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Prognostic impact of CONUT score in older patients with chronic heart failure

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Abstract

Background Malnutrition is common in older patients with chronic heart failure (HF) and often accompanies a deterioration of their condition. The Controlling Nutritional Status (CONUT) score is used as an objective indicator to evaluate nutritional status, but relevant research in this area is limited. This study aimed to report the prevalence, clinical correlates, and outcomes of malnutrition in elder patients hospitalized with chronic HF.

Methods A retrospective analysis was conducted on 165 eligible patients admitted to the Department of Cardiology at Huadong Hospital from January 2021 to December 2022. Patients were categorized based on their CONUT score into three groups: normal nutrition status, mild risk of malnutrition, and moderate to severe risk of malnutrition. The study examined the nutritional status of this population and its relationship with clinical outcomes.

Results Findings revealed that malnutrition affected 82% of the older patients, with 28% experiencing moderate to severe risk. Poor nutritional scores were significantly associated with prolonged hospital stay, increased in-hospital mortality and all-cause mortality during readmissions within one year ($P<0.05$). The multivariable analysis indicated that moderate to severe malnutrition (CONUT score of 5–12) was significantly associated with a heightened risk of prolonged hospitalization (aOR: 9.17, 95%CI: 2.02–41.7).

Conclusions Malnutrition, as determined by the CONUT score, is a common issue among HF patients. Utilizing the CONUT score upon admission can effectively predict the potential for prolonged hospital stays.

Keywords Older patients, Chronic heart failure, The controlling nutritional status score, Malnutrition, Clinical outcome

Introduction

The management of heart failure (HF) is increasingly challenging due to the aging population and a substantial number of individuals at elevated risk for the condition. A comprehensive national survey within the Chinese population has elucidated that HF prevalence escalates with age, rising from 3.86% in those aged between 65 and 79 years to a pronounced 7.55% in those aged 80 and above [1]. The ramifications of chronic HF are multifaceted, encompassing not merely physical encumbrances and symptomatic distress but also emotional turmoil and the pervasive unease attendant to ongoing therapeutic regimens [2].

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Research indicates that nutrition impairment is prevalent among hospitalized patients with chronic HF, with malnutrition impacting an estimated 16–62% of these individuals [3]. Contemporary clinical practice has seen the widespread adoption of nutritional screening instruments, such as the Nutrition Risk Screening 2002 (NRS2002) and the Mini Nutritional Assessment-Short Form (MNA-SF) [4]. However, in patients with chronic HF, the effectiveness of these tools is often restricted due to the incorrect body weight measurements caused by concurrent symptoms such as edema or lack of body weight information. The CONUT score, introduced by De Ulíbarri et al. in 2005, circumvents these limitations [5]. It is calculated based on three blood test indicators including serum albumin, total cholesterol, and total lymphocyte count, which respectively reflect protein reserves, caloric expenditure and parameters of immune function [5]. The CONUT score is an objective nutritional index used to assess the nutritional status of individuals, and unlike other tools, it does not rely on subjective data or weight changes [6].

The CONUT score has been shown to be associated with poor nutritional status in various diseases, particularly in oncology patients [7, 8]. However, there is a scarcity of research examining the link between the CONUT score and elderly individuals suffering from chronic HF [9–11], especially within the context of the Chinese demographic [12]. Consequently, our study seeks to assess the influence of the CONUT score on clinical outcomes and prognostic indicators among older Chinese patients with chronic HF.

Methods

Study design and patient population

This research was a retrospective study conducted using a computer-assisted system. Older patients hospitalized with a diagnosis of chronic HF in the Cardiology Department of Huadong Hospital affiliated to Fudan University were retrospectively identified between January 2021 and December 2022, and their electronic medical records were reviewed. The eligibility criteria for the study were as follows: (1) participants aged 65 years or older; (2) both genders were eligible; (3) individuals diagnosed with chronic HF according to the Chinese Guidelines for the Diagnosis and Treatment of Heart Failure (2018) [13]; (4) exclusion of those with end-stage renal disease (ESRD) or acute kidney injury (AKI) occurring within the three months preceding hospital admission; (5) exclusion of patients with acute coronary syndrome (ACS); (6) exclusion of individuals with severe nutritional impact disorders such as severe malabsorption syndrome or other recognized metabolic diseases; (7) exclusion of those who had undergone major surgery within the three months prior to admission; (8) exclusion of patients who had received chemotherapy within the past three months. This study was approved by the Ethics Committee of Huadong Hospital (NO. 2023K199). A waiver of informed consent from each patient was granted by the Ethics Committee due to anonymous use of the data for research purpose. All procedures were conducted in accordance with the World Medical Association Declaration of Helsinki.

Definition of heart failure

According to the Chinese guidelines [13], heart failure can be classified into three categories: (1) heart failure with reduced ejection fraction (HFrEF), indicated by a left ventricular ejection fraction (LVEF) of less than 40%; (2) heart failure with intermediate ejection fraction (HFmrEF), where the LVEF falls between 40% and 49%. This category is also marked by elevated natriuretic peptide levels, specifically N-terminal pro brain natriuretic peptide (NT-proBNP) greater than 125 ng/L or B-type natriuretic peptide (BNP) greater than 35 ng/L, and at least one additional criterion such as left ventricular hypertrophy, left atrial enlargement, or diastolic dysfunction; (3) heart failure with preserved ejection fraction (HFpEF), defined by an LVEF of 50% or higher. In this category, elevated natriuretic peptide levels are also present, with the same thresholds as HFmrEF, and similar additional criteria for diagnosis, including left ventricular hypertrophy, left atrial enlargement, or diastolic dysfunction.

Data collection

Data acquisition was conducted from the inpatient electronic medical record system of Huadong Hospital including demographic data (age and sex), anthropometric measurements (weight and height), hospitalization etiology, antecedent medical conditions, pertinent comorbidities, medication profiles, histories of smoking and alcohol consumption, New York Heart Association (NYHA) functional class, and results from echocardiographic evaluations and laboratory tests performed within 48 h of admission. Blood samples were analyzed through an enzymatic immunoassay technique, utilizing Roche Automatic Analyzer modular P800 (Roche Diagnostics GmbH). Clinical outcome measures were recorded including length of hospital stay (LOS), cardiac care unit (CCU) admission, in-hospital mortality, all-cause readmissions within 1 year, and all-cause mortality during readmissions within 1 year.

Anemia (defined as hemoglobin < 13 g/dL for men and < 12 g/dL for women) was recorded by hematologic examination 48 h within admission [14]. Hypoalbuminemia (defined as serum albumin levels < 3.5 g/dL) was documented [15]. Abnormal eGFR (defined as eGFR < 60 ml/min) was recorded based on serum creatinine levels [16]. Abnormal serum sodium [17] (defined as serum sodium levels < 135 mmol/L or > 145 mmol/L) and abnormal serum potassium [18] (defined as serum potassium levels < 3.5 mmol/L or > 5.0 mmol/L), and abnormal CRP (defined as CRP levels > 10 g/dL) were recorded [19]. Moreover, high BNP (defined as BNP levels > 400 pg/mL) were recorded [20].

Anthropometry assessment

Height and weight were measured according to standardized protocols, body mass index (BMI) (kg/m^2) was calculated by dividing weight in kg by height square in m^2. We used the appropriate cutoff points for BMI of the older patients in China to define various BMI groups: underweight (<20 kg/m^2), normal weight (20–26.9 kg/m^2), and overweight (≥27 kg/m^2) [21].

Nutrition status measurements

CONUT score was calculated based on the values of the three indicators, serum albumin, total cholesterol, and total lymphocyte count on admission, and used as indicator of nutrition status [5]. The nutritional status was classified into four levels: normal (0–1), mild (2–4), moderate (5–8), and severe (9–12) [5].

Prolonged hospital stay

LOS was quantified in terms of days, starting from the date of admission to the date of discharge. For analytical purposes, a prolonged hospital stay was characterized as one where the LOS was equal to or exceeded the median duration of all hospital admissions during the study period.

Main outcomes

The primary outcome of this study was to determine the influence of the CONUT score on the prognosis of the older patients hospitalized with chronic HF. The secondary outcome encompassed the assessment of patients' nutritional status through the CONUT score and the exploration of factors that may affect this nutritional status.

Statistical analysis

Normally distributed data were described by mean ± standard deviation (SD), non-normally distributed numbers were described by median and interquartile range (IQR), and categorical variables were expressed by numbers and percentages. Group differences were assessed by analysis of variance (ANOVA), or the chi-square (χ^2) test. Spearman's correlation analysis was used to examine the associations between nutritional status and demographic information, laboratory test, and echocardiographic data, as well as to elucidate the relationship between clinical outcomes and other relevant variables. Variables that showed significant differences were included in univariate and multivariate logistic regression analyses to evaluate the prognostic significance of the nutritional status determined by CONUT score. $P < 0.05$ was considered statistically significant in all comparisons. All statistical analyzes were performed using SPSS 27.0 statistical software for MAC (SPSS Inc., Chicago, USA).

Results

Participants characteristics

The final cohort analysis included 165 patients with chronic HF, as shown in Fig. 1. The study population had

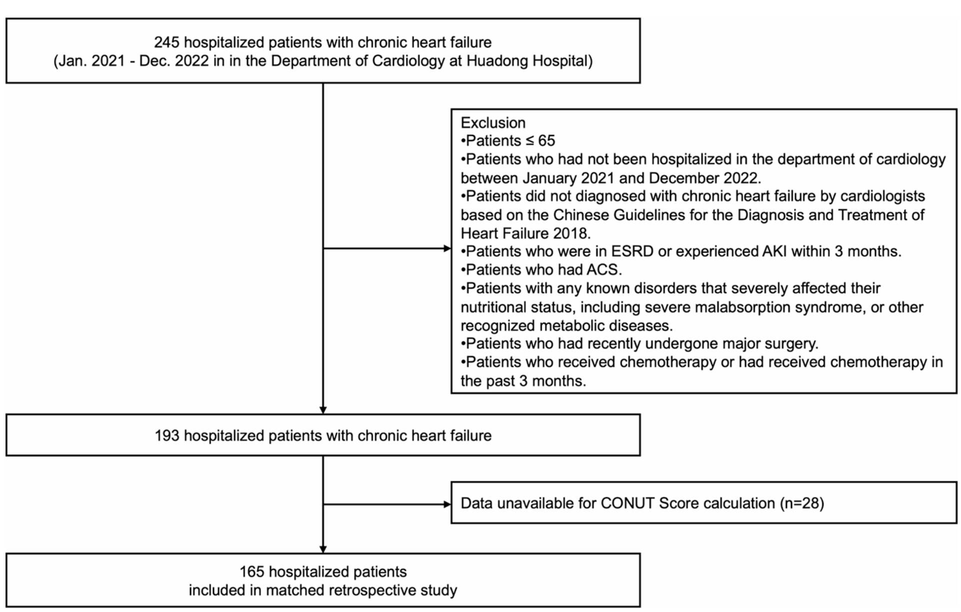

Fig. 1 Study flowchart of patient's inclusion and exclusion. ACS, acute coronary syndrome; AKI, acute kidney injury; ESRD, end-stage renal disease

a median age of 80 years, with males comprising 57.6% (95 patients). Among these patients, 26.7% (44 patients) presented with abnormal BMI levels, and a significant segment, 34.5% (57 patients) lacked body weight and height data at admission. The patient cohort exhibited a range of comorbid conditions, with hypertension and atrial fibrillation being the most prevalent. The average number of co-morbidities among these patients was seven, while the typical number of medications regularly taken was eight, highlighting the complexity of their medical profiles. Furthermore, 33.9% of the cohort presented with advanced HF symptoms, classified as NYHA functional class III or IV. The LVEF showcased a mean value of 50.2% ± 13.4%, reflecting a variance in cardiac function among the patient population. The detailed baseline characteristics of patients are summarized in Table 1.

Nutritional status and clinical associations

The mean CONUT score of this cohort was 3, indicating a general nutritional status that requires attention. Patients were stratified into three groups: normal nutritional status, at mild risk of malnutrition, and at moderate-to-severe risk of malnutrition. Notably, individuals in the moderate-to-severe malnutrition group were significantly older and exhibited with lower BMI compared to the other groups ($P<0.05$) (Table 1).

The increasing risk of malnutrition was accompanied by a rise in the prevalence of severe cardiac dysfunction. Patients with poor nutritional status based on CONUT score demonstrated higher levels of BNP and CRP, as well as decreased levels of key nutritional and functional markers such as prealbumin, albumin, hemoglobin, and eGFR. Furthermore, poor nutritional status were significantly correlated with prolonged hospital stay, increased in-hospital mortality and all-cause mortality during readmissions within one year ($P<0.001$) (Table 2).

Malnutrition and clinical outcomes

The LOS for patients in the group at moderate-to-severe risk of malnutrition was markedly higher compared to group with normal nutritional status (13 days vs. 8 days). Among older patients with HF who were identified as having moderate to severe nutritional risk at the beginning of the study, 34.8% were readmitted within one year, and 23.9% experienced mortality during these readmissions (see Table 1).

Initially, correlation analysis identified nine variables as independently associated with prolonged hospital stay: CONUT score, BMI, number of co-morbidities, diabetes, number of regularly used medications, anemia, high CRP and high BNP (Supplementary Table S1). These variables were subsequently analyzed through univariate and multivariate logistic regression to delineate the independent risk factors for prolonged hospital stay. Moderate to severe malnutrition (CONUT score of 5–12) was proved to be an independent risk factor for prolonged hospital stay for chronic HF in the older patients (aOR 9.17, 95%CI:2.02–41.7, $P=0.004$), as shown in Table 3.

Discussion

This retrospective study indicated that 82% of older chronic HF patients exhibited varying levels of risk of malnutrition, with approximately one-third at moderate or higher risk, as quantified by objective CONUT scores. Additionally, moderate to severe malnutrition, as indicated by the CONUT score, was found to be a significant factor contributing to prolonged hospitalization durations.

Bermejo et al.'s findings align with ours, showing that 52% and 15% of older inpatients with HF, when evaluated using the CONUT score, suffered from mild and moderate-to-severe malnutrition, respectively [22]. The prevalences of hypertension, LVEF, and hemoglobin levels observed at baseline mirror our findings, where hypertension emerged as the predominant comorbidity at admission among the HF patient cohort. Lower LVEF and anemia are prevalent in HF populations, particularly in those at an increased risk of malnutrition [22]. Bermejo et al.'s study cohort, mainly comprising younger individuals from Western regions and with a history of more frequent HF hospitalizations, also presented a high prevalence of overweight and obesity—factors associated with more severe HF symptoms at admission [22]. In contrast, our study population, despite exhibiting less severe HF symptoms, demonstrated a higher risk of malnutrition, potentially due to a greater average age and a lower prevalence of overweight and obesity.

We determined a correlation between the CONUT score and variables such as inflammatory markers, hemoglobin, and cardiac function. Malnutrition exacerbates cardiac dysfunction through several mechanisms, including the promotion of BNP release [23]. This is indicative not only of elevated intraventricular pressure but also of malnutrition's impact on intracellular signaling pathways and metabolic status [24, 25]. Higher CONUT scores were associated with decreased hemoglobin levels, underlying insufficient tissue oxygenation and malnutrition that may result in insufficient energy supply and imbalance in red blood cell metabolism [26–28]. CRP, a biomarker of the chronic inflammatory state that persisted in HF patients [29], compounds the effects of malnutrition in the older patients and directly influences ongoing cardiac stress and myocardial damage [30, 31].

The median LOS was 10 (7–13) days. A comprehensive HF registry from China initiated in 2012 documented a median LOS of 9 (6–12) days for HF hospitalizations [32]. The CONUT score's prognostic relevance for mortality

Table 1 Comparisons of clinical features among CONUT category

Characteristics	Total (n = 165)	Normal nutrition status (n = 30)	Mild risk of malnutrition (n = 89)	Mod. & Severe risk of malnutrition (n = 46)	*P* value
CONUT Score	3 (2–5)	1 (0–1)	3 (2–4)	6 (5–7)	< 0.001
Age (years)	81 (74–86)	78 (71–85)	80 (73–86)	84 (78–87)	0.038
65–74, n (%)	44 (26.7)	11 (36.7)	26 (29.2)	7 (15.2)	0.086
75–84, n (%)	61 (37.0)	10 (33.3)	34 (38.2)	17 (37.0)	0.894
≥ 85, n (%)	60 (36.4)	9 (30.0)	29 (32.6)	22 (47.8)	0.160
Sex (male), n (%)	95 (57.6)	16 (53.3)	55 (61.8)	24 (52.2)	0.497
Height (m)	1.65 (1.60–1.70)	1.64 (1.58–1.70)	1.68 (1.60–1.70)	1.65 (1.62–1.70)	0.329
Weight (kg)	66.1 ± 11.6	67.8 ± 9.6	67.4 ± 13.2	60.8 ± 7.7	0.047
BMI (kg/m^2)	24.3 ± 4.2	25.6 ± 4.0	24.4 ± 4.4	22.3 ± 2.9	0.019
Underweight, n (%)	17 (10.3)	2 (6.7)	10 (11.2)	5 (10.9)	0.001
Normal, n (%)	64 (38.8)	12 (40.0)	35 (39.3)	17 (37.0)	
Overweight and obesity, n (%)	27 (16.4)	12 (40.0)	14 (15.7)	1 (2.2)	
Unknown, n (%)	57 (34.5)	4 (13.3)	30 (33.7)	23 (50.0)	
Pervious HF hospital admissions, n (%)	19 (10.8)	3 (10.0)	11 (12.3)	5 (10.9)	0.861
Co-morbidities					
Hypertension, n (%)	106 (64.2)	20 (66.7)	60 (67.4)	26 (56.5)	0.436
Atrial fibrillation, n (%)	80 (48.5)	16 (53.3)	41 (46.1)	23 (50.0)	0.766
Valvular heart disease, n (%)	21 (12.7)	2 (6.7)	13 (14.6)	6 (13.0)	0.527
Ischemic heart disease, n (%)	68 (41.2)	10 (33.3)	45 (50.6)	13 (28.3)	0.028
Diabetes, n (%)	51 (30.9)	8 (26.7)	29 (32.6)	14 (30.4)	0.829
Chronic kidney disease, n (%)	38 (23.0)	6 (20.0)	19 (21.3)	13 (28.3)	0.604
Healthy behavior factor					
Alcohol intake for over 10 years, n (%)	10 (6.1)	1 (3.3)	7 (7.9)	2 (4.3)	0.571
Smoking for over 10 years, n (%)	21 (12.7)	4 (13.3)	12 (13.5)	5 (10.9)	0.907
NYHA class					
III or IV, n (%)	56 (33.9)	8 (26.7)	31 (34.8)	17 (37.0)	0.629
Cardiac Imaging Data					
LVEF (%)	50.2 ± 13.4	52.3 ± 15.3	50.0 ± 12.7	49.1 ± 13.5	0.603
HFrEF, n (%)	42 (25.5)	9 (30.0)	22 (24.7)	11 (23.9)	0.200
Laboratory Data					
Hemoglobin (g/dL)	12.2 ± 2.4	13.7 ± 1.9	12.2 ± 2.2	11.1 ± 2.5	< 0.001
Anemia, n (%)	106 (64.2)	10 (33.3)	60 (67.4)	36 (78.3)	< 0.001
eGFR (ml/min)	53.0 (36.0–70.0)	54.5 (40.8–72.7)	58.9 (38.5–78.1)	47.5 (31.7–61.0)	0.052
Abnormal eGFR, n (%)	94 (57.0)	16 (53.3)	45 (50.6)	33 (71.7)	0.057
Serum sodium (mmol/L)	140.2 ± 4.2	140 ± 3.6	140.7 ± 3.7	139.3 ± 5.3	0.197
Abnormal sodium, n (%)	30 (18.2)	3 (10.0)	14 (15.7)	13 (28.3)	0.083
Serum potassium (mmol/L)	4.0 ± 0.6	4.2 ± 0.6	4.0 ± 0.5	4.0 ± 0.6	0.090
Abnormal potassium, n (%)	32 (19.4)	5 (16.7)	17 (19.1)	10 (21.7)	0.857
Albumin (g/dL)	3.8 ± 0.6	3.9 ± 1.0	3.9 ± 0.4	3.4 ± 0.5	< 0.001
Hypoalbuminemia, n (%)	39 (23.6)	0 (0.0)	10 (11.2)	29 (63.0)	< 0.001
Prealbumin (mg/dL)	17.2 ± 6.1	20.7 ± 7.8	19 ± 5.2	13.3 ± 5.3	< 0.001
CRP (g/dL)	15.4 ± 28.9	6.8 ± 6.4	15.3 ± 34.6	21.0 ± 24.6	0.117
High CRP, n (%)	46 (30.2)	5 (16.7)	17 (19.1)	24 (52.2)	< 0.001
BNP (pg/mL)	1381.8 ± 1434.7	796.0 ± 1163.6	1266.3 ± 1348.0	1962.1 ± 1568.5	0.001
High BNP, n (%)	112 (67.9)	12 (40.0)	59 (66.3)	41 (89.1)	< 0.001
Number of co-morbidities	7(5.5-9)	7(5-8.75)	7(6-8.75)	8(5–10)	0.733
Number of regularly used medications	8(5–10)	7(5–10)	8(5.5–10)	8(5–10)	0.557
Clinical outcome of admission					
Length of hospital stay (days)	10 (7–13)	8 (6–11)	9 (7–12)	13 (10–15)	0.140
Prolonged hospital stay, n (%)	88 (53.3)	11 (36.7)	41 (46.1)	36 (78.3)	< 0.001
CCU admission, n (%)	12 (7.3)	0 (0.0)	8 (9.0)	4 (8.7)	0.237
In-hospital mortality, n (%)	3 (1.8)	0 (0.0)	0 (0.0)	3 (6.5)	0.235

Table 1 (continued)

Characteristics	Total (n = 165)	Normal nutrition status (n = 30)	Mild risk of malnutrition (n = 89)	Mod. & Severe risk of malnutrition (n = 46)	*P* value
Clinical outcome within one year					
All-cause readmissions, n (%)	60 (36.4)	0 (0.0)	35 (39.3)	16 (34.8)	0.638
All-cause mortality during readmissions, n (%)	14 (8.5)	0 (0.0)	3 (3.4)	11 (23.9)	< 0.001

BMI, body mass index; BNP, B-type natriuretic peptide; CCU, cardiac care unit; CONUT, controlling nutritional status; CRP, C-reactive protein; eGFR, estimated glomerular filtration; HF, heart failure; HFrEF, heart failure ejection fraction; LVEF, left ventricular ejection fraction; NYHA, New York Heart Association

Table 2 Correlation analyses with CONUT categories and other parameters

Variables	Correlation coefficient (r)	*P* value
Age	0.190*	0.015
Sex (male)	-0.026	0.738
BMI	-0.277**	0.004
Cardiac Imaging Data		
LVEF	-0.071	0.391
Laboratory Data		
Hemoglobin	-0.385**	< 0.001
Albumin	-0.498**	< 0.001
Prealbumin	-0.462**	< 0.001
Serum sodium	-0.041	0.598
Serum potassium	-0.113	0.149
eGFR	-0.164*	0.035
CRP	0.231*	0.003
BNP	0.353**	< 0.001
Number of co-morbidities	0.073	0.357
Number of regularly used medications	0.013	0.865
Clinical outcomes		
Prolonged hospital stay	0.303**	< 0.001
CCU admission	0.094	0.228
In-hospital mortality	0.188*	0.015
All-cause readmissions within one year	0.019	0.810
All-cause mortality during readmissions within one year	0.179*	0.021

Spearman's correlation analysis, *$P < 0.05$,**$P < 0.01$

Table 3 Univariate and multivariate logistic regression analyses of prolonged hospitalization

Variables	Univariate analysis		Multivariate analysis#	
	Crude OR (95% CI)	*P* value	Adjuste OR (95% CI)	*P* value
CONUT category				
Mild risk of malnutrition	1.48 (0.63–3.46)	0.371	1.07 (0.37–3.08)	0.898
Mod. & Severe risk of malnutrition	6.22 (2.24–17.26)	< 0.001	9.17 (2.02–41.7)	0.004
NYHA III or IV	1.41 (0.73–2.70)	0.303	1.31 (0.54–3.19)	0.547
Anemia	2.22 (1.19–4.15)	0.012	2.03 (0.87–4.75)	0.104
Abnormal sodium	1.65 (0.73–3.74)	0.228	4.34 (0.83–22.81)	0.083
Abnormal potassium	0.99 (0.46–2.15)	0.979	0.52 (0.16–1.75)	0.291
Abnormal eGFR	1.80 (0.96–3.35)	0.065	2.04 (0.88–4.73)	0.097
High CRP	2.59 (1.25–5.36)	0.011	1.61 (0.59–4.39)	0.348
High BNP	2.70 (1.36–5.35)	0.004	1.91 (0.79–4.6)	0.149

CI: confdence interval; #adjusted for age ≥ 85 years, sex, abnormal body mass index (BMI < 20 kg/m^2 or BMI ≥ 27 kg/m^2), number of co-morbidities and number of regularly used medications

among HF patients has been well-documented [29]; it has been shown to be a robust predictor for readmission due to HF or other causes [22]. Our study also revealed a significant association between the nutritional status, as determined by the CONUT scores, and both in-hospital mortality rates as well as all-cause mortality rates during subsequent readmissions within a one-year period.

Concurrently, our study identified a noteworthy link between the nutritional status, evaluated through the CONUT score, and an extended duration of hospitalization, persisting even after accounting for potential confounding factors. Elderly patients with HF who had moderate to severe malnutrition, as indicated by a CONUT score ranging from 5 to 12, exhibited a 9.17-fold heightened risk of prolonged hospital stays when compared to those with a normal nutritional status. This highlights the significance of the CONUT score as a robust independent predictor of unfavorable outcomes. Indeed, 78% of patients classified at a moderate to severe risk of malnutrition experienced prolonged hospital stay. A recent study indicated that patients with CONUT scores ≥ 5 were nearly 90% more prone to longer hospitalizations compared to those with lower scores [33]. Our analysis also highlighted that the 1-year rates for all-cause readmissions and mortality for patients with prolonged hospital stay were 36.4% and 23.9%, respectively. Malnutrition heightened the likelihood of repeated hospital admissions in individuals with chronic HF [22], adversely affected their quality of life [34], and was implicated in reduced life expectancy [35]. Ikeya et al. have posited that incorporating the CONUT score into conventional risk assessment models could effectively enhance the ability to predict adverse outcomes within one year in HF patients receiving cardiac treatment [36].

Several nutritional screening and nutritional assessment tools, such as MNA-SF, the Universal Malnutrition

Screening Tool (MUST), NRS 2002, as well as the SGA have been recommended for determining the nutritional status of older adults [37]. These tools took into account factors such as appetite and weight changes, which are affected by the fluid status in patients with chronic HF. About 34.5% of patients population lacked BMI data upon admission due to due to health conditions that required the use of wheelchairs or gurneys. In contrast, the CONUT score relies on straightforward objective biochemical markers that are accessible upon hospital admission for those with chronic HF. While a considerable number of these patients presented with elevated blood lipid levels, subsequent treatment with lipid-lowering medications led to reduced cholesterol levels. In this study, no significant differences were noted in the use of lipid-lowering medications among individuals with varying nutritional statuses (data not shown). The CONUT score can be easier to apply among older people with HF than other assessments, nonetheless, future studies are warranted to establish the most suitable nutritional measure for this population.

This study is subject to certain limitations. First, its retrospective, single-center design only encompasses a restricted patient cohort. Secondly, the analysis was confined to admission data, without considering longitudinal changes in clinical parameters, which were not captured. The absence of data on weight changes, dietary intake, and anthropometric measurements precludes direct comparisons with other nutritional assessment tools like the NRS2002 and MNA. In future research, prospective research is planned to corroborate these findings with multiple tools, enhancing the generalizability and precision of the results.

Conclusion

Approximately one-third of older patients hospitalized for chronic HF were found to be at moderate to severe risk of malnutrition, as indicated by the CONUT score. Moreover, higher CONUT scores were associated with extended hospital stays. The utilization of the CONUT score serves as an invaluable instrument for pinpointing older patients with chronic HF who necessitate vigilant monitoring throughout their hospitalization.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12877-024-05330-5.

Supplementary Material 1: Supplementary Table S1. Correlation analyses with prolonged hospital stay and other variables

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Author contributions
Renrui Shen: collected of data, wrote the main manuscript, prepared figures. Danfeng Xu: revised the manuscript and supervision. Ming Hu: assisted in data collection, statistical analysis, and revised the manuscript. Qing Fan: revised the manuscript. Jiang Wu: developed the conceptual framework for the study, revised the manuscript. All authors have read and agreed to the published version of the manuscript.

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Data availability
The datasets used and/or analyzed during this study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
This study was approved by the Ethics Committee of Huadong Hospital, affiliated with Fudan University (NO. 2023K199). A waiver of informed consent from each patient was granted by the Ethics Committee of Huadong Hospital, affiliated with Fudan University due to anonymous use of the data for research purpose. All the procedures were in accordance with World Medical Association Declaration of Helsinki.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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