observation.

In contrast, impaired ADL, impaired IADL, cognitive impairment, depression, and high fall risk showed an increasing trend in ORs with age, but the 95% confidence intervals were relatively wide. This may be partly due to the relatively small number of patients aged 60–69 years in the reference

group, which reduced the statistical power of the analysis. In addition, these conditions are multifactorial and are influenced not only by age but also by other factors, such as underlying diseases, living environment, and nutritional status. Therefore, in univariable logistic regression analysis including age as the only explanatory variable, the associations may not have been sufficiently clear.

The prevalence of geriatric syndromes was higher among female patients than among male patients; however, the difference was not statistically significant ($p > 0.05$). This trend is consistent with findings from several previous studies, which suggest that older women generally have a longer life expectancy but may experience a greater burden of disease and functional decline than men. The lack of statistical significance in our study may be due to the relatively small sample size in some geriatric syndrome subgroups, which may have limited the ability to detect true differences between sexes. It may also be related to the relatively homogeneous study population from a single healthcare facility.

Limitations of the study

This study has several limitations. First, the sample size of patients aged 60–69 years ($n = 71$) was relatively small, which may have reduced the statistical power of comparisons. Second, the cross-sectional design only allowed us to identify associations and did not allow causal relationships to be established between age, sex, and geriatric syndromes. Third, the study was conducted at a central-level hospital, where patients generally have more complex medical conditions. Therefore, the prevalence of geriatric syndromes may be higher than that in the general community, limiting the generalisability of the findings.

CONCLUSION

Older patients in this study had a relatively high prevalence of geriatric syndromes, particularly multimorbidity and polypharmacy. The prevalence of geriatric syndromes increased with age, especially among patients aged ≥ 80 years. Therefore, comprehensive geriatric screening should be strengthened, with particular attention to medication use, sarcopenia, and frailty among patients aged 80 years and older, to enable timely and appropriate interventions.

RECOMMENDATIONS

Thai Nguyen National Hospital should consider implementing routine comprehensive geriatric assessment for all patients aged ≥ 60 years, with particular attention to those aged ≥ 80 years, who may have a higher risk of polypharmacy, frailty, sarcopenia, and multimorbidity. Early interventions for sarcopenia and frailty should include resistance exercise, nutritional supplementation, and fall prevention strategies. Healthcare professionals should receive appropriate training in the recognition and management of common geriatric syndromes, while medication regimens should be routinely reviewed to identify and minimise inappropriate polypharmacy.

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