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A Study on the Correlation Between Malnutrition and Short-Term Prognosis in Elderly Emergency Admissions

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Research Article

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Abstract

Background

Malnutrition affects patients health and clinical prognosis in multiple ways. Approximately one-quarter of older adults worldwide are at risk of malnutrition or suffer from malnutrition. Malnutrition and malnutrition risk are highly prevalent in emergency patients and are associated with adverse clinical outcomes. However, nutritional risk assessment is not routinely performed for elderly emergency patients in clinical practice, and studies on the nutritional status of elderly emergency patients remain scarce. The short-term prognostic significance of malnutrition in elderly Chinese emergency admissions remains unclear.

Methods

This retrospective study collected clinical data of elderly patients (≥ 60 years) who visited the Emergency Department of West China Hospital, Sichuan University between May 31, 2019 and December 31, 2023 and were admitted to hospital within 72 hours. We first characterized the nutritional status of elderly patients admitted via the emergency department. Patients were then divided into a malnutrition group and a normal nutrition group based on GNRI and GLIM. PSM was used to match the two groups at the 1:1 ratio. The 28-day survival was compared between the two groups, and short-term survival curves were plotted using the Kaplan–Meier method. Secondary outcomes, including ICU admission rate and total length of hospital stay, were also compared to analyze the impact of malnutrition on short-term prognosis in elderly emergency admissions.

Results

A total of 7,439 patients were included after applying inclusion and exclusion criteria. According to GNRI assessment, 43.3% of patients had nutritional risk. The nutritional risk group showed statistically significant differences in ICU admission, length of hospital stay, and 28-day mortality compared with the no-risk group ($P < 0.05$). A total of 4,217 patients without nutritional risk by GNRI were assigned to the normal nutrition group, and 1,658 patients diagnosed with malnutrition by GLIM were assigned to the malnutrition group. Malnutrition significantly reduced 28-day survival in elderly patients ($P < 0.001$). After PSM, 1,375 patients were successfully matched in each group, with acceptable between-group balance. After adjusting for covariates, the malnutrition group had significantly lower 28-day survival than the normal nutrition group ($P = 0.068$). There was no significant difference in ICU admission rate between the normal nutrition and malnutrition groups ($P = 0.303$), while malnutrition significantly prolonged the length of hospital stay ($P < 0.001$).

Conclusions

Nutritional risk/malnutrition is common in elderly emergency admissions. Elderly emergency admissions with malnutrition have longer hospital stays and lower 28-day survival rates than those with normal nutrition, with no significant difference in ICU admission rate.

Introduction

Malnutrition, an abbreviation for Protein-energy malnutrition, is a condition caused by insufficient intake or the inability to absorb and/or digest adequate energy and/or protein[1–3]. Malnutrition can affect patients' health and clinical prognosis in multiple aspects, and it is prevalent among populations of different age groups worldwide, especially among the elderly[4–6], as a number of age-related changes can affect nutritional status, such as lack of physical exercise, loss of appetite, feelings of being unwanted or neglected. In addition, the elderly are characterized by loss of taste, which affects eating habits and negatively impacts health status [29]. Other important changes include decreased bone density or skeletal muscle mass, and increased body fat, which can lead to osteoporosis, sarcopenia or sarcopenic obesity[30, 31]. In this context, compared with well-nourished elderly patients, malnourished elderly patients have a higher risk of geriatric syndromes, leading to severe impairment of health status [32]It is estimated that approximately one-quarter of older adults (≥ 60 years old) worldwide are at risk of malnutrition or suffer from malnutrition. Against the backdrop of the accelerating global population aging, this figure is expected to continue rising [7–8]. Correspondingly, the proportion of elderly patients in the emergency patient population has also increased significantly. In the United States, elderly patients account for 38% of emergency medical services, nearly four times the rate of younger patients. A European survey shows that elderly patients make up 5% to 30% of the total number of emergency department attendees. Reports on emergency departments from multiple tertiary general hospitals in China indicate that patients aged 60 and above account for more than 60% of all emergency patients [9]. As the physical functions of the elderly population naturally decline, their physiological defense mechanisms are weakened, making them more susceptible to various diseases, which makes the elderly group a high-frequency population visiting the emergency department. A European survey shows that elderly patients account for 5% to 30% of the total number of emergency department attendees, of whom approximately 51% will be admitted to hospital [10]. The majority of elderly patients visiting the emergency department are aged 60–75 years [11–12], and malnutrition and the risk of malnutrition are extremely prevalent among emergency internal medicine patients. [13–14]Compared with patients without nutritional risk, patients at risk of malnutrition have a higher acute admission rate for initial hospitalization[15]. Among the limited number of studies investigating malnutrition in elderly patients in the emergency department, the prevalence is reported to be 15%~29%[16–19], which is associated with an increase in short-term mortality[20]; moreover, as the age group increases, the proportion of patients with malnutrition increases, and the number of comorbidities increases. The malnourished population has lower quality of life scores and functional ability scores, are frailer, more likely to have been hospitalized or fallen recently, have longer waiting times, and have a higher risk of death.[21–22]

The negative impact of malnutrition on the health of the elderly should not be underestimated. Studies have shown that malnutrition can cause a significant decline in the immunity of the elderly, a reduction in

muscle mass, and a substantial increase in the probability of contracting diseases, while the risk of falls and fractures also rises accordingly. In addition, malnutrition also exerts an adverse effect on the therapeutic effect of diseases, which may lead to the deterioration of the disease or the prolongation of the course of the disease, further reducing the quality of life of the elderly[23–24]. However, in the busy and urgent working environment of the emergency department, emergency medical staff often cannot conduct in-depth assessment of the nutritional status of patients, and even neglect nutritional assessment. At present, nutritional risk assessment for elderly emergency patients is not routinely performed in clinical practice[25], which directly leads to the failure of timely detection and intervention of malnutrition problems in many elderly emergency patients. There are very few studies on the nutritional status of elderly emergency patients. A prognostic study on malnutrition in patients presenting to the emergency department in Ireland found that malnutrition is very common among elderly patients and is associated with adverse outcomes; compared with the population with normal nutrition, the malnourished population has lower scores on quality of life and functional ability, are frailer, more likely to have been hospitalized or fallen recently, and have longer waiting times; at 30 days, compared with the elderly with normal nutritional status at the baseline emergency department visit, the elderly with malnutrition are more likely to be readmitted, admitted to a nursing home, have a decreased quality of life and declined function[20–21]. A domestic multicenter study on patients admitted to the emergency department concluded that as the age group increases, the proportion of patients with malnutrition increases, and the number of comorbidities increases; the incidence of malnutrition is the highest among patients aged > 80 years and patients with two or more comorbidities; the mortality rate of patients with high nutritional risk is significantly higher than that of patients with low nutritional risk ($P < 0.01$) and patients with no nutritional risk ($P < 0.01$)[22]. However, neither of the above two studies adopted the globally recognized diagnostic criteria for malnutrition, and the nutritional status of elderly emergency patients in China and the short-term prognostic significance of malnutrition are still unclear.

This study retrospectively collected clinical data of elderly patients admitted to the emergency department of a single center, investigated the nutritional status of these elderly emergency admission patients, divided the patients into the normal nutrition group and the malnutrition group according to GLIM, balanced the baseline characteristics of the normal nutrition group and the malnutrition group basically through the PSM, and then compared the differences in survival outcomes between the two groups, so as to raise the awareness of emergency medical staff on the nutritional status of elderly patients visiting the emergency department.

Methods

Study population

We retrospectively reviewed electronic medical records to select elderly patients (≥ 60 years) who presented to the Emergency Department of West China Hospital, Sichuan University between May 31, 2019 and December 31, 2023 and were admitted to the inpatient department. Collected data included baseline characteristics (age, sex, ethnicity, vital signs on emergency arrival, consciousness, diagnosis,

comorbidities, height, weight, BMI), initial laboratory parameters after emergency presentation (hemoglobin, hematocrit, white blood cell count, platelet count, serum albumin, total serum protein, serum creatinine, blood urea nitrogen, C-reactive protein), and prognostic data (ICU admission, total length of hospital stay, 28-day vital status).This study was approved by the Biomedical Ethics Committee of West China Hospital, Sichuan University (Approval No. 2024 (150)).

Selection criteria

Inclusion criteria including : Age ≥ 60 years;First admission via the emergency department.

Exclusion criteria including : Emergency observation > 72 hours;Out-of-hospital or in-emergency cardiac arrest;End-stage malignant tumor;Incomplete medical records.

Grouping

Nutritional risk screening was performed using GNRI(Appendix1). Patients without nutritional risk were assigned to the normal nutrition group. Patients with nutritional risk who met GLIM(Appendix1) diagnostic criteria for malnutrition were assigned to the malnutrition group. In GLIM diagnosis, the presence of both inflammation and low BMI (European criteria) was used as the basis for diagnosing malnutrition.

PSM

This study is a retrospective investigation where the data were not strictly randomized, and numerous potential clinical factors influencing malnutrition exist. Consequently, various confounding factors may be distributed differently among elderly patients with malnutrition. To eliminate the impact of these confounders on prognosis, the propensity score matching (PSM) method was employed to balance the confounding factors between the two groups. The specific implementation steps were as follows: (1) Covariates included patient gender, age, ethnicity, consciousness status and vital signs at emergency department admission, comorbidities, HGB, PCV, WBC, PLT, Crea, Urea, TP, etc.; (2) The presence or absence of malnutrition was used as the dependent variable, and propensity scores were calculated using logistic regression; (3) R language (R version 4.4.2, MatchIt package) was applied to perform 1:1 nearest neighbor matching, with a caliper value set at 0.02; (4) The matched sample data from the two groups were utilized for subsequent analysis.

Outcome measures

Prognostic data were collected via electronic medical records or telephone follow-up.The primary outcome is 28-day vital status (survival duration from emergency registration to day 28).The secondary outcomes are ICU admission and total length of hospital stay (from emergency registration to discharge;

patients who died, discharged against medical advice, or transferred were excluded).Follow-up ended at discharge or 28 days after emergency presentation.

Statistical Analysis

Normally distributed continuous data are presented as mean ± standard deviation and compared using independent-samples t-tests. Non-normally distributed continuous data are presented as median and interquartile range (IQR) and compared using the Mann–Whitney U test. Categorical data are presented as counts and percentages and compared using the Pearson χ^2 test or Fisher exact test. Survival curves were plotted using the Kaplan–Meier method and compared using the log-rank test. Univariate and multivariate Cox proportional hazards models were used to analyze 28-day all-cause mortality. Statistical analyses were performed using SPSS 27.0 (IBM) and R 4.4.2. A two-sided $P < 0.05$ was considered statistically significant.

Result

Baseline characteristics

From May 31, 2019, to December 31, 2023, a total of 15,193 elderly patients aged ≥ 60 years who visited the emergency department of West China Hospital of Sichuan University and were admitted to the hospital were included. After sequentially excluding 6,085 patients with an emergency observation duration ≥ 72 hours, 33 patients who experienced cardiac arrest before or during the emergency department stay, 4 patients diagnosed with terminal malignant tumors, and 1,632 patients with incomplete medical records, a total of 7,439 patients were included in this study (Fig. 1).

Among all patients, the median age was 70.5 (65.7, 77.1) years. Male elderly patients outnumbered female patients, accounting for 56.8% (4,228/7,439) and 43.2% (3,211/7,439). A total of 95.2% (7,082/7,439) of the patients were of Han ethnicity. LBMI and anemia were present in 32.8% and 38.3% of the patients, respectively. Hypoproteinemia was observed in 11.3% of the patients, and 7.1% had a urea-to-creatinine ratio less than 10:1. Among the listed comorbidities, the top three were hypertension (28%), diabetes mellitus (18.5%), and esophageal/gastric/intestinal diseases (18.1%). Inflammation was present in over three-quarters of the patients (78.3%). According to the GNRI assessment, 43.3% (3,222/7,439) of the patients were at nutritional risk, with 18.6% at mild nutritional risk and 24.7% at moderate to severe nutritional risk. Significant differences were observed between elderly patients with nutritional risk and those without nutritional risk in terms of gender, age, ethnicity, NEWS, and the presence of LBMI, anemia, leukopenia, thrombocytopenia, hypoproteinemia, urea-to-creatinine ratio < 10, inflammation, hypertension, esophageal/gastric/intestinal diseases, moderate to severe liver disease, connective tissue diseases, tumors, and neurological and hematological diseases ($P < 0.05$). Moreover, the group with nutritional risk was more likely to be admitted to the ICU, had longer hospital stays, and exhibited a higher risk of 28-day mortality. Additionally, after admission to the inpatient department via the emergency department, only 56.7% (4,171/7,439) of the patients underwent nutritional risk screening

(NRS2002/MNA/SGA). Among these, 2,090 (50.1%) patients were assessed as having nutritional risk (Table 2,Appendix1).

Clinical Datas and Prognostic Analysis in patients before PSM

According to GNRI assessment, 4,217 out of 7,439 patients (56.69%) were identified as having no nutrition risk and were classified into the normal nutrition group. Among them, male patients accounted for 55.02% (2,320/4,217), while female patients accounted for 44.98% (1,897/4,217). The median age was 69.9 (65.4, 76.6) years, and the median BMI was 23.86 (21.90, 26.14) kg/m^2. 3,222 out of 7,439 patients (43.31%) were identified as having nutrition risk, and among them, 1,658 out of 7,439 patients (22.29%) were diagnosed with malnutrition using GLIM criteria, forming the malnutrition group. This group consisted of 988 male patients (59.59%) and 670 female patients (40.41%). The median age was 72.5 (67.0, 78.7) years, and the median BMI was 19.38 (17.78, 20.93) kg/m^2(Fig. 1 and Table 3,Appendix1). Figure 2 shows the Kaplan-Meier survival analysis for the 28-day period before matching. The 28-day survival rates were 98.31% for the normal nutrition group and 94.99% for the malnutrition group,indicating that malnutrition significantly reduced the 28-day survival rate compared to the normal nutrition group($P < 0.001$).

PSM 1:1: matched using the 1:1 nearest neighbor matching method.

Cox regression analysis of factors influencing 28-day survival prognosis in patients before PSM

The preliminary univariate analysis of PSM results indicated that age, presence of hematologic disorders, NEWS score classified as intermediate risk, malnutrition, mild or severe anemia, thrombocytopenia, hypoalbuminemia, low body mass index, and ICU admission were independent factors influencing the 28-day survival prognosis of elderly patients admitted to emergency departments ($P < 0.05$). Multivariate analysis confirmed that age (70–80 years), severe anemia, thrombocytopenia, malnutrition, and ICU admission remained significant independent predictors for 28-day survival in this population (Table 4,Appendix1).

Clinical Data of Patients After Matching

Using patients' gender, age, ethnicity, vital life signs (T, HR, R, MAP, SPO_2) and consciousness status at emergency admission, complications(hypertension, diabetes, coronary heart disease, heart failure, esophageal/gastric/intestinal diseases, chronic lung disease, chronic renal disease, moderate-to-severe liver disease, connective tissue diseases, AIDS, nervous system disease, blood System Diseases, drug-induced immunosuppression state), as well as WBC, HGB, PCV, TP, PLT, Urea, and Crea as covariates, and malnutrition presence as the dependent variable, a 1:1 matching was performed using the nearest neighbor method in R software. A total of 1,375 patients were successfully matched. Post-matching, the distribution of propensity score matching (PS) scores between the two groups was essentially

consistent (Fig. 3,Appendix1); all standardized mean differences (SMD) for the covariates were < 0.1, indicating acceptable intergroup balance (Table 4,Appendix1). No significant statistical differences were observed among the covariates between the two groups after matching (P > 0.05) (Table 5,Appendix1).

Patient Outcome Data After Matching

The follow-up outcomes of patients after PSM are presented in Table 6: the number of deaths at 28 days was 38 (2.76%) in the nutrition-normal group and 65 (4.73%) in the malnutrition group. A chi-square test revealed a statistically significant difference between the groups (P = 0.007). Figure 4 shows the Kaplan-Meier survival analysis for both groups at 28 days, demonstrating survival rates of 97.24% and 95.27%, respectively. A Log-rank test yielded P = 0.0068, indicating that after propensity score matching and control for covariates, the malnutrition group exhibited a significantly lower 28-day survival rate compared to the nutrition-normal group—a conclusion consistent with the data prior to PSM.The secondary outcome measures included ICU admission status and total hospital stay duration (see Table 6). The nutrition-normal group and malnutrition group had 20 (1.45%) and 27 (4.73%) patients admitted to the ICU, respectively (P = 0.303), with no significant intergroup difference or statistical significance. The median total hospital stay (excluding patients who were discharged automatically, transferred, or deceased) was 10.69 (7.78–15.78) days in the nutrition-normal group versus 11.77 (8.00–17.54) days in the malnutrition group (P < 0.001), indicating that malnutrition significantly prolonged hospitalization duration.

Table 6
Follow-up status of patients after matching

	Normal nutritional group	**Malnutrition group**	**Test**	***P***
	N = 1375	**N = 1375**		
Primary outcome				
Death of 28th	38(2.76%)	65(4.73%)	χ^2 = 7.353	0.007
Secondary outcome				
Admitted to the ICU	20(1.45%)	27(1.96%)	χ^2 = 1.061	0.303
Total hospitalization days	10.69(7.78,15.78)	11.77(8.00,17.54)	Z=-3.525	< 0.001
Automatic discharge or hospital transfer	131(9.53%)	172(12.51%)		
In-hospital death	15(1.09%)	22(1.62%)		

Discussion

Nutrition serves as a crucial factor bridging health and disease. With the continuous advancement of nutrition-related research, a comprehensive system for assessing nutritional status has gradually been established. Risks associated with nutritional factors that may lead to adverse clinical outcomes in patients are termed nutritional risks. Nutrition risk assessment is a vital component in diagnosing clinical malnutrition and initiating nutritional support. Various screening and evaluation tools have been developed for different populations and disease conditions, with the most widely used clinical instruments including NRS 2002, MNA, and SGA. However, it was not until 2018 that expert consensus led to the introduction of the GLIM, which initially standardized global diagnostic criteria for malnutrition through two key steps: risk screening and diagnosis [1]. Nevertheless, China has yet to reach a consensus on nutritional risk screening tools based on the GLIM standards. The GNRI provides an objective nutritional risk assessment tool by integrating serum albumin levels and body weight data. Its efficacy in evaluating the nutritional status of elderly individuals makes it suitable for inclusion as part of the GLIM assessment process [2–3]. In this study, we investigated and analyzed the nutritional status and short-term prognosis of elderly patients (≥ 60 years old) who visited the Emergency Department and were admitted to the Inpatient Ward at West China Hospital of Sichuan University between May 31,2019, and December 31,2023. Since routine nutritional risk screening or malnutrition diagnosis was not performed during emergency department visits, malnutrition was diagnosed using the globally recognized GLIM criteria. The GLIM standard comprises two steps: nutritional risk screening and malnutrition diagnosis; however, no consensus has yet been reached regarding the specific nutritional risk screening scale to be used under these criteria. Studies have demonstrated that GNRI exhibits excellent performance as an objective nutritional screening tool in identifying malnutrition as defined by GLIM [58]. Therefore, this study adopted GNRI as the nutritional risk screening tool to identify patients at risk of malnutrition and further determined those with confirmed malnutrition status using the GLIM criteria. During the GLIM diagnostic process, due to the limitations of retrospective studies in obtaining clinical data, we were unable to determine patients' dietary habits, weight trends, or muscle mass at emergency admission. Nearly all etiological criteria were derived from inflammatory responses, and almost all phenotypic criteria were established based on LBMI. Although our study focused on Asian populations, the GLIM does not explicitly provide severity grading standards for malnutrition in this population; therefore, we adopted European criteria for identifying concomitant low BMI. Consequently, false negatives may have occurred among excluded malnourished patients, potentially leading to an underestimated prevalence of malnutrition. We only ensured that patients classified as malnourished indeed met GLIM diagnostic criteria. To our knowledge, this is the first retrospective study combining GNRI scores with GLIM criteria for diagnosing malnutrition in elderly emergency patients, examining the association between nutritional status and all-cause mortality in this population.

Our analysis using the GNRI identified that 43.3% of patients exhibited nutritional risks, a result lower than those reported in previous studies on nutritional risk screening among hospitalized elderly patients (53.36%–83.21%) [60–63]. We found that elderly males were more likely to have nutritional risks or malnutrition than females, which contradicts the findings of Bardon, L.A. et al. [41], who concluded that women are associated with higher malnutrition risks due to longer life expectancy or greater exposure to

adverse economic and social environments in old age; however, their study focused on community-dwelling elderly individuals. Furthermore, our analysis suggests the following potential factors: First, height and weight data in this study were derived from hospital admission records rather than measurements taken during emergency visits, which may lead to an underestimation of nutritional risk prevalence. Additionally, the nutritional risk screening methods employed in hospitals primarily assess recent weight changes, appetite status, subcutaneous tissue volume, and muscle mass, providing insights into short-term nutritional status but potentially influenced by subjective factors, thereby compromising accuracy. Second, nutritional status during emergency observation periods varies with disease progression, and some patients may not receive nutritional interventions; conversely, inadequate nutritional intake may contribute to higher screening rates among hospitalized patients. Third, while no study has definitively compared the efficacy of GNRI versus other nutritional assessment tools for risk identification, existing evidence demonstrates that GNRI serves as a reliable screening instrument for elderly patients with high sensitivity and accuracy [59, 62, 64]. The increased susceptibility to malnutrition in older adults may be attributed to age-related declines in metabolism and immune function, inflammatory factors, oral health issues, comorbidities, and psychosocial factors. When diagnosing malnutrition using GNRI combined with GLIM, we found that the majority of malnourished patients were aged between 67 and 79 years, with a prevalence rate of 28.22%, and the prevalence was higher in males than in females. This result is consistent with recent domestic and international studies on malnutrition prevalence among elderly emergency patients (15%–29%) [16–19, 28], although our study may have underestimated the true prevalence. Additionally, before PSM analysis, significant statistical differences were observed between the malnutrition group and the normal nutrition group regarding gender, age, BMI, low body mass index, vital signs at admission, hypertension, chronic kidney disease, moderate-to-severe liver disease, neurological disorders, hematologic disorders, WBC, HGB, PCV, ALB, TP, Urea, Crea, and GNRI ($P < 0.05$). In contrast, no statistically significant differences were found in ethnicity, level of consciousness, diabetes, coronary heart disease, heart failure, chronic pulmonary disease, esophageal/gastric/intestinal diseases, AIDS, connective tissue diseases, tumors, drug-induced immunosuppression state, or platelet count ($P > 0.05$). Current research has clearly established the associations between malnutrition and factors such as gender, age, BMI, LBMI, some complications, as well as parameters including white blood cell count, hemoglobin, serum albumin, total serum protein, serum creatinine, blood urea nitrogen, and platelet count [28–29, 34–42, 65–74]. However, most experimental conclusions were derived from analyses of inpatient or community patient data. Hospitalization itself constitutes a risk factor for malnutrition [28, 52]. Insufficient dietary support, limited food choices, inadequate meal frequency, and reliance on assisted feeding are major risk factors contributing to deteriorating nutritional status during hospitalization [52]. Our findings may thus differ from these studies due to variations in individual compensatory capacity, treatment efficacy, sample characteristics, and study design limitations. Additionally, incomplete diagnosis may occur in emergency settings, where most admitted patients exhibit inflammatory factors that can be controlled or resolved with treatment—this could explain our lower reported prevalence rates. Further analysis using larger samples of emergency department patients is warranted for validation.

While numerous studies have investigated the impact of malnutrition on disease prognosis or nutritional status in non-emergency hospitalized patients, research focusing on its correlation with outcomes in elderly emergency patients remains relatively limited. A study in Ireland examining the prognosis of malnourished emergency patients revealed that malnutrition is prevalent among elderly individuals and associated with adverse outcomes. Compared to nutritionally adequate individuals, malnourished patients exhibited lower quality-of-life scores, poorer functional capacity, greater physical weakness, higher rates of recent hospitalization or falls, and longer waiting times. At 30 days post-diagnosis, malnourished elderly patients were more likely to experience readmission, nursing home placement, declines in quality of life, and functional impairment compared to those with normal nutritional status at baseline [20, 21]. A multicenter study in China involving emergency hospitalizations demonstrated an increasing prevalence of malnutrition and comorbidities across age groups, with the highest incidence observed in patients aged > 80 years and those with two or more comorbidities. Patients at high nutritional risk exhibited significantly higher mortality rates than those with low nutritional risk ($P < 0.01$) or no nutritional risk ($P < 0.01$) [22]. Our study further revealed that among elderly emergency patients, those with nutritional risk had higher 28-day mortality rates, prolonged hospital stays, and higher ICU admission rates compared to those without nutritional risk. Malnutrition was identified as a significant predictor of 28-day mortality risk in elderly emergency patients; compared to nutritionally adequate individuals, malnutrition markedly extended total hospitalization duration and substantially increased 28-day mortality risk. However, our study found no significant difference in ICU admission rates between malnourished and nutritionally adequate patients, which contradicts findings from other studies [20–22] due to differences in our diagnostic criteria for malnutrition. Additionally, the following factors may have influenced our results: First, patients requiring ICU admission in emergency departments typically experience prolonged waiting times; our study excluded those who had been observed in the emergency department for over 72 hours, and patients requiring ICU admission often present with concurrent malnutrition, potentially leading to an underestimation of malnourished patients' ICU admission rates. Second, during data collection, we observed that ICU-admitted patients frequently lacked height or weight information—data essential for nutritional risk screening and diagnosis—which may have further reduced the inclusion rate. Finally, increasing sample size could mitigate these effects. Malnutrition in the elderly constitutes a serious health issue. Elderly emergency patients often suffer from comorbid conditions, diminished physical function, and reduced nutritional reserves, making them more susceptible to malnutrition. In emergency settings, critically ill elderly patients commonly exhibit malnutrition, exacerbating their vulnerability and poor disease outcomes. Therefore, the nutritional status of elderly patients in emergency departments warrants heightened attention, as early nutritional screening and intervention can significantly improve their nutritional status and quality of life.

First, our study adopted European standards for assessing low body mass index (BMI), which may not align with the characteristics of Asians. Although WANG et al. developed a predictive model based on large-sample, multicenter cross-sectional data to explore new BMI cutoff values tailored to the Chinese population, their results suggested that BMI < 20 kg/m^2 should be adopted as the cutoff value for malnutrition diagnosis in China, consistent with the BMI cutoff for malnutrition defined in the GLIM

criteria [76]. Second, our study utilized height, weight, and nutritional risk screening information systematically recorded in the hospitalization department after patient admission, which may differ from the patients 'initial measurements upon emergency department arrival, although we excluded patients with prolonged observation periods (≥ 72 h). Third, when performing malnutrition diagnosis using GLIM, we employed GNRI as the nutritional risk screening tool; however, this is not the tool recommended by ESPEN for GLIM-based screening. Despite evidence demonstrating GNRI's superior performance as an objective nutritional screening tool in identifying GLIM-defined malnutrition [59], our sensitivity analysis—including analyses of populations screened in the hospitalization department combined with GLIM-based stratification—reached consistent conclusions. Thus, GNRI may serve as a viable nutritional risk screening tool for GLIM-standardized malnutrition diagnosis in elderly patients. Fourth, due to the limitations of retrospective clinical data, we were unable to obtain information on changes in patients' weight, appetite, and muscle mass during the specific period at emergency department admission. Therefore, the primary diagnostic criteria for malnutrition relied on inflammation markers and a low body mass index, which may have underestimated the prevalence of malnutrition among patients. Fifth, our study may have overlooked other significant factors that could substantially influence nutritional status and prognosis, such as economic status [28, 33], family support, education level [44], psychological state [46, 47], marital status [48, 49], alcohol use, and smoking [50, 51]. In fact, hospitalization itself is a risk factor for malnutrition [28, 52]. Insufficient dietary services, limited food options, inadequate meal times, and reliance on assistance with meal preparation are major risk factors contributing to deteriorating nutritional status during hospitalization [52].

Conclusion

This study retrospectively analyzed the clinical data of elderly patients aged ≥ 60 years who visited and were admitted to the Emergency Department of West China Hospital, Sichuan University between May 31,2019, and December 31,2023, using the PSM method. The results concluded that malnutrition risk/malnutrition is prevalent among elderly emergency patients: 43.3% were assessed as having malnutrition risk by GNRI, while 22.29% were diagnosed with malnutrition according to GLIM criteria. Malnutrition significantly influenced the 28-day mortality risk in elderly patients; those with malnutrition exhibited longer hospital stays and lower 28-day survival rates compared to normotrophic patients, although ICU admission rates showed no significant difference. These findings require further validation with larger sample sizes and prospective studies.

Declarations

Authors’ contributions

Meng Yang: Writing - original draft, Writing - review & editing, Conceptualization, Data curation, Formal Analysis, Funding acquisition, Methodology, Project administration, Resources, Software, Supervision.

Shu Zhang: Writing -review & editing, Conceptualization, Funding acquisition, Supervision, Visualization.

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Consent for publication

Not applicable, as this study did not involve human participants or individual-level clinical data requiring consent for publication.

Ethics approval and consent to participate

All procedures in this retrospective observational study were approved by the Biomedical Ethics Review Committee of West China Hospital, Sichuan University. Given the retrospective nature of this study and the use of fully anonymized and de-identified clinical data, the institutional ethics committee granted a waiver of individual informed consent. All patient data were processed strictly in accordance with the ethical principles of the Declaration of Helsinki and relevant institutional research regulations. No identifiable personal information was retained or analyzed during the study, and all participants' rights and privacy were fully protected.

Availability of Data and Materials

The raw clinical data generated and analysed during this study are not publicly available due to hospital data privacy regulations and patient confidentiality restrictions. De-identified data may be available from the corresponding author upon reasonable request and after institutional approval.

Competing interests

The authors declare no competing interests.

Clinical trial number

This study was conducted as a retrospective observational investigation and has obtained ethical approval from the Biomedical Ethics Review Committee of West China Hospital, Sichuan University. Given that this study relies solely on routinely collected, anonymized clinical data without any prospective interventions, clinical trial registration is not mandatory for this study, and no clinical trial registration number is applicable. All patient-related data were thoroughly de-identified to protect individual privacy and maintain data confidentiality. All research procedures strictly complied with the ethical guidelines stipulated by the institutional review board and were consistent with the principles outlined in the Declaration of Helsinki.

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Figures

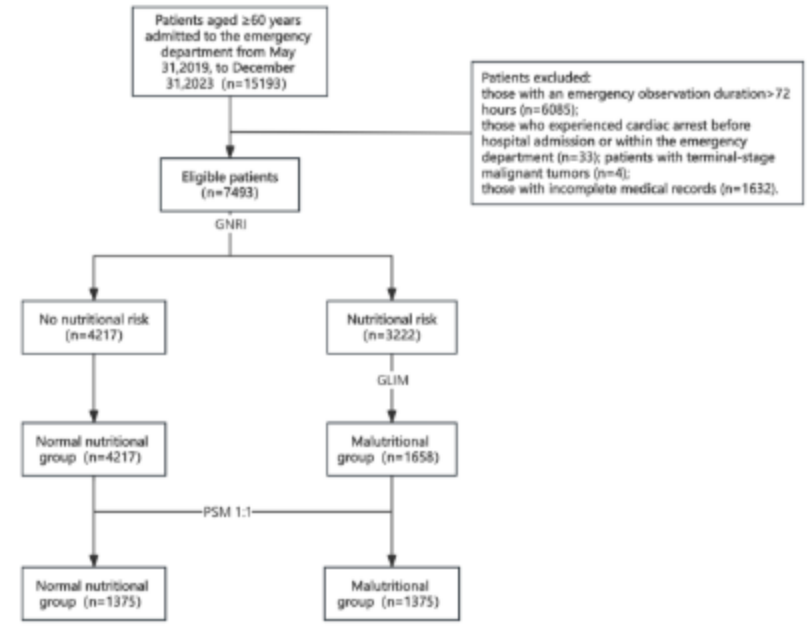


Figure 1

Patient screening workflow

PSM 1:1: matched using the 1:1 nearest neighbor matching method.

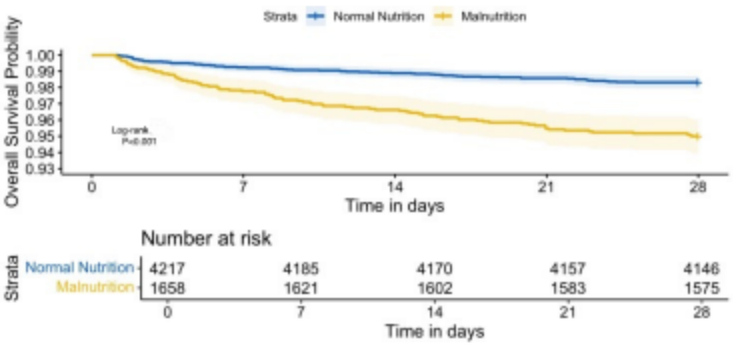


Figure 2

Kaplan-Meier survival analysis curves and risk profiles for the pre-PSM group at 28 days

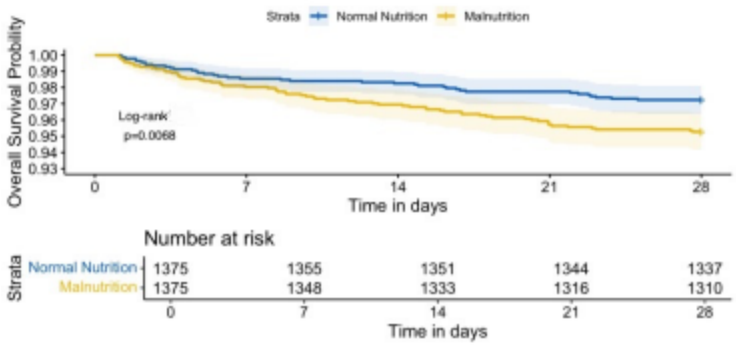


Figure 3

Figure 4 Kaplan-Meier survival analysis curves and risk ratios for the post-matching group at 28 days

Supplementary Files

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- Appendix1.docx