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The relationship between nutritional risk and clinical outcomes in medical patients transferred from internal medicine wards to the intensive care unit

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ABSTRACT

Objective: Malnutrition is common in hospitalized medical patients but is frequently underrecognized and undertreated. This study aimed to determine the prevalence of nutritional risk at intensive care unit (ICU) admission among patients transferred from internal medicine wards of a university hospital, to evaluate nutritional interventions during hospitalization in the wards, and to investigate the association between nutritional risk and ICU outcomes.

Methods: This retrospective observational study included adult patients transferred from internal medicine wards to a tertiary ICU between November 2022 and June 2025. Nutritional risk was assessed within 24 hours of ICU admission using the modified Nutrition Risk in the Critically Ill (mNUTRIC) score. Patients were categorized as high (mNUTRIC ≥5) or low (mNUTRIC <5) risk of malnutrition. Clinical characteristics, nutritional interventions before ICU admission, and ICU outcomes were compared between groups. Multivariable logistic regression analysis was performed to identify independent predictors of ICU mortality.

Results: Among 340 patients, 205(60.3%) had high malnutrition risk at ICU admission. High-risk patients were older and had significantly higher APACHE II and SOFA scores. Nutritional support during hospitalization in the ward was initiated in fewer than half of patients with high malnutrition risk (46.3%). Compared with low-risk patients, those with high malnutrition risk more frequently required invasive mechanical ventilation (63.2% vs 31.9%, p<0.001), developed ICU-acquired infections (33.7% vs 20.9%, p=0.011), and experienced higher ICU mortality (56.1% vs 25.9%, p<0.001). In multivariable analysis, high nutritional risk independently predicted ICU mortality (OR 2.85, 95%CI: 1.64–4.98, p<0.001), together with RIFLE Failure stage (OR 2.36, 95% CI: 1.23–4.53, p=0.010), ICU admission due to sepsis (OR 1.84, 95% CI: 1.07–3.17, p=0.028), and hypoalbuminemia (OR 2.36, 95% CI: 1.40–3.99, p=0.001).

Conclusion: These findings highlight nutritional risk as a key determinant of outcomes in patients transferred from internal medicine wards to the ICU and underscore the importance of early nutritional assessment in wards.

Keywords: malnutrition, nutritional risk, intensive care unit, mnutric, critical illness, clinical outcomes

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Introduction

Malnutrition is a common but frequently underrecognized condition among hospitalized medical patients and is associated with adverse clinical outcomes, including infections, prolonged hospital stay, functional decline, and increased mortality.[1-3] Malnutrition is a multifactorial condition resulting from the combined effects of inadequate nutritional intake, disease burden, and systemic inflammation, rather than a simple deficiency of calories or nutrients.[4] In this context, international frameworks have proposed a structured approach to malnutrition management, beginning with nutritional risk screening followed by diagnostic assessment using phenotypic and etiologic criteria.[4]

Data from Türkiye and other European countries demonstrate that nutritional risk is highly prevalent in internal medicine wards, particularly among older adults and patients with multiple chronic comorbidities.[5,6] Large-scale hospital studies have reported malnutrition risk rates ranging from 20% to over 50% in medical inpatients, depending on patient characteristics and the screening tool used.[5,6] Despite this high prevalence, several studies have consistently shown that a substantial proportion of patients identified as being at malnutrition risk do not receive timely or adequate nutritional support during hospitalization.[5-7]

Critically ill patients represent a subgroup in whom the clinical consequences of malnutrition are further affected by hypermetabolism, catabolic stress, and organ dysfunction.[8] The European Society for Clinical Nutrition and Metabolism (ESPEN) emphasizes the importance of early nutritional risk assessment and individualized nutritional therapy in the intensive care unit (ICU), as cumulative energy and protein deficits may negatively affect outcomes.[8] In critically ill patients, nutritional risk screening is essential to identify individuals most likely to benefit from targeted nutritional interventions. Among available tools, the modified Nutrition Risk in the Critically Ill (mNUTRIC) score has been widely validated across diverse ICU populations.[9-11]

Main Points

- High nutritional risk is common among patients transferred from internal medicine wards to the ICU.
- Nutritional support during ward hospitalization is initiated in fewer than half of high-risk patients.
- High mNUTRIC score independently predicts ICU mortality.
- The ward-to-ICU transition represents a potential window for early nutritional intervention.

While the impact of malnutrition in hospitalized patients and ICU populations has been well described, less attention has been paid to patients transferred from internal medicine wards to the ICU. This transition period may represent a missed opportunity for early nutritional screening and intervention. Randomized controlled trials in medical inpatients have demonstrated that individualized nutritional support initiated during ward hospitalization can improve clinically relevant outcomes, including survival.[7,12] However, data specifically addressing malnutrition risk at ICU admission and the adequacy of nutritional interventions before ICU transfer in internal medicine patients remain limited. Therefore, this study aimed to evaluate the prevalence of malnutrition risk at ICU admission among patients transferred from internal medicine wards, to assess whether nutritional support was initiated during ward hospitalization, and to investigate the association between malnutrition risk and ICU outcomes.

Material and Methods

Study design and setting

This retrospective observational study was conducted in a 9-bed tertiary-level internal medicine ICU of Gazi University Hospital, Ankara, Türkiye, between November 1, 2022, and June 30, 2025. The ICU primarily admits adult patients transferred from internal medicine wards, including general internal medicine, nephrology, medical oncology, endocrinology, geriatrics, hematology, gastroenterology, and rheumatology services. The study was designed and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[13]

Ethical approval

The study protocol was approved by the Gazi University Clinical Research Ethics Committee (approval date: September 23, 2025; approval number: 2025-1599). Due to the study's retrospective nature, informed consent was waived. The study was conducted in accordance with the Declaration of Helsinki.

Study population

Adult patients (≥18 years) transferred from internal medicine wards to the ICU during the study period were eligible for inclusion. Patients were excluded if they were admitted from non–internal medicine units, had an ICU length of stay shorter than 24 hours, had repeated ICU admissions during the same hospitalization, or were classified as terminal at the time of ICU admission.

Data collection

Demographic characteristics, comorbid conditions, source ward, ICU admission diagnoses, and clinical data were obtained retrospectively from electronic medical records. Disease severity at ICU admission was assessed using the Acute Physiology and Chronic Health Evaluation II (APACHE II) score, and organ dysfunction was evaluated using the Sequential Organ Failure Assessment (SOFA) score.[14,15] Comorbidity burden was assessed using the Charlson Comorbidity Index.[16] Performance status prior to ICU admission was evaluated using the Eastern Cooperative Oncology Group (ECOG) performance scale.[17] Acute kidney injury was classified according to the Risk, Injury, Failure, Loss, and End-stage kidney disease (RIFLE) criteria.[18] Laboratory data obtained at ICU admission included hemoglobin, white blood cell count, platelet count, blood urea nitrogen, creatinine, serum albumin, electrolytes, liver function tests, C-reactive protein, and procalcitonin.

Assessment of nutritional risk

Nutritional risk was assessed within the first 24 hours of ICU admission using the modified Nutrition Risk in the Critically Ill (mNUTRIC) score, which includes age, APACHE II score, SOFA score, number of comorbidities, and the number of days from hospital admission to ICU admission.[9-11] Patients were classified as having high nutritional risk (mNUTRIC ≥5) or low nutritional risk (mNUTRIC <5).

Nutritional support before ICU admission

Information regarding consultation with the nutrition support unit and initiation of nutritional support during ward hospitalization before ICU transfer was recorded. Nutritional support was defined as the initiation of enteral and/or parenteral nutrition documented in the medical records. The adequacy of caloric or protein delivery could not be evaluated due to the retrospective design.

Outcomes

The primary outcome was ICU mortality. Secondary outcomes included the need for invasive mechanical ventilation, ICU-acquired infections, ICU length of stay, and duration of hospitalization prior to ICU admission.

Statistical analysis

Continuous variables were assessed for normality and expressed as median and interquartile range (25th–75th percentile). Comparisons between groups were performed using the Mann–Whitney U test. Categorical variables were expressed as numbers and percentages and compared using the chi-square test or Fisher's exact test, as appropriate. Variables with a P value <0.05 in univariable analyses and clinically relevant variables were entered into a multivariable logistic regression model to identify independent predictors of ICU mortality. Results were reported as odds ratios (ORs) with 95% confidence intervals (CIs). Statistical analyses were performed using IBM SPSS Statistics (IBM Corp, Armonk, NY, USA). A two-sided P value <0.05 was considered statistically significant.

Results

A total of 340 patients transferred from internal medicine wards to the ICU were included in the analysis, of whom 205 (60.3%) were classified as having high nutritional risk (mNUTRIC ≥5) (Table 1). Despite the high burden of nutritional risk at the time of ICU transfer, nutritional support before ICU admission was initiated only in 46.3% of the patients with high malnutrition risk. Moreover, only 28% of the patients received nutritional support team consultation before ICU transfer, which was not significantly higher among those at risk (31.7% vs 23.7%, p=0.110) (Table 1).

Demographic characteristics, source wards, nutritional interventions during ward stay, and comorbidities by nutritional risk status are presented in Table 1. ICU admission characteristics, including performance status, RIFLE classification, reasons for ICU admission, organ dysfunction scores, laboratory findings, and clinical outcomes according to nutritional risk status, are summarized in Table 2. At ICU admission, patients with high nutritional risk had greater disease severity and organ dysfunction, as reflected by higher APACHE II and SOFA scores, lower GCS scores, and higher Charlson Comorbidity Index values (p<0.05) (Table 2). Sepsis was

Table 1. Demographic characteristics, source wards, nutritional interventions during ward stay, and comorbidities of patients according to malnutrition risk

Variable	All Patients (n=340)	High Malnutrition Risk (n=205)	Low Malnutrition Risk (n=135)	P value
Admission Data				
Age, median (IQR)	73 (64–81)	77 (70–83)	66 (55–74)	**<0.001**
Female sex, n (%)	143 (42.1)	82 (40.0)	61 (45.2)	0.343
Height (cm), median (IQR)	165 (160–173)	167 (160–174)	165 (160–173)	0.823
Weight (kg), median (IQR)	70 (60–76)	70 (60–75.5)	70 (60–77)	0.783
BMI (kg/m^2),median(IQR)	24.2 (22–27)	24.2 (22.1–27)	24 (22–27)	0.936
Source Ward, n (%)				
Medical Oncology	117 (34.4)	66 (32.2)	51 (37.8)	0.289
Nephrology	75 (22.1)	51 (24.9)	24 (17.8)	0.122
Geriatrics	60 (17.6)	44 (21.5)	16 (11.5)	0.015
Gastroenterology	38 (11.2)	18 (8.8)	20 (14.8)	0.084
General Internal Medicine	28 (8.2)	15 (7.3)	13 (9.6)	0.448
Endocrinology	6 (1.8)	3 (1.5)	3 (2.2)	0.603
Hematology	8 (2.4)	5 (2.4)	3 (2.2)	0.897
Rheumatology	8 (2.4)	3 (1.5)	5 (3.7)	0.182
Nutritional Support During Ward Stay				
NST consultation, n (%)	97 (28.5)	65 (31.7)	32 (23.7)	0.110
Nutritional support before ICU, n (%)	134 (39.4)	95 (46.3)	39 (28.9)	**<0.001**
Comorbidities, n (%)				
Hypertension	201 (59.3)	143 (69.8)	58 (43.3)	**<0.001**
Chronic kidney disease	118 (34.7)	85 (41.5)	33 (24.4)	**<0.001**
Diabetes mellitus	115 (33.8)	69 (33.7)	46 (34.1)	0.937
Malignancy (solid or hematologic)	126 (37.0)	72 (35.1)	54 (40.0)	0.623
Coronary artery disease/Heart failure	165 (48.7)	113 (55.1)	52 (38.8)	0.002
COPD/Asthma	107 (31.5)	59 (28.8)	48 (35.6)	0.188
Cerebrovascular disease	72 (21.2)	52 (25.4)	20 (14.8)	0.013

Values are presented as median (interquartile range, IQR) or number (%), as appropriate. High malnutrition risk was defined as an mNUTRIC score ≥5.
BMI; Body mass index, ICU; Intensive Care Unit, COPD; Chronic obstructive pulmonary disease, n; Number, NST; Nutritional Support Team.

the most common reason for ICU admission and was more frequent among patients with high nutritional risk ($p<0.05$).

High nutritional risk was associated with worse ICU outcomes. Patients in the high-risk group required invasive mechanical ventilation more frequently, developed ICU-acquired infections more often, and had higher ICU mortality than those in the low-risk group ($p<0.05$) (Table 2). Length of hospital stay before ICU admission was longer in patients with high nutritional risk, whereas ICU length of stay and the use of enteral or parenteral nutrition in the ICU did not differ significantly between groups. Laboratory findings at ICU admission showed higher blood urea nitrogen, creatinine, aspartate aminotransferase, and procalcitonin levels, together with lower serum albumin concentrations and more frequent hypoalbuminemia in the high-risk group ($p<0.05$) (Table 2).

Table 2. ICU admission characteristics, laboratory findings, and clinical outcomes according to malnutrition risk

Variable	All Patients (n=340)	High Malnutrition Risk (n=205)	Low Malnutrition Risk (n=135)	P value
Organ Dysfunction and Prognostic Scores at ICU Admission, median (IQR)				
APACHE II score	23 (16–31)	27 (22–34)	17 (13–20)	**<0.001**
SOFA score	6 (4–9)	8 (5–11)	4 (3–7)	**<0.001**
GCS score	14 (9–15)	12 (7–15)	15 (13–15)	**<0.001**
Charlson comorbidity index	6 (5–8)	6 (5–8)	5 (3–7)	**<0.001**
Reasons for ICU Admission, n (%)				
Sepsis	221 (65.2)	149 (72.7)	72 (53.7)	**<0.001**
Renal	122 (35.9)	80 (39.0)	42 (31.1)	0.137
Pulmonary	203 (59.7)	123 (60.0)	80 (59.3)	0.892
Cardiac	38 (11.2)	29 (14.1)	9 (6.7)	0.022
Gastrointestinal	52 (15.3)	24 (11.7)	28 (20.7)	**0.018**
Hepatobiliary	29 (8.5)	15 (7.3)	14 (10.4)	0.324
Neurologic	41 (12.1)	24 (11.7)	17 (12.6)	0.806
Rheumatologic	2 (0.6)	1 (0.5)	1 (0.7)	0.765
Metabolic/endocrine	12 (3.5)	5 (2.4)	7 (5.2)	0.179
Performance Status (ECOG), n (%)				
ECOG 1	55 (16.2)	23 (11.2)	32 (23.7)	0.002
ECOG 2	86 (25.3)	47 (22.9)	39 (28.9)	0.216
ECOG 3	106 (31.2)	76 (37.1)	30 (22.2)	0.003
ECOG 4	72 (21.2)	56 (27.3)	16 (11.9)	<0.001
RIFLE Classification, n (%)				
Risk	96 (28.2)	55 (26.8)	41 (30.4)	0.478
Injury	41 (12.1)	25 (12.2)	16 (11.9)	0.924
Failure	64 (18.8)	42 (20.5)	22 (16.3)	0.04
Loss	18 (5.3)	14 (6.8)	4 (3.0)	0.119
End-stage	30 (8.8)	26 (12.7)	4 (3.0)	**0.001**
Mechanical Ventilation Support in ICU, n (%)				
Invasive	172 (50.7)	129 (63.2)	43 (31.9)	<0.001
Non-invasive	77 (22.8)	46 (22.8)	31 (23.0)	0.967
ICU-acquired infection, n (%)	96 (28.6)	68 (33.7)	28 (20.9)	**0.011**

Values are presented as median (interquartile range, IQR) or number (%), as appropriate. ICU mortality was defined as death during the ICU stay. Hypoalbuminemia: Albumin < 3g/dL

APACHE II; Acute Physiology and Chronic Health Evaluation II, SOFA; Sequential Organ Failure Assessment, GCS; Glasgow Coma Scale, ECOG; Eastern Cooperative Oncology Group performance status, RIFLE; Risk, Injury, Failure, Loss, and End-stage kidney disease classification, IMV; Invasive mechanical ventilation, NIMV; Non-invasive mechanical ventilation, WBC; White blood cell count, PLT; Platelet count, BUN; Blood urea nitrogen, ALT; Alanine aminotransferase, AST; Aspartate aminotransferase, ALP; Alkaline phosphatase, GGT; Gamma-glutamyl transferase, CRP; C-reactive protein, n; Number

Table 2. Continued

Variable	All Patients (n=340)	High Malnutrition Risk (n=205)	Low Malnutrition Risk (n=135)	P value
Nutritional Support in ICU, n (%)				
Enteral	205 (60.7)	130 (63.7)	75 (56.0)	0.153
Parenteral	90 (26.7)	56 (27.7)	34 (25.2)	0.606
Laboratory Values at ICU Admission, median (IQR)				
Hemoglobin (g/dL)	9.6 (8.3–11.5)	9.3 (8.2–11.0)	10.0 (8.3–12.0)	0.073
WBC (×10^3/μL)	11.3 (7.3–15.7)	11.6 (7.7–16.4)	10.8 (6.7–14.2)	0.113
Platelets (×10^3/μL)	176 (97–261)	169 (100–242)	184 (95–281)	0.441
BUN (mg/dL)	41.5 (26–64)	47 (32–65)	33 (19–57)	**<0.001**
Creatinine (mg/dL)	1.5 (0.8–2.6)	1.8 (1.0–3.1)	1.2 (0.7–2.1)	**<0.001**
Albumin (g/dL)	2.9 (2.5–3.3)	2.8 (2.4–3.1)	3.0 (2.6–3.5)	**0.001**
Hypoalbuminemia, n (%)	211(62%)	141(69%)	70(52%)	**<0.001**
Sodium (mEq/L)	138 (134–142)	137 (134–141)	138 (133–142)	0.835
Potassium (mEq/L)	4.1 (3.6–4.6)	4.1 (3.6–4.7)	4.1 (3.8–4.6)	0.262
ALT (U/L)	27 (14–54)	29 (15–61)	25 (14–42)	0.070
AST (U/L)	37 (24–76)	41 (25–88)	33 (21–64)	**0.014**
ALP (U/L)	98 (69–168)	99 (70–176)	97 (67–157)	0.557
GGT (U/L)	48 (24–100)	49 (24–100)	47 (23–102)	0.596
CRP (mg/L)	91 (35–164)	91 (41–160)	87 (27–170)	0.633
Procalcitonin (ng/mL)	0.9 (0.2–3.7)	1.3 (0.3–4.7)	0.5 (0.1–2.4)	**<0.001**
Length of stay before ICU (days)	4 (1–10)	5 (2–16)	3 (1–9)	**<0.001**
Length of ICU stay (days)	6 (3–12)	7 (4–13)	5 (3–10)	0.209
ICU mortality, n (%)	150 (44.1)	115 (56.1)	35 (25.9)	**<0.001**

Values are presented as median (interquartile range, IQR) or number (%), as appropriate. ICU mortality was defined as death during the ICU stay.
Hypoalbuminemia: Albumin < 3g/dL
APACHE II; Acute Physiology and Chronic Health Evaluation II, SOFA; Sequential Organ Failure Assessment, GCS; Glasgow Coma Scale, ECOG; Eastern Cooperative Oncology Group performance status, RIFLE; Risk, Injury, Failure, Loss, and End-stage kidney disease classification, IMV; Invasive mechanical ventilation, NIMV; Non-invasive mechanical ventilation, WBC; White blood cell count, PLT; Platelet count, BUN; Blood urea nitrogen, ALT; Alanine aminotransferase, AST; Aspartate aminotransferase, ALP; Alkaline phosphatase, GGT; Gamma-glutamyl transferase, CRP; C-reactive protein, n; Number

Table 3. Independent Predictors of ICU mortality identified by multivariable logistic regression analysis

Variable	Odds Ratio (OR)	95% Confidence Interval (CI)	P value
RIFLE Failure stage	2.36	1.23–4.53	**0.010**
ICU admission due to sepsis	1.84	1.07–3.17	**0.028**
High malnutrition risk (mNUTRIC ≥5)	2.85	1.64–4.98	**<0.001**
Hypoalbuminemia (albumin <3 g/dL)	2.36	1.40–3.99	**0.001**

mNUTRIC; Modified Nutrition Risk in the Critically Ill Score, RIFLE; Risk, Injury, Failure, Loss, and End-stage kidney disease classification, ICU; Intensive Care Unit.

In multivariable logistic regression analysis, high nutritional risk was independently associated with ICU mortality (OR: 2.85, 95% CI: 1.64–4.98, p < 0.001). Additional independent predictors of ICU mortality included RIFLE Failure stage (OR:2.36, 95%CI:1.23–4.53, p=0.010), ICU admission due to sepsis (OR:1.84, 95%CI:1.07–3.17, p=0.028), and hypoalbuminemia (albumin <3 g/dL) (OR:2.36, 95%CI:1.40–3.99, p=0.001) (Table 3).

Discussion

In this retrospective cohort of patients transferred from internal medicine wards to the ICU, nearly two-thirds presented with high nutritional risk at ICU admission. High nutritional risk was associated with greater disease severity, increased need for invasive mechanical ventilation, higher rates of ICU-acquired infections, and higher ICU mortality. Most importantly, our data reveal a clinically critical gap between nutritional vulnerability and clinical action during ward hospitalization; despite the high burden of nutritional risk at the time of ICU transfer, nutritional support before ICU admission was initiated in fewer than half of patients with high malnutrition risk, and nutrition support unit consultation was not consistently higher among those at risk.

This gap between nutritional risk and nutritional intervention is the key finding of the present study, because it identifies a potentially modifiable challenge of critical illness. Previous data have consistently shown that a substantial proportion of hospitalized patients at high malnutrition risk do not receive timely nutritional support, even when reduced intake is evident.[5-7] Randomized evidence in medical inpatients further supports addressing this gap, demonstrating that protocol-guided individualized nutritional support can improve outcomes, including survival.[7] Our study extends these observations by focusing on a vulnerable subgroup, patients deteriorating on internal medicine wards and subsequently requiring ICU admission, and by linking inadequate pre-ICU nutritional intervention to worse ICU outcomes. Together, these findings suggest that the ward to ICU transition represents a missed opportunity for earlier nutritional screening and timely intervention in a population that experiences poor ICU outcomes.

A high mNUTRIC score was not only a marker of worse baseline status but also remained an independent predictor of ICU mortality in the multivariable analysis. This finding is clinically meaningful because mNUTRIC was originally designed to identify ICU patients most likely to experience harm from underfeeding and who might benefit from targeted nutritional strategies, rather than categorizing malnutrition severity.[9-11] In our cohort, consisting of patients deteriorating on internal medicine wards, the mNUTRIC score showed a multidimensional risk profile reflecting age, comorbidity burden, acute illness severity, and pre-ICU hospital exposure, beyond what is explained by conventional severity scores alone. Methodologically, because mNUTRIC incorporates acute severity variables and time from hospital admission to ICU, its independent association with mortality should be interpreted as reflecting cumulative depletion of physiologic reserve rather than an isolated evaluation of nutritional risk in this transitional population.

A longer duration of ward hospitalization prior to ICU transfer among patients with high malnutrition risk represents another important finding of the present study. This observation suggests that nutritional vulnerability may progress during the ward phase of hospitalization and may indicate prolonged exposure to reduced nutritional intake or metabolic stress prior to ICU admission. Importantly, these findings identify the ward hospitalization period as a potential therapeutic window during which early nutritional assessment and targeted support may modify subsequent ICU outcomes, whereas interventions initiated only after ICU admission may represent a delayed response to a process that has already progressed during the pre-ICU period.

Beyond malnutrition risk, sepsis-related ICU admission, RIFLE Failure stage, and hypoalbuminemia remained independent predictors of mortality, underscoring the combined impact of systemic inflammation, acute organ dysfunction, and impaired metabolic reserve on outcomes.[12,18,19] Patients with high nutritional risk were more frequently admitted with sepsis and had higher procalcitonin levels, indicating coexisting systemic inflammation and nutritional vulnerability at the time of clinical deterioration in this patient population.[12] Advanced renal dysfunction may further amplify this vulnerability through metabolic instability, accumulation of uremic toxins, and impaired amino acid utilization, contributing to adverse outcomes. Hypoalbuminemia, although not a specific marker of malnutrition, reflects the integrated effects of inflammation, capillary leak, hepatic synthesis, and nutritional reserve and consistently correlates with adverse outcomes.[19,20] Together, these factors define a clinical profile characterized by systemic inflammatory stress, impaired organ reserve, and reduced metabolic resilience.

Another finding of the study was that patients with high malnutrition risk had substantially worse functional status at ICU admission, with higher proportions of ECOG 3–4, reflecting advanced dependency and poor performance status before critical illness. Consistent with this profile, patients with high malnutrition risk required invasive mechanical ventilation more frequently and experienced higher rates of ICU-acquired infections, reflecting impaired physiologic reserve and host defense as reported in previous literature.[21,22] High malnutrition risk was also associated with longer hospital stay before ICU transfer, suggesting a period of progressive deterioration and cumulative nutritional deficit on the wards.[5,7] In contrast, ICU length of stay did not differ significantly between groups despite higher mortality among high-risk patients, suggesting that the observed mortality difference may have been related to earlier deaths during the ICU course rather than longer ICU stays. These findings may reflect progressive deterioration during ward hospitalization rather than events occurring solely after ICU admission.

This study has several limitations. First, its retrospective single-center design limits generalizability. Second, detailed data on actual caloric and protein delivery, the timing of nutritional initiation, and achievement of nutritional targets were not available in ICU nutrition, precluding evaluation of nutritional adequacy and dose-response relationships. Third, functional and long-term outcomes after ICU discharge were not assessed. Finally, ward nutritional support was evaluated as a binary variable, with no detailed information on adequacy, duration, or achieved energy or protein targets; therefore, the findings should be interpreted as reflecting the presence of a nutritional intervention rather than the precise amount of nutritional delivery. Despite these limitations, the study provides clinically relevant insights into nutritional risk and care process gaps in a vulnerable transitional population.

Conclusion

In conclusion, high nutritional risk is common among patients transferred from internal medicine wards to the ICU and is independently associated with increased mortality. Despite this, nutritional interventions during ward hospitalization remain insufficient. These findings indicate that systematic nutritional screening, combined with early, individualized nutritional support on the wards, may represent a critical, modifiable opportunity to improve outcomes for patients at risk of critical illness.

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Author contributions

Conception: K.İ., N.B.D.; Design: K.İ., G.A., A.O.T., S.Ç., A.Y., D.Y.A., E.T.M., B.K.; Data acquisition: K.İ., N.B.D., G.A., A.O.T., S.Ç., A.Y., D.Y.A., E.T.M., B.K., M.T.; Data analysis: K.İ.; Data interpretation: K.İ.; Drafting of the manuscript: K.İ.; Critical revision of the manuscript: G.A., M.T.; All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Gazi University Clinical Research Ethics Committee (Date: Sep 23,2025, Decision/Protocol No: 2025-1599).

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The authors declare that during the preparation of this work, the following AI-assisted technology was used: Name and Manufacturer of the Tool / Service: ChatGPT, OpenAI; Grammarly, Grammarly Inc. Date(s) of Use: During manuscript preparation and revision process.

Reason and Extent of Use: ChatGPT and Grammarly were used solely for language editing, grammar checking, sentence-level clarity, and improving the readability of the manuscript.

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