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Prevalence and Severity of Malnutrition among Intensive Care Patients in a Government Tertiary Care Hospital in Swat

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ABSTRACT

Malnutrition is a prevalent issue among critically ill patients in Intensive Care Units (ICUs), significantly impacting morbidity, mortality, and healthcare costs. **Objective:** To assess the prevalence and severity of malnutrition among critically ill patients admitted to the Intensive Care Unit (ICU) of a government tertiary care hospital in Swat. **Methods:** This cross-sectional study was conducted at a government tertiary care hospital in Swat to assess the prevalence and severity of malnutrition among ICU patients. A sample of 80 ICU patients was selected using a non-probability convenience sampling technique, and data were collected using the Modified Nutrition Risk in Critically Ill (mNUTRIC) Score, Sequential Organ Failure Assessment (SOFA) Score, and Acute Physiology and Chronic Health Evaluation II (APACHE-II) Score. **Results:** The findings revealed that 71.3% of patients had multiple comorbidities, and 51.25% experienced severe organ dysfunction (SOFA score ≥8). Additionally, 37.5% of patients were at high nutritional risk (mNUTRIC score ≥5). **Conclusions:** The study demonstrated a significant association between malnutrition and adverse clinical outcomes, including prolonged ICU stays, increased severity of illness, and higher mortality risk. Comparisons with previous studies suggested that malnutrition prevalence among ICU patients in Swat is comparable to global trends. Addressing malnutrition through early identification and targeted nutritional interventions can improve patient recovery and reduce healthcare burdens. The study highlights the need for integrating standardized nutritional assessment protocols in ICU settings to enhance patient outcomes.

INTRODUCTION

Malnutrition is extremely prevalent in severely ill people and common among hospitalized patients. Increased morbidity, mortality, nosocomial infection rates, longer hospital stays, worse functional status upon discharge from Intensive Care Units (ICUs), and higher hospital expenses are all linked to malnutrition [1]. While there is no commonly accepted definition, malnutrition is generally understood to be a decrease in lean body mass that may result in functional impairment.1. Inadequate intake, with or without increased needs, poor absorption, changed transport or nutrient utilization, or a combination of these problems are usually the variables that cause it [2]. Although malnutrition is rather uncommon in older adults living independently (5–10%), the risk of malnutrition rises significantly among those in hospitals. After conducting a Subjective Global Assessment (SGA) on 311 elderly patients (those over 70) [2]. Additionally, another study found the prevalence of patients identified with high nutritional risk was 53.9% and 13%, respectively [3]. Furthermore, Malnutrition in children, while infrequent in industrialized nations, continues to be a significant issue in numerous developing countries. According to estimates, over 3% of children worldwide were severely wasted in 2012, and 26% of children were stunted. The mere fact that a child was

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underweight was the cause of 45% of all deaths in children younger than five. Sub-Saharan Africa and Southern Asia are the regions where malnutrition is most prevalent. In healthcare settings with limited resources, managing Severe Acute Malnutrition (SAM) effectively is extremely difficult. There is a pressing need for more efficient malnutrition prevention and treatment [4]. Critical illness, stress, sepsis, trauma, surgery, and burns can all cause a systemic inflammatory response. The body needs more nutrients as a result. Significant muscle protein loss, changed hormone secretion, reduced physical activity, increased inflammatory mediators, and tissue perfusion blockages have all been noted in critically ill patients, all of which lengthen the time that mechanical ventilation is necessary [5]. An intensive care unit patient is considered malnourished if their intake of calories, both internal and external, is not enough to meet their metabolic requirements. It has been stated that 50% of critically ill patients suffer from malnutrition, depending on the criterion and the population under study [6]. Malnutrition is a widespread and subtle issue among intensive care patients in tertiary care hospitals, affecting approximately 45% of this population. This condition leads to heightened morbidity, mortality, and healthcare expenditures. Despite its significance, the prevalence and severity of malnutrition in this population remain unclear, hindering the development of effective prevention and treatment strategies. 20% to 50% of patients in acute care settings have been documented to be malnourished, with predicted higher [7]. About 2 billion people worldwide suffer from malnutrition, one of the worst health issues. Early childhood development is significantly impacted by several factors, such as poverty, food insecurity, maternal health, and nutritional status, the mother's age at marriage and educational attainment, low birthweight or Small for Gestational Age (SGA), premature births, inadequate breastfeeding, unhealthy dietary and lifestyle patterns, the health and immunization status of children, the socioeconomic status of the family, environmental and household conditions, as well as cultural practices and myths [8]. There are global treatment standards for maintaining appropriate nutrition in patients with chronic liver disease, but both patients and doctors in Pakistan lack adequate knowledge and experience with nutritional counseling. Vital sign recording and nutritional status assessment must be prioritized during the first visit. To properly educate patients based on appropriate scientific data, treating physicians must also be made aware of the misunderstandings regarding nutritional hinders [9]. Among intensive care unit patients, malnutrition is a major problem that raises the risk of complications, lengthens hospital stays, and increases death.

This study will assist medical professionals in creating evidence-based nutritional programs by determining the prevalence and severity of the condition. This will guarantee prompt interventions that can enhance recovery rates and lower consequences like infections and delayed wound healing. Furthermore, by knowing the prevalence of malnutrition, hospital managers and legislators would be better able to allocate funds for nutrition support programs, which will improve regional healthcare delivery.

METHODS

The Cross-sectional study was conducted at a tertiary care hospital in swat in the intensive care unit. This study was conducted at a tertiary care hospital in Swat, specifically focusing on patients admitted to the Medical Intensive Care Unit (MICU). This study targeted critical patients receiving care in the Medical Intensive Care Unit at a tertiary care hospital in Swat. The study was approved by the Institutional Review Board (IRB) under reference number NINHS/Admin/355-10/2024, and the research was conducted over 3 months. Patient/participants' consent was obtained before data collection as per ethical guidelines. A non-probability convenience sampling technique was employed to select 80 patients for this research study, with sample size calculation performed using an Open Epi calculator to ensure a 95% confidence level. Patients admitted to the Intensive Care Unit (ICU) at Government tertiary care hospital in Swat. (SGTH). The Inclusion Criteria were Patients admitted to the Intensive Care Unit (ICU) of tertiary care hospitals in Swat. 2. Age ≥ 18 years. 23 3. Patients who require mechanical ventilation or have a high risk of malnutrition (e.g., those with severe trauma, burns, or sepsis). Patients who have been in the ICU for at least 48 hours. Patients or their legal representatives provide informed consent. The exclusion criteria were patients with a known history of malabsorption or malnutrition before ICU admission, patients who were pregnant, patients who had been transferred from another ICU or hospital, patients with a history of eating disorders or psychiatric conditions that may impact nutrition, and patients who were not expected to survive for more than 72 hours. The Modified Nutrition Risk in Critically Ill (mNUTRIC) Score was used in this study as a tool to assess the nutritional risk of ICU patients based on key clinical parameters, including age, severity of illness (APACHE-II and SOFA scores), number of comorbidities, and time from hospital admission to ICU admission. Patients were categorized into two groups based on their total score. Those with an mNUTRIC score of 0-4 were classified as low nutritional risk, typically characterized by younger age (<50 years), fewer comorbidities (0-1), lower severity of illness (APACHE-II <15 and SOFA <6), and immediate ICU admission (<1 day from hospital admission). On the other hand, patients with an mNUTRIC score of 5-9

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were considered high nutritional risk, often older (≥50 years), with multiple comorbidities (≥2), higher severity of illness (APACHE-II ≥15 and SOFA ≥6), and a delayed ICU admission (≥1 day from hospital admission). The study was approved by the research committee. Subsequently, permission was obtained from the ICU ward in charge to collected data from patient charts. Data were collected from ICU patients, some of whom were bedridden. The Sequential Organ Failure Assessment (SOFA) score and Acute Physiology and Chronic Health Evaluation II (APACHE II) score were utilized to assess the severity of malnutrition. Descriptive statistics was used to calculate the prevalence and severity of malnutrition, summarizing categorical variables using frequencies and percentages, and continuous variables using means and standard deviations. Results were presented in tables to support the findings. Informed consent was obtained from patients or their legal representatives before participating in the study. Patient confidentiality and anonymity were maintained throughout the study. The study prioritized patient well-being and safety, minimizing harm and risk. Fair selection of participants is crucial, avoiding bias and ensuring equal access.

RESULTS

Table 1 shows that among 80 ICU patients, 63.7% were below 50 years, 26.3% were between 50-75 years, and 10% were above 75 years. Most patients (98.8%) stayed in the ICU for more than a day. Additionally, 71.3% had two or more comorbidities, while 28.7% had only one comorbidity, highlighting the high prevalence of multiple health conditions among ICU patients.

Table 1: Age Distribution, ICU Admission Duration, and Comorbidities

Category	Frequency (%)
Age Group	
Less than 50 Years	51 (63.7%)
50 - 75 Years	21 (26.3%)
More than 75 Years	08 (10.0%)
ICU Stay Duration	
Less than 1 Day	1 (1.3%)
More than 1 Day	79 (98.8%)
Number of Comorbidities	
One	23 (28.7%)
Two or More	57 (71.3%)

Table 2 summarizes the clinical parameters of 80 ICU patients. About 25% had a PaO_2/FiO_2 ratio below 400, while 33.8% had mean arterial pressure below 70 mmHg, with some requiring vasopressor support. Most patients (76.3%) had normal bilirubin levels, while a small percentage had elevated liver enzymes. Renal function assessment showed that 66.3% had creatinine levels below 1.2 mg/dl, while 12.6% had significantly high levels (>3.5 mg/dl). Platelet count varied, with 41.3% having normal levels, while 37.6% had dangerously low counts (<50k). Lastly, 43.8% had a normal GCS score, but 45% had moderate to severe impairment.

Table 2: Clinical Parameters of ICU Patients (SOFA)

Category	Frequency (%)
PaO_2/FiO_2 Ratio	
Less than 400	20 (25.0%)
More than 400	60 (75.0%)
Less than 70	27 (33.8%)
Mean Arterial Pressure (mmHg)	
More than 70	46 (57.5%)
Dopamine < 5	06 (7.5%)
Dopamine > 15 and Norepinephrine	01 (1.3%)
Liver Enzymes (Bilirubin mg/dl)	
Less than 1.2	61 (76.3%)
1.2 - 1.9	12 (15.0%)
2.0 - 5.9	04 (5.0%)
6.0 - 11.9	02 (2.5%)
More than 12	01 (1.3%)
Renal Clearance (Creatinine mg/dl)	
Less than 1.2	53 (66.3%)
1.2 - 1.9	15 (18.8%)
2.0 - 3.4	02 (2.5%)
3.5 - 3.9	05 (6.3%)
More than 5	05 (6.3%)
Platelet Count	
Normal	33 (41.3%)
Less than 150k	13 (16.3%)
Less than 100k	04 (5.0%)
Less than 50k	15 (18.8%)
Less than 20k	15 (18.8%)
GCS Score	
Normal	35 (43.8%)
13-14	06 (7.5%)
10-12	03 (3.8%)
6-9	20 (25.0%)
Less than 6	16 (20.0%)

Table 3 presents the distribution of APACHE-II (Acute Physiology and Chronic Health Evaluation II) score parameters among ICU patients, highlighted key physiological variables critical for assessing the severity of illness and predicting clinical outcomes.

Table 3: APACHE-II Score Variables of ICU Patients

Variables	Category	Frequency (%)
Temperature (°C)	36 - 38.4	24 (30.0%)
	38.5 - 39	42 (52.5%)
	39 - 40.9	12 (15.0%)
	>41	2 (2.5%)
Heart Rate (Beats/min)	70 - 109	53 (66.3%)
	110 - 139	22 (27.5%)
	140 - 179	4 (5.0%)

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	>180	1 (2.5%)
Respiratory Rate (Breaths/min)	12 - 24	41 (51.2%)
	25 - 34	27 (33.8%)
	35 - 49	9 (11.3%)
	>50	3 (3.8%)
Arterial Blood Gas (pH)	7.33 - 7.49	46 (57.5%)
	7.5 - 7.59	6 (7.5%)
	7.25 - 7.32	17 (21.3%)
	7.15 - 7.24	5 (6.3%)
	<7.14 or >7.7	6 (7.5%)
Serum Sodium (mEq/L)	130 - 149	67 (83.8%)
	150 - 154	8 (10.0%)
	155 - 159	4 (5.0%)
	>180	1 (2.5%)
Serum Potassium (mEq/L)	3.5 - 5.4	50 (62.5%)
	5.5 - 5.9	20 (25.0%)
	6.0 - 6.9	3 (3.8%)
	2.5 - 2.9	5 (6.3%)
	<2.5 or >7	2 (2.5%)
Hematocrit (%)	30 - 45.9	69 (86.3%)
	46 - 49.9	5 (6.3%)
	<29.9 or >50	6 (7.5%)

Table 4 presents the APACHE-II score parameters recorded for 80 ICU patients. Most patients (52.5%) had a temperature between 38.5 - 39°C, while only 2.5% had a fever above 41°C. The majority (66.3%) had a normal heart rate (70 - 109 bpm), but 2.5% had dangerously high rates (>180 bpm). Respiratory rates varied, with 51.2% having normal values (12 - 24 breaths/min) and 3.8% showing severe tachypnea (>50 breaths/min). Arterial blood gas analysis revealed 57.5% of patients had a normal pH (7.33 - 7.49), while 7.5% had dangerously low or high pH levels (<7.14 or >7.7). Serum sodium levels were normal (130 - 149 mEq/L) in 83.8% of cases, but a few patients (2.5%) had dangerously low or high values (>180 mEq/L). Similarly, potassium levels were normal (3.5 - 5.4 mEq/L) in 62.5% of cases, but some (2.5%) had extreme abnormalities (<2.5 or >7 mEq/L). Lastly, hematocrit levels were within the normal range (30 - 45.9%) for 86.3% of patients, with 7.5% showing dangerously low or high values (<29.9 or >50%).

Table 4 presented an integrated view of the organ dysfunction severity (SOFA Score), disease severity (APACHE Score), and nutritional risk (NUTRIC Score) in ICU patients.

Table 4: Severity and Nutritional Risk Scores

Score Category	Range	Frequency (%)
Sofa Score	2 to 4 (Mild organ dysfunction)	22 (27.5%)
	5 to 7 (Moderate organ dysfunction)	17 (21.25%)
	8 or above (Severe organ dysfunction)	41 (51.25%)
APACHE Score	Low Severity (0 to 10)	41 (51.25%)
	Moderate Severity (11 to 20)	31 (38.75%)
	High Severity (Score above 21)	10 (10.00%)
NUTRIC Score	Low Nutrition Score (0-4)	50 (62.5%)
	High Nutrition Score (5-9)	30 (37.5%)

DISCUSSION

With its substantial effects on morbidity, mortality, and overall clinical outcomes, malnutrition is a serious problem for patients in Intensive Care Units (ICUs) [10]. Hypermetabolism, catabolism, and inflammatory reactions are common in critically ill individuals, which causes their nutritional stores to be rapidly depleted. Impaired immune function, delayed wound healing, prolonged mechanical breathing, and longer hospital stays are all linked to malnutrition in intensive care unit patients, which ultimately lowers survival rates. This study aims to assess the prevalence and severity of malnutrition in ICU patients using standardized scoring systems like the NUTRIC Score, SOFA Score, and APACHE-II Score. Current findings reveal that 71.3% had two or more comorbidities, while 28.7% had only one comorbidity. While another study found that (75.5%) had multiple comorbidities [11]. The current findings show that 51% have severe organ dysfunction. In contrast, another study found that 91.3 percent of patients do not have organ dysfunction [12]. The findings indicate that 62.5% (50 patients) had a low nutrition risk (score 0-4), whereas 37.5% (30 patients) had a high nutrition risk (score 5-9. In this regard, another study employed a quantitative, prospective, observational design. 129 mechanically ventilated patients were selected as a convenience sample from intensive care units in seven hospitals located among the various healthcare sectors in Jordan. At the time of ICU admission, about 88.4% of patients on mechanical ventilators were at high risk of malnutrition [13]. Similarly, another research found out Among ICU patients, the combined prevalence of nutritional risk was considerably higher (92.2%) [14]. Another retrospective, cross-sectional investigation was carried out in a mixed intensive care unit of a public hospital. There were 380 patients in the sample who were at least 18 years old, and 57.6% of them had malnutrition. 64.4% of those were classified as moderate and severe in 35.6% [11]. Furthermore, a study shows Malnutrition after 1 year of ICU admission was found in 8.1% of ICU survivors. Interestingly, malnutrition after ICU admission was linked to a higher risk of death among ICU survivors during 1 to 5 years of ICU admission [15]. Moreover, another study found Malnutrition was present in 13% of the population [16]. In addition, another study found merely 35% of individuals who are malnourished [17]. A previous study involved 200 medical adult intensive care unit patients and was prospective and observational. Daily paperwork served as the basis for the investigation. When medical patients were admitted to the adult intensive care unit, their nutritional state was the main result. Of the 200 patients in this study, mild, moderate, and severe malnutrition affected 45%, 48.5%, and 9% of the patients, respectively [18].

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Correspondingly, the study, which had 390 elderly sepsis patients, revealed notable differences between the groups that were malnourished and those that were well-nourished in terms of comorbidities, disease severity, and demography. The rate of ICU hospitalization was greater for malnourished patients (52.82%). Elderly sepsis patients who suffer from malnutrition have far worse outcomes, with higher ICU hospitalizations, ventilator requirements, fatality rates, and readmissions; this highlights the importance of early nutritional therapy [19]. Because malnutrition impairs immunity, patients are more vulnerable to infections like bloodstream infections, urinary tract infections, and ventilator-associated pneumonia. Immunity is already weakened in intensive care unit patients, and malnutrition raises the risk of morbidity and death much more [20, 21].

CONCLUSIONS

The substantial burden of severe disease and malnutrition among intensive care unit patients is highlighted by this study. About half (48.75%) had moderate to high disease severity based on APACHE-II scores, and a significant percentage (51.25%) had severe organ dysfunction (SOFA ≥8). Furthermore, 37.5% of patients were considered to be at high nutritional risk, highlighting the possible influence of malnutrition on clinical results. Early detection and focused nutritional therapies are essential for enhancing patient recovery and lowering ICU morbidity and mortality since malnutrition is strongly linked to the severity of the disease and a poor prognosis.

Authors Contribution

Conceptualization: SS, SB
Methodology: LU, BAK, SU, MH
Formal analysis: AK
Writing, review and editing: SS, KU, AB, LU, BAK, SU, HK, MH
All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

All the authors declare no conflict of interest.

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