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ORIGINAL ARTICLE

RELATIONSHIP BETWEEN VARIOUS NUTRITION SCREENING TOOLS AND MORTALITY AMONG GERIATRIC PATIENTS ADMITTED TO THE INTENSIVE CARE UNIT

Abstract

Introduction: Various scoring systems (modified Nutrition Risk in Critically ill, Nutritional Risk Screening 2002, Nutritional Risk Index, Geriatric Nutritional Risk Index, and Malnutrition Universal Screening Tool) are used to evaluate nutrition in patients admitted to the intensive care unit. This study examined the relationship between 5 screening scores and mortality on day 1 of intensive care unit admission.

Materials and Method: This observational, prospective study was approved by the local Ethics Committee (FSMEAH-KAEK-2021/60).Data from 103 patients, hospitalized in the intensive care unit> 24 h between June 1 and September 30, 2021, were included. Informed consent was provided by their relatives, and 5 different nutrition scores were recorded on day 1 of intensive care unit hospitalization. Correlations between mortality and scores were examined, and mechanical ventilation and intensive care unit hospitalization days were compared between low- and high-risk patients in both score groups

Results: According to the modified Nutrition Risk in Critically ill score, mortality rate, intensive care unit length of stay, and duration of mechanical ventilation were significantly higher among high-risk patients than those in low-risk patients. As risk increased with the Malnutrition Universal Screening Tool score, an increase in mortality was observed. The area under the receiver operating characteristic curves for mortality were greatest for the modified Nutrition Risk in Critically ill score and Nutritional Risk Index scores.

Conclusion: The modified Nutrition Risk in Critically ill and Nutritional Risk Index scores were the most effective predictors of mortality among geriatric patients admitted to the intensive care unit and may be used according to clinician preference.

Keywords: Geriatrics; Intensive Care Unit; Mortality; Nutrition Assessment.

INTRODUCTION

Geriatric patients admitted to the intensive care unit (ICU) are a high-risk population requiring close monitoring. Mortality in this age group is influenced not only by ICU admission, but also by comorbidities, infections, age, and nutritional status. Various methods and scoring systems have been used to assess nutritional status in ICU practice. Protein–energy malnutrition is frequently observed among elderly patients, with varying reported incidences due to different indices and threshold values in anthropometric and biological evaluations (1, 2). Nutritional screening tools are valuable tools for early detection of malnutrition, particularly among elderly patients (3).

The Nutrition Risk in Critically ill (NUTRIC) score, developed by Heyland et al. (4), is a scoring system designed to predict 28-day mortality in critically ill patients. The NUTRIC score incorporates parameters such as acute and chronic malnutrition, markers of acute and chronic inflammation (age, Acute Physiology and Chronic Health Evaluation [APACHE II] score, Sequential Organ Failure Assessment [SOFA] score, number of comorbidities, time from hospital admission to ICU admission, and interleukin [IL]-6 levels). A high NUTRIC score (6–10) indicates a high risk for mortality, whereas a low score (0–5) suggests a lower risk for malnutrition. However, because routine monitoring of IL-6 levels is not always feasible, a modified version of the NUTRIC score (mNUTRIC) excludes IL-6. An mNUTRIC score of 5–9 is classified as high risk and 0–4 as low risk (Table 1) (4).

The Nutritional Risk Screening (NRS 2002) score is another tool routinely used in ICU practice to evaluate nutritional status. This score assesses 2 components—malnutrition and disease severity—and patients are scored based on the absence, or mild, moderate, or severe severity of these components, with a total score ranging from 0 to 6. A total score ≥ 3 indicates nutritional risk (5).

Table 1. Mean scores, duration of mechanical ventilation, ICU stay and patient comorbidities

	Mean±SD	Median
APACHE II	15.7±8.3	14
SAPS II	36.6±15.7	36
SOFA	5.0±5.1	3
NRS 2002	2.4±2.0	2
mNUTRIC	4.4±1.9	4
NRI	96.7±16.9	95
GNRI	95.7±16.8	94
MUST	0.4±0.8	0
ICU Stay (days)	11.8±18.1	3
Duration of Mechanical Ventilation (days)	10.0±18.2	1
Patient comorbidities	**n**	**%**
Hypertension	72	69.9
Diabetes	36	35
Coronary Artery Disease	21	20.4
Congestive Heart Failure	20	19.4
Chronic Renal Failure	18	17.5
Cerebrovascular Accident	12	11.7
Dementia	17	16.5
Thyroid Dysfunction	11	10.7
COPD	11	10.7
Valve Disease	6	5.8
Benign Prostate Hyperplasia	5	4.9
Parkinson's Disease	4	3.9
Epilepsy	3	2.9
Rheumatoid Arthritis	3	2.9
Gout	3	2.9
Psychiatric Disease	3	2.9
Liver Failure	2	1.9
Meniere's Disease	1	1
OSAS	1	1

APACHE II: Acute Physiology and Chronic Health Evaluation Score, SAPS II: Simplified Acute Physiology Score, SOFA: Sequential Organ Failure Assessment Score, NRS 2002: Nutritional Risk Screening 2002 Score, mNUTRIC: modified NUTRIC score, NRİ: Nutritional Risk Index, GNRI: Geriatric Nutritional Risk Index, MUST: Malnutrition Universal Screening Tool, ICU: Intensive Care Unit, COPD: Chronic Obstructive Pulmonary Disease, OSAS: Obstructive Sleep Apnea Syndrom

The Nutritional Risk Index (NRI) evaluates nutritional status using objective parameters. The NRI is calculated using body weight and serum albumin level according to the following equation:

NRI = (1.519 × serum albumin [g/L]) + 41.7 × (current body weight [kg]/ideal body weight [kg]).

Based on the result, a score >100 indicates no malnutrition, 97.5<NRI<100 indicates low malnutrition, 83.5<NRI<97.5 indicates moderate malnutrition, and <83.5 indicates severe malnutrition.

The Geriatric Nutritional Risk Index (GNRI) is calculated using serum albumin level and body mass index (BMI). The method was first described by Bouillanne et al. The GNRI is determined using the following equation:

GNRI = (1.489 × serum albumin [g/L]) + (41.7 × current body weight/ideal body weight).

A score >98 indicates no nutrition-related risk, 92<GNRI<98 indicates low risk, 82<GNRI<92 indicates moderate risk, and <82 indicates major risk.

The Malnutrition Universal Screening Tool (MUST) is another widely used screening tool. Using this tool, individuals are first scored based on BMI, as follows: 0, BMI > 20 kg/m2; 1, BMI 18.5–20 kg/m2; and 2, BMI < 18.5 kg/m2. A BMI > 30 kg/m2 is defined as obese. In the second step, scores are assigned based on weight loss over the past 3–6 months, as follows: 0, < 5%; 1, 5%–10%; and 2, ≥ 10%. In the third step, a score of 2 is assigned if the individual had an acute illness or likely had no nutritional intake for > 5 days; otherwise, a score of 0 is assigned. The total risk for malnutrition is calculated by summing the scores for the 3 steps, as follows: 0, low risk; 1, moderate risk; and ≥ 2, high risk (6).

Different nutritional screening tools are used in geriatric patient groups. The use of acute malnutrion and inflammation, chronic malnutrion and inflammation markers SOFA, APACHE II etc. scorings that we routinely use in our intensive care practice in the mNUTRIC score has made this score important. The European Society of Clinical Nutrition and Metabolism (ESPEN) recommends the routine use of NRS 2002 in inpatients. NRI and GNRI are screening tools that are mostly applied using objective parameters. These two screening tools evaluate malnutrition with objective parameters such as albumin value. The MUST screening tool is again the screening tool that ESPEN recommends us to use especially in outpatients. This cross-sectional prospective study investigated the relationship between mortality and 5 different nutritional screening scores used in ICU practice on day 1 of ICU admission. The primary aim of this study was to determine which score was most strongly correlated with mortality to promote its use in routine ICU practice. Considering that IL-6 monitoring can be costly and time consuming, we used the mNUTRIC score in our analysis. To account for other factors influencing mortality among patients in the ICU, we incorporated the APACHE II score to standardize patient assessment.

MATERIALS AND METHOD

The present study was conducted at the Anesthesiology and Reanimation Clinic of the Health Sciences University Fatih Sultan Mehmet Teaching and Research Hospital. The study protocol was approved by the hospital's Ethics Committee (FSMEAH-KAEK-2021/60). Data from 103 patients over the age of 65, whose ICU stay exceeded 24 h between June 1 and September 30, 2021, and whose relatives provided informed consent for participation were included. Hospitalizations of less than 24 hours, cases under the age of 65, and cases for which we could not access the necessary data to calculate the scores were not included. The authors' clinic is a 23-bed, level-3 ICU. The primary hospitalization diagnoses were categorized as primary respiratory failure, secondary respiratory failure, postoperative care, cerebrovascular accident(s), and post-cardiopulmonary resuscitation monitoring.

Demographic data, comorbidities, APACHE II scores, Simplified Acute Physiology Score (SAPS II), mNUTRIC, NRS 2002, NRI, GNRI, and MUST scores were recorded. The length of ICU stay, duration of invasive and noninvasive mechanical ventilation (MV), presence of malignancy, tracheostomy status, home ventilator use, mortality rate, discharge mode, and 30-day mortality rate were also documented. The scores from day 1 of hospitalization were recorded and their correlations with mortality were analyzed. Furthermore, the number of MV days and ICU hospitalization days between low- and high-risk patients within each scoring system were compared. For the scoring, patients' weight information at the time of admission to the ICU was obtained from the patients' relatives.

Statistical analyses were performed using SPSS version 22 (IBM Corporation, Armonk, NY, USA). Data distribution was assessed using the Shapiro–Wilk test, which indicated that the parameters did not exhibit a normal distribution. Descriptive statistics (mean, standard deviation, median, and frequency) were used to summarize the data. The Mann–Whitney U test was used for comparisons between 2 groups, whereas the Kruskal–Wallis test was used for comparisons involving > 2 groups. Qualitative data were compared using the chi-squared test, Fisher–Freeman–Halton exact test, and Yates Continuity Correction. The predictive ability of the scores for mortality was evaluated using receiver operating characteristic (ROC) curve analysis. Differences with $p < 0.05$ were considered to be statistically significant.

RESULTS

Data from 103 patients were included in the study. The mean (± SD) age of the cohort was 78.8 ± 8.6 years (range 65–97 years), 48 (46.6%) patients were male, and 55 (53.4%) were female. The mean length of ICU stay was 11.8 ± 18.1 days and the mean duration of MV was 10.0 ± 18.2 days. The mean scores, lengths of hospital stay, and durations of MV are summarized in Table 1.

Hypertension and diabetes were the most common comorbidities, present in 69.9% and 35% of patients, respectively. The distribution of comorbidities is reported in Table 1. Primary respiratory failure accounted for 14.6% of cases, secondary respiratory failure for 23.3%, and postoperative ICU hospitalization for 55.3%.

According to the NRS 2002 scoring system, 35.9% of patients were classified as high risk, whereas 39.8% were identified as high risk according to the mNUTRIC score. Additionally, 22.3% and 19.4% of the patients were categorized as serious risk according to the NRI and GNRI scoring systems, respectively. The proportion of high-risk patients, based on the MUST score, was 11.7%. Malignancy was observed in 21.4% of patients; 14.6% underwent tracheotomy during their ICU stay; and the home ventilator use rate was 14.6%. Mortality occurred in 40.8% of cases, and the 30-day mortality rate was 37.9% (Table 2).

When comparing the length of ICU stay and duration of MV between the risk groups, the high-risk group, based on the mNUTRIC score, had significantly longer ICU stay and MV duration than the low-risk group ($p<0.001$). However, no significant differences were observed in ICU stay or MV duration according to NRS 2002, NRI, GNRI, or MUST scores ($p>0.05$) (Table 3).

According to the mNUTRIC score, the mortality rate among high-risk patients was significantly greater than that in low-risk patients (70.7% versus [vs.] 16.1%; $p<0.001$). The MUST score was also significantly associated with mortality ($p=0.014$), with the mortality rates increasing as the risk level increased. However, no significant correlation was found between mortality rates and the NRS 2002, NRI, or GNRI scores (Table 4).

Table 2. Primary Diagnosis of patients, risk scores, presence of malignancy, home mechanical ventilator use, mode of exit and 30-day mortality

		n	%
Primary Diagnosis	Primary respiratory failure	15	14.6
	Secondary respiratory failure	24	23.3
	Postoperative admission	57	55.3
	CVA	4	3.9
	Post-CPR	3	2.9
	Total	103	100
NRS 2002	No Risk	66	64.1
	Risk	37	35.9
	Total	103	100
mNUTRIC	Low risk	62	60.2
	High risk	41	39.8
	Total	103	100
NRI	No Risk	39	37.9
	Low Risk	6	5.8
	Moderate Risk	35	34
	Severe Risk	23	22.3
	Total	103	100
GNRI	No Risk	39	37.9
	Low Risk	19	18.4
	Moderate Risk	25	24.3
	Severe Risk	20	19.4
	Total	103	100
MUST	Low risk	77	74.8
	Moderate risk	14	13.6
	High risk	12	11.7
	Total	103	100
Malignancy	No	81	78.6
	Yes	22	21.4
	Total	103	100
Tracheotomy	No	88	85.4
	Yes	15	14.6
	Total	103	100
Home mechanical ventilator use	No	88	85.4
	Yes	15	14.6
	Total	103	100
Mode of exit	Transfer to ward	61	59.2
	Exitus	42	40.8
	Total	103	100
30-day mortality	No	64	62.1
	Yes	39	37.9
	Total	103	100

CPR: Cardiopulmonary resuscitation, CVA: Cerebrovascular accident, NRS 2002: Nutritional Risk Screening 2002 Score, mNUTRIC: modified NUTRIC score, NRI: Nutritional Risk Index, GNRI: Geriatric Nutritional Risk Index, MUST: Malnutrition Universal Screening Tool

Table 3. Intensive Care Unit stay and duration of mechanical ventilation of risk categories of different scores

		ICU stay (days)	Duration of MV (days)
		Mean±SD (Median)	**Mean±SD (Median)**
NRS 2002	Low risk	12.02±19.62 (2)	10.23±19.82 (0)
	High risk**	11.49±15.23 (4)	9.59±15.04 (3)
	[1]p	0.273	0.468
mNUTRIC	Low risk	9.65±19.98 (2)	7.48±19.93 (0)
	High risk**	15.12±14.4 (11)	13.8±14.56 (7)
	[1]p	0.000*	0.000*
NRI	No risk	14.59±18.65 (3)	12.31±18.93 (0)
	Low risk	12.67±20.07 (2)	11.67±20.72 (1)
	Moderate risk	8.94±12.89 (2)	6.97±12.18 (0)
	Severe risk**	11.3±23.26 (3)	10.26±23.67 (3)
	[2]p	0.747	0.745
GNRI	No risk	14.59±18.65 (3)	12.31±18.93 (0)
	Low risk	8±13.4 (2)	6.68±13.73 (0)
	Moderate risk	9.88±13.81 (2)	7.72±12.93 (0)
	Severe risk**	12.5±24.79 (3)	11.5±25.21 (3)
	[2]p	0.559	0.608
MUST	Low risk	10.9±15.08 (2)	8.86±15.05 (0)
	Moderate risk	11.43±19.3 (3)	10.21±19.08 (3)
	Severe risk**	18.25±31.19 (5.5)	17.08±31.69 (4.5)
	[2]p	0.596	0.439

*[1]Mann Whitney U Test [2]Kruskal Wallis test *p<0.05, ** high risk of malnutrition*

ICU: Intensive Care Unit, NRS 2002: Nutritional Risk Screening 2002 Score, mNUTRIC: modified NUTRIC Score, MV: Mechanical Ventilation, NRI: Nutritional Risk Index, GNRI: Geriatric Nutritional Risk Index, MUST: Malnutrition Universal Screening Tool

ROC analysis was used to evaluate the accuracy of the scoring systems for predicting mortality. The areas under the ROC curve (AUC) for the NRS 2002, mNUTRIC, NRI, GNRI, and MUST scores were 0.562, 0.778, 0.778, 0.610, and 0.630, respectively. The AUC for the mNUTRIC score was significantly greater than those for the NRS 2002 (p=0.001), GNRI (p=0.025), and MUST (p=0.027) scores. Similarly, the AUC for the NRI was significantly greater than that for the NRS 2002 (p=0.001), GNRI (p=0.025), and MUST (p=0.027) scores. No significant differences were observed in the AUCs for the NRS 2002, GNRI, and MUST (p>0.05) scores (Table 5).

Table 4. Evaluation of risk scores and mortality

		Mortality		p
		No	Yes	
		n (%)	n (%)	
NRS 2002	Low risk	44 (66.7%)	22 (33.3%)	[1]0.292
	High risk**	20 (54.1%)	17 (45.9%)	
mNUTRIC	Low risk	52 (83.9%)	10 (16.1%)	[1]0.000*
	High risk**	12 (29.3%)	29 (70.7%)	
NRI	No risk	28 (71.8%)	11 (28.2%)	[2]0.136
	Low Risk	3 (50.0%)	3 (50.0%)	
	Moderate Risk	23 (65.7%)	12 (34.3%)	
	Severe Risk**	10 (43.5%)	13 (56.5%)	
GNRI	No risk	28 (71.8%)	11 (28.2%)	[3]0.101
	Low Risk	11 (57.9%)	8 (42.1%)	
	Moderate Risk	17 (68.0%)	8 (32.0%)	
	Severe Risk**	8 (40.0%)	12 (60%)	
MUST	Low Risk	54 (70.1%)	23 (29.9%)	[3]0.014*
	Moderate Risk	6 (42.9%)	8 (57.1%)	
	Severe Risk**	4 (33.3%)	8 (66.7%)	

*[1]Continuity (yates) correction [2]Fisher Freeman Halton Exact Test [3]Chi-square test *p<0.05, ** high risk of malnutrition*

NRS 2002: Nutritional Risk Screening 2002 Score. mNUTRIC: Modified NUTRIC Score. NRS: Nutritional Risk Index. GNRI: Geriatric Nutritional Risk Index. MUST: Malnutrition Universal Screening Tool

Table 5. ROC analysis of the efficacy of risk scores for mortality

	AUC	SE	95% CI	NRS2002 p	mNUTRIC p	NRİ p	GNRİ p
NRS2002	0.562	0.049	0.460 - 0.659				
mNUTRIC	0.778	0.043	0.685 - 0.854	0.001*			
NRİ	0.778	0.043	0.685 - 0.854	0.001*	1.000		
GNRİ	0.610	0.056	0.509 - 0.704	0.460	0.025*	0.025*	
MUST	0.630	0.046	0.529 - 0.723	0.235	0.027*	0.027*	0.695

AUC: Area Under Curve, NRS 2002: Nutritional Risk Screening 2002 Score, mNUTRIC: modified NUTRIC score, NRI: Nutritional Risk Index, GNRI: Geriatric Nutritional Risk Index, MUST: Malnutrition Universal Screening Tool

DISCUSSION

The present study examined the relationship between the mNUTRIC score, NRS 2002 score, NRI, GNRI, and MUST score—measured on day 1 of ICU admission—and mortality. We observed that the mortality rate was significantly greater in high-risk than that in low-risk patients according to the mNUTRIC score and, similarly, the MUST score. Based on the mNUTRIC score, high-risk patients experienced longer ICU stays and durations of MV than those of low-risk patients. The AUC for the mNUTRIC score was greater than that for the NRS 2002, GNRI, and MUST scores. The AUC for the NRI was also greater than those for the NRS 2002, GNRI, and MUST scores.

In a prospective observational study, Zhang et al. (7) evaluated nutritional risk using 3 different scores (NUTRIC and mNUTRIC scores, and NRS 2002) in 140 patients admitted to the neurology ICU for > 24 h. The study found that 87.1% of patients were at nutritional risk according to the NRS 2002 score, whereas 15.7% and 28.6% were at high nutritional risk according to the NUTRIC and mNUTRIC scores, respectively. Age ≥ 60 years, nosocomial infection, prolonged MV, and high nutritional risk (mNUTRIC score ≥ 5) were independently associated with increased 28-day mortality after multivariate analysis. The NUTRIC and mNUTRIC scores were both independently predictive of 28-day mortality risk.

In a prospective cohort study investigating the association between nutritional risk and clinical outcomes in 200 critically ill patients treated in the ICU, Marchetti et al. (8) collected data from patient records as well as from patients, care teams, and family members. Patients with scores ≥ 5 were considered to be at high nutritional risk. According to the NRS 2002 and NUTRIC scores, 55% and 36.5% of patients, respectively, were classified as high risk. The mean patient age in their study was 59 years.

High nutritional risk—based on the NRS 2002 score—was associated with MV use, infection, and mortality, whereas high nutritional risk based on the NUTRIC score was associated with renal replacement therapy and mortality.

In a prospective study involving 384 critically ill patients, Machado dos Reis et al. (9) examined the association between the mNUTRIC score alone and in combination with the NRS 2002 score and mortality. High nutritional risk was identified in 54.4% of patients using the NRS 2002 score and in 48.4% using the mNUTRIC score. Furthermore, multiple logistic regression analysis was used to evaluate associations with mortality. Mortality was observed in 140 (36.5%) patients. The risk for in-hospital mortality was twice as high in patients identified as high-risk by both the mNUTRIC and NRS 2002 scores (score ≥ 5). The authors concluded that both scores were similarly effective in predicting in-hospital mortality; however, the mNUTRIC score demonstrated better discrimination in assessing mortality risk in critically ill patients. Patients who died more commonly had higher APACHE II and SOFA scores, longer ICU stay, use of MV, and renal replacement therapy.

Our study, unlike the studies conducted by Zhang et al. (7), Marchetti et al. (8) and Machado dos Reis et al. (9), was conducted on geriatric cases, and our average age was 78.8. According to the NRS 2002 score, we identified 35.9% of patients at risk, and 39.8% of patients at high nutritional risk according to the mNUTRIC score. In addition, according to the mNUTRIC score, the mortality rate was higher in high-risk patients. Zhang et al. (7) conducted their study on a single patient group, the neurological patient group. Our cases were not single-type homogeneous patient groups. The mNUTRIC score, which evaluates malnutrition inflammation markers, APACHE II and SOFA scores, which we think is suitable and specific for evaluating malnutrition especially in ICU patients, was more significant in our study, unlike Machodo dos Reis et al. We think that age groups and patient numbers are effective in these results.

In a retrospective study involving 191 geriatric ICU patients diagnosed with respiratory failure, Yenibertiz et al. (10) evaluated nutritional status using the GNRI, Onodera Prognostic Nutritional Index (OPNI), NRS 2002, and NUTRIC scores. The authors examined the predictive ability of these tools for one-month mortality by dividing patients into survivor (n=105) and non-survivor (n=86) groups based on 30-day mortality and found an overall 30-day mortality rate of 45%. The NUTRIC score, prealbumin level, and GNRI were identified as significant independent risk factors for 30-day mortality. BMI was positively correlated with OPNI and GNRI scores, whereas age and NRS 2002, NUTRIC, and SOFA scores were negatively correlated with GNRI.

Peng et al. (11) investigated the association between the GNRI and hospital mortality in a study involving 3696 geriatric ICU patients. Using multivariate Cox regression models, the prevalence of major risk factors was found to be 28.6%. The authors concluded that the simple malnutrition screening tool GNRI could predict poor prognosis in this patient population. More specifically, a GNRI < 79 was negatively correlated with both hospital and ICU mortality rates.

Bektaş et al. (12) examined the nutritional status of 60 geriatric patients treated in the ICU and the relationship between different nutritional screening tools (NRS 2002, Mini Nutritional Assessment-Screening Form [MNA-SF], NRI, GNRI) and mortality. They found that 1.7%–33.3% of patients were within the normal nutritional range, whereas 28.4%–60% were at risk for malnutrition or severe nutritional risk. Length of ICU stay, and duration of hospitalization and MV were shorter among survivors than those in non-survivors. Male sex, NRS 2002 ≥ 5, and NRI ≥ 81.2 were associated with higher mortality. The study revealed that the NRS-2002 yielded the highest sensitivity, whereas the NRI demonstrated the highest specificity among the screening tools evaluated.

In our study, we found the patient rates with serious risk according to NRI and GNRI scores as 22.3% and 19.4%, respectively. Our mortality rate was 40.8% and our 30-day mortality rate was 37.9%, which is different from the study conducted by Yenibertiz et al. (10) BMI and albumin values are required to determine nutritional risk status based on objective parameters such as GNRI and NRI. However, we think that due to the long half-life of albumin, it is limited in reflecting nutritional status changes in a timely manner. In addition, the body weight of the patients must be known for the calculation of BMI. We calculated the body weight of the patients on admission to the ICU by asking the relatives of the patients to calculate BMI.

Majari et al. (13) highlighted the lack of data regarding the validity of the mNUTRIC and NRS 2002 scores among Iranian ICU patients, noting that the MUST score is more commonly used in Iranian ICUs, and aimed to evaluate the validity of these scores. This prospective observational cohort study included 440 patients from 4 different ICUs. Using multivariate logistic regression, they assessed the association of nutritional risk scores with prolonged hospitalization, extended MV, and 28-day mortality. They found that both the mNUTRIC and NRS 2002 scores were associated with all 3 outcomes, whereas the MUST score was not. The authors concluded that the mNUTRIC score could serve as a useful tool to select patients for aggressive nutritional therapy. Their results indicated that the mNUTRIC score had moderate performance in predicting 28-day mortality, consistent with previous validation studies (4, 12, 13). They also suggested that providing enhanced nutritional support to patients with high mNUTRIC scores may improve survival rates. However, the NRS 2002 and MUST scores were ineffective in identifying patients who would benefit from nutritional interventions.

In a study by Poulia et al. (6), the effectiveness of 6 different nutritional screening tools (NRI, GNRI, Subjective Global Assessment [SGA), MNA-SF, MUST, and NRS 2002) was evaluated in 248 geriatric patients on hospital admission. A composite index was generated by combining the results of these tools with those of patients classified as malnourished if they were identified as malnourished using ≥ 4 of the 6 tools. This study found that the prevalence and risk of malnutrition varied significantly with the screening tool used.

The composite index found 66.9% of the patients to be malnourished to some degree, whereas individual tools yielded rates ranging from 47.2% with the GNRI to 97.6% with the NRS 2002. The proportion of patients with normal nutritional status ranged from 2.4% with NRS 2002 to 52.8% with GNRI. The highest agreement with the composite index was observed with the SGA, followed by MUST, while NRS 2002 demonstrated the lowest agreement. The MUST score had the strongest and the NRS 2002 had the weakest correlation with the actual nutritional status. The results obtained for elderly patients admitted to secondary healthcare institutions were similar to those of other studies. Although the NRS 2002 demonstrated the highest sensitivity among the tools, it also had the lowest specificity and positive predictive value, potentially leading to the overclassification of patients at risk for malnutrition. The authors emphasized that, while high sensitivity is desirable for nutritional screening tools, it may result in an overestimation of malnutrition risk. They also noted that the low positive predictive value of NRS 2002 could lead to incorrect patient classification (6). The variability in the parameters used across different scoring methods, as well as their application in diverse patient populations, may have contributed to these differing results.

We believe that the combination of parameters used in various scores complements different aspects of the scores and that using them in different patient populations can also be effective in these results. In our study, the mortality rate according to the mNUTRIC score was significantly greater among high-risk cases than that in low-risk cases. The mortality rate increased with higher risk levels based on the MUST score. High-risk patients identified using the mNUTRIC score experienced longer ICU stays and longer durations of MV. ROC analysis for mortality prediction revealed that the AUC for the mNUTRIC score and NRI were greater than those for the other scoring systems.

A limitation of our study was its small sample size; as such, the results may differ from those obtained from a larger patient cohort.

CONCLUSION

Results of the present study demonstrated that the mNUTRIC score and NRI were more effective in predicting mortality among geriatric patients admitted to the ICU. Incorporating the mNUTRIC score and NRI into daily clinical practice based on the preferences of the clinical team could be beneficial for improving patient follow-up, treatment, and overall ICU management.

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