WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 14, Issue 2, 729-751. Research Article ISSN 2277–7105

A PROSPECTIVE STUDY ON DETERMINATION OF EARLY NUTRITION INTERVENTION FOR PATIENTS ADMITTED IN A LEVEL I TRAUMA CARE CENTRE

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Article Received on
28 November 2024,

Revised on 18 Dec. 2024,
Published on 15 Jan. 2025

DOI: 10.20959/wjpr20252-35241

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ABSTRACT

Nutritional support is a unique challenge because the therapy regimen is changeable according to patients' conditions. Many patients in trauma care are severely malnourished, and further nutrient losses may occur due to starvation, infection, pneumonia, blood loss, and drug interactions. The main goals of the study are to find out how well trauma patients were eating when they were admitted to a level I trauma care centre (using the Subjective Global Assessment and Nutrition Risk Score 2002) and to figure out the best way to help these patients eat based on their disease-adjusted mortality rate, level of consciousness, and the bad effects of their first treatment (using the APACHE IV, GCS, SOFA, and NUTRIC scores). This ongoing study has recruited 102 patients to date, with an estimated sample size of 245. The average age of patients is 42.4 (± standard deviation 16.5) years, and BMI is 18.3 (range 15.1 to 25.8) kg/m^2. Most underweight patients faced critical nutrition conditions (88.5%), with a mortality rate between 40 and 73% as per APACHE IV. Patients having high mortality rates derived from SOFA were also suffering from nutritional risk. The correlation between SGA and NUTRIC scores in judging nutritional risk status was moderate. Enteral nutrition has been started in 90% of cases, although the diet principle varies. As the patients are critically ill at admission and the severity of illness is highly unpredictable, assessment at admission becomes very challenging. Early nutritional intervention may improve the outlook and speed up recovery in people who have recently been through a traumatic event in a hospital setting, where secondary infections and persistent catabolism can make things more difficult. A single nutrition risk assessment tool cannot be the best interpreter.

KEYWORDS: Trauma, Nutrition Care Process, Assessment, Intervention, Interrelationship.

INTRODUCTION

Major trauma patients require more nutritional support. Regrettably, these patients frequently overlook appropriate interventions. Limited research focuses on assessing and delivering nutrition.

In many cases, nutrition intervention may proceed without proper screening and assessment. The nutrition care process is either compromised in many ways due to a lack of resources or overlooked due to the restricted knowledge of the care team. Nutrition assessment is the key to judging the pre-existing nutrition status and overall metabolic state. The assessment score can help determine the nutrition intervention that will impact clinical outcomes and prognosis.

A traumatic event is an incident that causes physical, emotional, spiritual, and psychological harm. So, injured patients need to be diagnosed though multidisciplinary expertise involving surgery, anaesthesiology, emergency medicine, radiology, etc. Early Medical Nutrition Therapy (MNT) for trauma patients is an important part of the treatment process.[1,2] Recent data suggests that early underfeeding of calories (trophic feeding) may have some benefits, but ICU nutrition delivery is a kind of ascertaining “starvation” (less than 75 % of total calorie consumption).[3,4,5] To bridge the gap, proper nutrition intervention must be incorporated for optimal ICU recovery, understanding starvation and recovery from it, and restoring lean body mass (LBM).[6]

According to recent research, major traumatic patients require more nutrition with proper administration; however, in many cases, the interventions emerge casually.[7] There is limited research on the delivery of nutrition support in the ICU, particularly for patients admitted to trauma units. Adapting the therapy regimen to patients' conditions presents a unique challenge in nutrition support. The "Nutrition Support Team" of hospitals must come forward to establish safe, timely, and cost-effective interventions. More studies can provide professionals with knowledge on how to administer proper nutrition care, modify the critical care guidelines for the future, and encourage the medical team to focus on nutrition intervention.[8]

Many patients in trauma care are severely malnourished, and further nutrient losses may occur due to starvation, infection, pneumonia, blood loss, and drug interactions. So, assessment of risk factors, requirements of nutrients, initiation of feeding, documentation of patients' health status modification of diet, and re-assessment are the important steps to be followed to sustain the quality of life (in nutritional perspective) of the patients. This study will investigate the importance of nutrition assessment and its effectiveness in patients admitted to the trauma unit.

The Nutrition Care Process (NCP), which encompasses screening, assessment, recommendation, modification, and evaluation, is the collective term for Medical Nutrition Therapy (MNT). However, dietary recommendations and implementation have often proceeded without assessing the patient properly at admission and at the time of diagnosis. This may lead to unorganized case interpretation to determine the dietary need.[2] The major objectives of this study are to document the nutrition condition of trauma patients at the time of admission to a level I trauma care centre (through Subjective Global Assessment and Nutrition Risk Score 2002) and to determine suitable dietary intervention in these patients as per disease-adjusted mortality rate, level of consciousness, and adverse effects of primary treatment (through Acute Physiological and Chronic Health Evaluation IV (APACHE IV), Glassgow Coma Scale (GCS), Sequential Organ Failure Assessment (SOFA), and The Nutrition Risk in Critically Ill (NUTRIC) scores).[9, 10,11] Subsequently, kitchen or formula feed recommendations are made according to patients' nutritional requirements, clinical state, and biochemical parameters.

MATERIALS AND METHODS

The observation, assessment, and analysis in this study continued until the patients' discharge. The patients were all adults aged 18 years and facing certain head injuries and orthopaedic injuries, and they were admitted to a level I trauma care centre. Patients were first evaluated within 24 hours of admission through Subjective Global Assessment (SGA) followed by Nutrition Risk Score (NRS) during follow-up. We used the Acute Physiology and Chronic Health Evaluation (APACHE)-IV, the Glasgow Coma Scale (GCS), and the Sequential Organ Failure Assessment (SOFA) to figure out the disease-adjusted mortality risk, the level of consciousness, and the organs' ability to do their jobs. We also applied the Nutrition Risk in Critically Ill (NUTRIC) Score to ascertain the dietary principles.[5] After that, the nutrition guidelines and the way they were given were changed based on the symptoms of malnutrition that were already there before the traumatic event and the physiological tests that were done during the healing and recovery stages.[12]

Apart from assessing the patients, a comparison between nutritional assessment tools was made to understand better compliance and outcomes of the patient's status and to standardize for further use of assessment tools.[7,14] The study has been approved by the Institutional Ethics Committee, namely the IPGME&R Research Oversight Committee (IEC/2020/663) of IPGME&R and SSKM Hospital, Kolkata, on 14th June, 2020. There might be some interrelationship between physiological and nutritional scores and the intrarelationship of medical and nutritional tools. So, statistical analysis was performed to detect the interrelationship and validation of different tools with the help of Statistica Version 8.0 [Tulsa, Oklahoma: StatSoft Inc.; 2007] software.

Study Population: 102 Adult patients (above 18 years) who are suffering from different head injuries were examined in the ICU, general wards, and emergency Trauma Care Unit of the Hospital. Adult patients of either sex, aged 18-60 years with history of trauma and requiring admission to ICU or ward and being provided enteral formula feed were recruited. Non-consenting subjects and those requiring parenteral feed were excluded. The study had been conducted from 1st June, 2021 to 31st January, 2023.

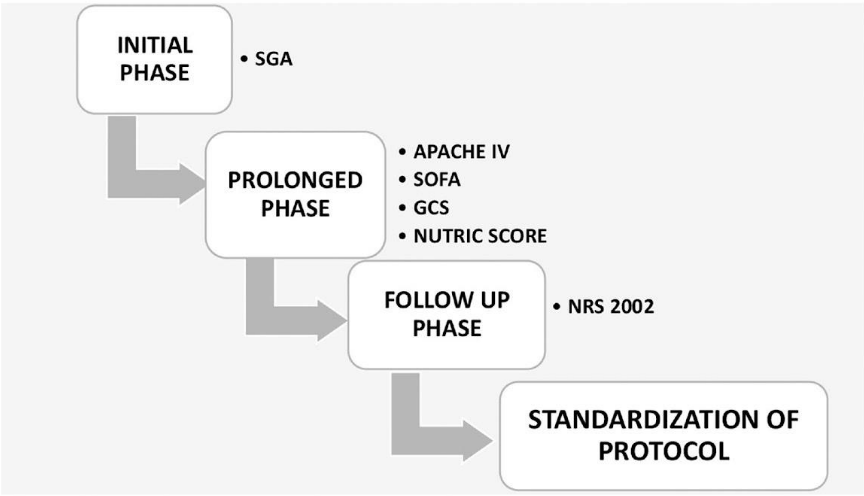


Figure 1: Three Steps for Standardization of Protocol during Hospital Stay.

This flowchart outlines a structured process for standardizing protocols through various clinical phases, including key tools or scores used at each step. This process emphasizes a multi-phase assessment approach, ensuring comprehensive care for patients over time.

Study Tools: The best screening tool should have enough validity, reliability, sensitivity, specificity, and positive predictive value to find patients who are at high risk. Nevertheless, to this date, no screening instrument has succeeded in meeting all of these criteria. Most of these have combined biomarkers of the inflammatory system with severity scores because these two things are closely linked to the pathophysiology of malnutrition in critically ill patients. The literature has examined numerous nutritional screening assessment instruments.

The screening instruments must evaluate dietary, physical, anthropometric, psychological, social, and clinical variables. Evidence-based risk factors or outcomes must substantiate each analysed variable. Furthermore, the instruments should be user-friendly for bedside administration and demonstrate cost-effectiveness. The screening instruments primarily comprise questionnaires that yield a final score.

These scores undergo further validation through prospective studies conducted within critically ill populations. Among all the available screening instruments, only the Nutritional Risk Screening 2002 (through Prasad et al., 2019) and the Nutrition Risk in the Critically Ill (NUTRIC) have undergone extensive investigation.[14]

In this particular study, the list of assessment tools was used as follows.

- Subjective Global Assessment (SGA) is one of the most commonly used methods to assess nutritional status. SGA is a semiquantitative tool to assess nutritional status based on the history and physical examination. Nutritional status is assessed through subjective scoring, which categorizes individuals into three principal SGA classifications: well-nourished (A), mildly to moderately malnourished (B), or severely malnourished (C).[15]
- The Acute Physiology and Chronic Health Evaluation (APACHE) IV model can predict the intensive care unit (ICU) length of stay (LOS) in critically ill patients. Physiological variables, chronic health conditions, emergency or elective admissions, and post-operative or non-operative admissions determine the scores.[16]
- The Sequential Organ Failure Assessment (SOFA) measures how organ dysfunction changes over time in response to treatment. A specific scoring system ranging from 1 to 4 is assigned to each of the six organ systems (respiratory, cerebro vascular system, central nervous system, renal, coagulation, liver).[17]
- The Nutrition Risk in Critically ill (NUTRIC) score is the first nutritional risk assessment tool developed and validated specifically for ICU patients. This is designed to quantify the risk of critically ill patients developing adverse events that may be modified by aggressive nutrition therapy. The score, 1-10, is based on 6 variables (age, APACHE, SOFA, ICU stay, comorbidities, and IL-6).[18]
- The Nutrition Risk Score (NRS 2002) is based on the idea that nutritional intervention is needed for patients who are critically ill and have high nutritional needs, who are severely malnourished, or who have different levels of disease severity and undernutrition. The scoring system for the conclusive assessment spans from 0 to 7, wherein a higher score denotes an increased severity of malnutrition risk.[19]

RESULTS

This ongoing study has recruited 102 patients to date, with an estimated sample size of 245. The average age of patients is 42.4 (± standard deviation 16.5) years, and BMI is 18.3 (range 15.1 to 25.8) kg/m^2. Most underweight patients faced critical nutrition conditions (88.5%), but interestingly, those having normal BMI were also critical (94.5%) (p = 0.340). Fifty-five percent of patients have a high mortality rate (between 40 to 73%) as per APACHE IV. Patients having high mortality rates derived from SOFA were also suffering from nutritional risk (p-value< 0.001). The correlation between SGA and NUTRIC Scores in judging nutritional risk status was moderate (Spearman's rho 0.386; ICC 0.4496) [Table 2,3,4]. Enteral nutrition has been started in 90% of cases, although the principle of diet varies (35% balanced diet, 28 % high protein diet, 16% renal diet, 9% diabetic diet). The oral diet primarily recommended scientific supplements, but it also recommended kitchen feeds.

I. The data [Table 1] indicates the cohort might be critically ill or undernourished, with several severity scores supporting this hypothesis.

- The statistical summary of a cohort of 102 individuals, providing descriptive statistics for multiple variables:
- Age: The mean age of 42.48 years suggests a relatively young cohort with moderate variability (SD = 16.5).
- The median BMI of 18.34 indicates a predominantly underweight group (the normal BMI starts at 18.5).
- Score GCS: All lower percentiles reflect a low baseline score (3), indicating poor initial Glasgow Coma Scale (GCS) scores for many participants.
- ScoreSOFA and ScoreAPACHE: These scores reflect a cohort with varied severity of illness, as evidenced by wide ranges and relatively high medians.
- ScoreSGA and Score NUTRIC : These scores reflect a cohort with varied severity of nutrition risk, as evidenced by wide ranges
- ScoreNRS2002: These score indicate the nutrition risk throughout the procedure based on range.

II. The bar graph [Figure 2] represents the three categories of patients

Underweight

Number of Patients: 61

This is the largest group, indicating that the majority of patients fall under the "underweight" category.

Normal BMI:

Number of Patients: 37

This group is the second largest, showing a significant proportion of patients with normal BMI.

Overweight

Number of Patients: 2

Very few patients are categorized as overweight.

Obese:

Number of Patients: 2

The "obese" category also contains a very small number of patients.

III. The pie chart [Figure 3] represents the SGA (Subjective Global Assessment) of patients, categorized into three groups:

Patient Education

Number of Patients: 92

This category makes up the vast majority of the group, indicating that most patients only require education.

Requires intervention:

Number of Patients: 8

A smaller portion of patients fall into this group, suggesting a moderate need for additional intervention.

Critical:

Number of Patients: 2

A tiny number of patients are in critical condition, highlighting the need for urgent care for this minority.

IV. The next chart represents [Figure 4] the NUTRIC Score, which assesses nutritional risk among patients.

Low NUTRIC Score

63.73% of patients fall into this category.

This indicates that the majority of patients are at a lower nutritional risk.

High NUTRIC Score:

36.27% of patients fall into this group.

This represents a significant portion of patients at higher nutritional risk, requiring targeted nutritional interventions.

V. Analysis the chart [figure 5] represents NRS 2002 data, displaying two numeric values (102 and 102).

Data Representation

Both groups (or sections) display the same value (102), suggesting equality in size, occurrence, or a shared characteristic.

The circle-and-rectangle comparison highlights that, despite differences in shape, the values are identical.

This visualization may aim to compare two methods or outcomes of nutritional risk screening (NRS 2002) where no significant difference exists.

VI. The next chart [Figure 6] represents APACHE IV scores and their relationship to mortality rates and percentages.

Mortality rate (shaded area) increases steadily as the APACHE IV score rises.

The relationship indicates a clear correlation: higher APACHE IV scores are associated with higher mortality rates.

Specific Data Points

At lower APACHE IV scores (1–6), mortality rates and percentages are minimal, ranging between 0.98% and 8.82%.

From scores 7 to 10, the mortality percentage increases from 13.73% to 32%, indicating a moderate risk.

For scores 12 to 14, mortality surges sharply, with percentages ranging from 22.5% to 73%, reflecting severe risk.

VII. The next chart [Figure 7] represents the SOFA Score distribution, which evaluates the severity of organ dysfunction in critically ill patients.

0 to 10 SOFA Score

66.67% of patients fall into this category.

This indicates that the majority of patients have mild organ dysfunction.

15 to 20 SOFA Score

25.49% of patients are in this range.

These patients exhibit moderate organ dysfunction.

40 to 50 SOFA Score

7.84% of patients fall in this range.

This small group represents patients with severe organ dysfunction.

VIII. This 3D bar chart [Figure 8] illustrates the distribution of patients based on their Glasgow Coma Scale (GCS) scores, categorized into three severity levels:

Severe:

Represents 88.24% of patients.

This suggests a large majority of patients had severe GCS scores, indicating significant neurological impairment or trauma.

Minor:

This category accounts for 8.82% of patients.

A smaller proportion experienced mild neurological issues.

Moderate:

Comprises only 2.94% of patients.

The data reflects a minimal number of patients falling into the moderate GCS category.

The dominance of severe cases (88.24%) highlights a critically high proportion of patients with significant neurological compromise.

Moderate and minor GCS scores are far less frequent, together comprising 11.76%, indicating fewer patients with less critical conditions.

This data emphasizes the need for intensive care and management strategies, as the majority of patients present with severe GCS scores.

IX. This donut chart [Figure 9] represents the distribution of feeding routes among a group. It highlights two categories

EN (Enteral Nutrition):

This is represented by the larger shaded portion.

It accounts for 90.2% of the total.

Oral Feeding

This is represented by the smaller grey portion.

It accounts for 9.8% of the total.

X. The last bar chart [Figure 10] represents the distribution of various types of recommended diets based on certain principles. The key data points are:

Balanced Diet

Highest frequency with 36 recommendations.

It shows that most patients receive advice to adopt a nutritionally balanced diet

High -Protein -Diet

Second highest frequency with 29 recommendations.

It suggests a significant need for protein supplementation, possibly for recovery, malnutrition, or specific medical conditions.

Low Protein Renal Diet:

It came in third place with 17 recommendations.

This indicates that patients require controlled protein intake, likely due to kidney-related issues.

High -Protein -Diabetic -Diet:

Seen in nine cases, there is overlap between diabetes and high protein requirements.

Other Diets:

Diet types like Hepatic Diet, Diabetic Diet (Soft), Normal Diet, and Renal Diet have lower frequencies, ranging between 1 to 3 recommendations.

Table 1: Descriptive statistics of numerical variables.

Whole cohort

Subject	Valid N	Mean	Lower Limit	Upper Limit	Standard Deviation
Age	102	42.48	39.24	45.72	16.508

Subject	**Valid N**	**Median**	**Minimum**	**Maximum**	**25th Percentile**	**75th Percentile**
Weight	102	50.00	40.00	75.00	50.00	55.00
Height	102	1.65	1.52	1.73	1.65	1.68
BMI	102	18.34	15.14	25.83	17.26	20.11
SGA	102	18.00	2.00	27.00	16.00	21.00
APACHE	102	23.00	3.00	40.00	20.00	27.00
GCS	102	3.00	3.00	15.00	3.00	4.00
SOFA	102	6.00	0.00	11.00	4.00	7.00
NUTRIC Score	102	4.00	1.00	9.00	3.00	5.00
NRS	102	6.00	4.00	7.00	6.00	6.00

The Kolmogorov-Smirnov goodness-of-fit test tells us that the median and range (25th and 75th percentiles) for other variables are skewed because the age variable has a normally distributed mean (95% class interval with lower and upper limit) and standard deviation.

Table 2: Interrelationship between BMI and SGA Score.

BMI	**Significance SGA - Critical**	**Significance SGA Requires intervention**	**Significance SGA Patient education**	**Row - Totals**
Underweight	54	5	2	61
Row %	88.52%	8.20%	3.28%	
Normal	35	2	0	37
Row %	94.59%	5.41%	0.00%	

Overweight	2	0	0	2
Row %	100.00%	0.00%	0.00%	
Obese	1	1	0	2
Row %	50.00%	50.00%	0.00%	
Totals	92	8	2	102

Chi-square test 6.800, p value 0.340, df 6

Interpretation: Fail to reject the null hypothesis. The result is not statistically significant at the 0.05 level.

Table 3: Interrelationship between NUTRIC Score and SOFA Score.

NUTRIC significance	SOFA derived Mortality Rate% - 0 to 10	SOFA derived Mortality Rate% - 15 to 20	SOFA derived Mortality Rate% - 40 to 50	Row - Totals
High	14	15	8	37
Row %	37.84%	40.54%	21.62%	
Low	54	11	0	65
Row %	83.08%	16.92%	0.00%	
Totals	68	26	8	102

Chi-square test 25.679, p value < 0.001, df 2

Interpretation: Reject the null hypothesis. The result is statistically significant at the 0.05 level.

Table 4: Intraclass correlation coefficient between NUTRIC score and SGA raw scores (Consistency of agreement)

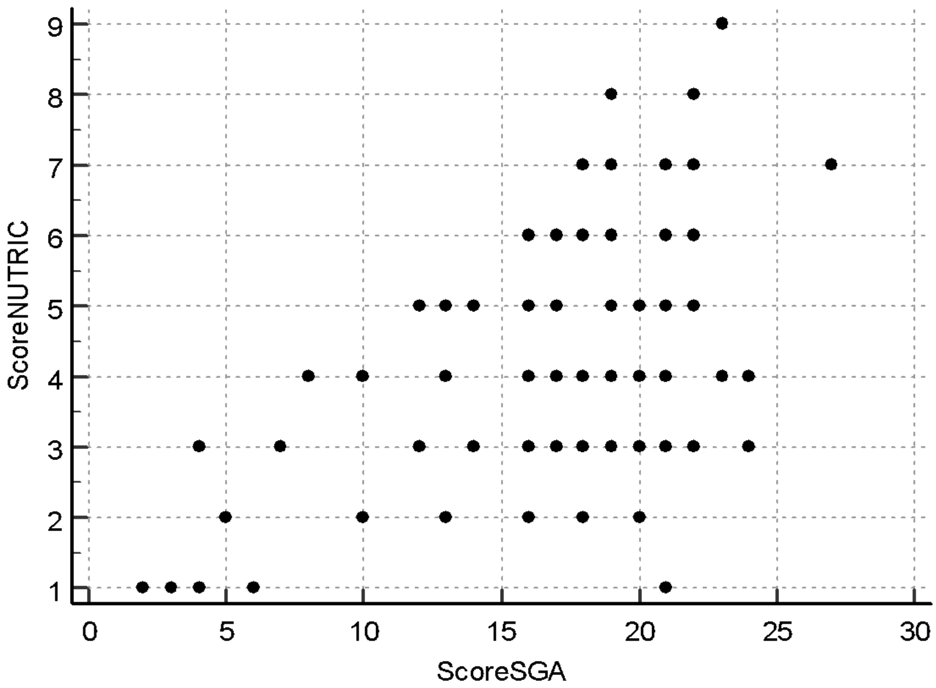
Number of subjects (n)	102
Model	The same raters for all subjects.
Type	Consistency
Measurements	ScoreNUTRIC ScoreSGA

Intraclass Correlation Coefficient

	Intraclass correlation [a]	95% Confidence Interval
Average measures [b]	0.4496	0.1852 to 0.6282

a=This refers to the degree of consistency among measurements.

b= Estimates the reliability of averages of *k* ratings.



Frequency Table 5: Diet Principles (in Percent)		
Distribution of Dietary composition		
Dietary Principles	**Count**	**Percent**
Balanced diet	36	35.29
High protein diet	29	28.43
Low protein renal diet	17	16.67
Diabetic diet	9	8.82
High protein diet (soft)	3	2.94
Hepatic diet	2	1.96
Diabetic diet (Soft)	1	0.98
Normal diet	1	0.98
Low protein renal diet (liquid)	1	0.98
Renal diet	1	0.98
High protein diet (peptide based)	1	0.98
High protein diet (dialysis)	1	0.98

The table represents a breakdown of diet types with corresponding counts and percentages. Most patients follow a balanced or high-protein diet, making up over 63% combined. 9% patients received diabetic composition. Specialized diets like hepatic and dialysis-specific are much less frequent.

Graphical Representations

The graphs show the nutritional status, including body mass index, nutritional effects measured by the NUTRIC score and nutrition risk score (2–5), as well as physiological conditions such as APACHE, GCS, and SOFA (6–8) and the administration of food (9–10).

A, Nutritional Assessments

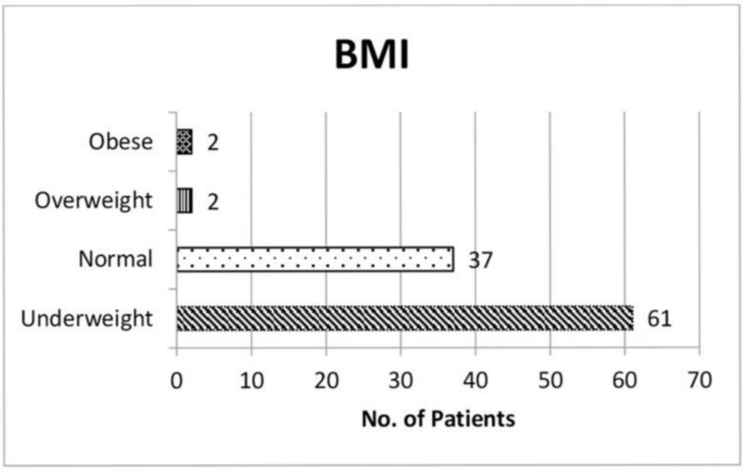


Figure 2: Body Mass Index (BMI).

This bar graph represents the Body Mass Index (BMI) distribution of patients. The majority of patients (61 out of 102) are underweight, followed by those with normal BMI (37 patients). Overweight and obese categories together represent only 4 patients, a tiny proportion.

Figure 3: Subjective Global Assessment (SGA).

This pie chart represents the SGA (Subjective Global Assessment) of patients, categorized into three groups: A large number of patients, 92 out of 102 are in critical condition, highlighting the need for urgent care. Only a small fraction (8%) of the patients require intervention, while 2 percent are considered for nutrition education.

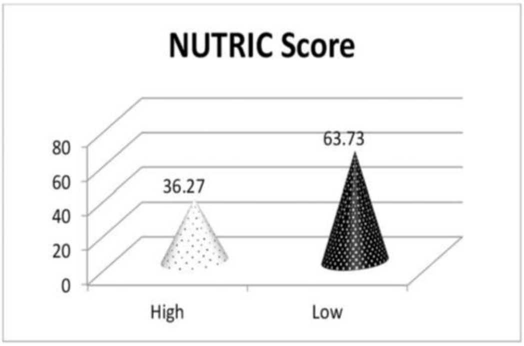


Figure 4 NUTRIC Score.

This chart represents the NUTRIC Score, which assesses nutritional risk among patients. This indicates that the majority of patients are at a lower nutritional risk. A majority of patients (63.73%) have a low nutritional risk. 36.27% of patients are at high nutritional risk, which is a concern that may require immediate focus for nutritional therapy to improve outcomes.

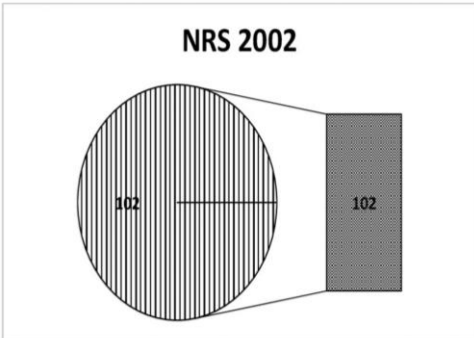
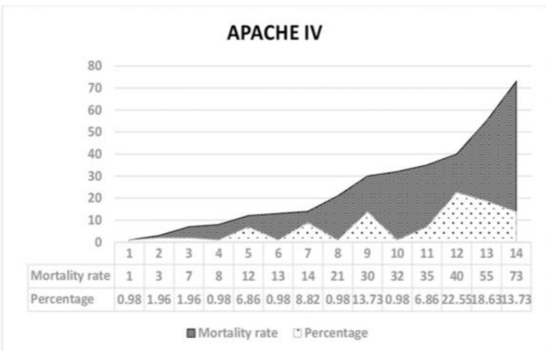


Figure 5: Nutrition Risk Score (NRS2002).

This chart represents NRS 2002 data, displaying two numeric values. This visualization may aim to compare the outcomes of nutritional risk screening (through Prasad et al., 2019) where no significant difference exists.

B: Physiological Assessments



	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mortality rate	1	3	7	8	12	13	14	21	30	32	35	40	55	73
Percentage	0.98	1.96	1.96	0.98	6.86	0.98	8.82	0.98	13.73	0.98	6.86	22.55	18.63	13.73

Figure 6: Acute Physiology and Chronic Health Evaluation (APACHE IV)

This chart represents APACHE IV scores and their relationship to mortality rates and percentages. Mortality rate (shaded area) increases steadily as the APACHE IV score rises. The relationship indicates a clear correlation: higher APACHE IV scores are associated with higher mortality rates. At lower APACHE IV scores (1–6), mortality rates and percentages are minimal, ranging between 0.98% and 8.82%. : From scores 7 to 10, the mortality percentage increases from 13.73% to 32%, indicating a moderate risk.For scores 12 to 14, mortality surges sharply, with percentages ranging from 22.5% to 73%, reflecting severe risk.

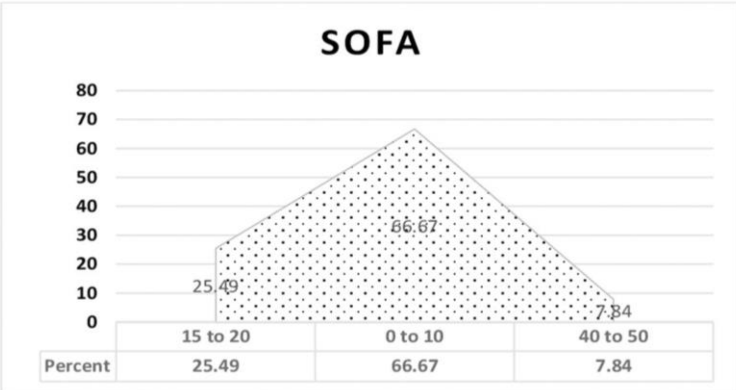


Figure 7: Sequential Organ Failure Assessment (SOFA).

This chart represents the SOFA Score distribution, which evaluates the severity of organ dysfunction in critically ill patients. A large proportion of patients (66.67%) have mild organ dysfunction, as indicated by low SOFA scores. A smaller percentage (25.49%) has moderate dysfunction, and a critical minority (7.84%) shows severe dysfunction.

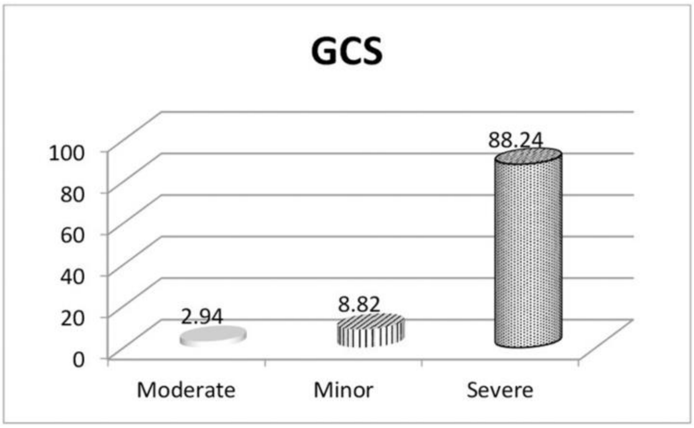


Figure 8: Glasgow Coma Scale (GCS).

This 3D bar chart illustrates the distribution of patients based on their Glasgow Coma Scale (GCS) scores, categorized into three severity levels. The dominance of severe cases (88.24%)

highlights a critically high proportion of patients with significant neurological compromise. Moderate and minor GCS scores are far less frequent, together comprising 11.76%, indicating fewer patients with less critical conditions.

C: Nutrition Administration

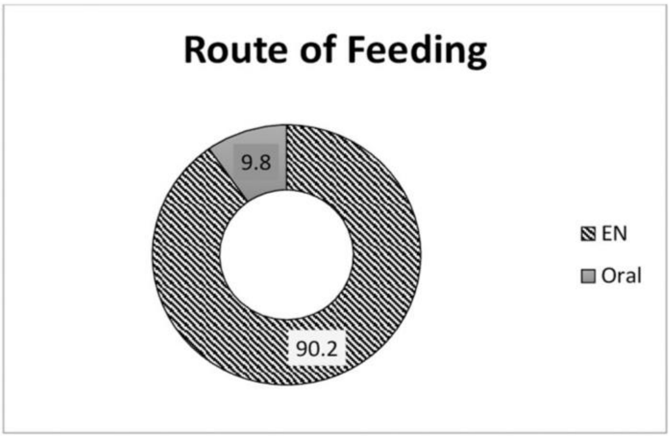


Figure 9: Distribution of Oral, Enteral and Parenteral Nutrition.

This chart is a donut chart representing the distribution of feeding routes among a group. It highlights two categories.

- Dominance of Enteral Nutrition: The majority of individuals (90.2%) are being fed via enteral routes.
- Only 9.8% of individuals use oral feeding, suggesting a minority can maintain adequate nutrition orally.

Figure 10: Dietary Recommendation.

This bar chart represents the distribution of various types of recommended diets based on certain principles.

- Balanced Diet Dominance: A majority of patients are recommended balanced diets, likely as a general principle for good health.
- High Protein Focus: The prominence of high-protein diets highlights conditions such as malnutrition, recovery, or illness-specific nutritional needs.
- Specialized diets: Diets for renal, hepatic, and diabetic patients appear with relatively low frequencies, suggesting specific but limited requirements. This distribution reflects diverse nutritional needs in the patient population, with a focus on general health maintenance and high-protein intake for specific cases.

DISCUSSION

Descriptive analysis

Based on the existing literature, the nutritional implications of trauma patients have received very little attention. Based on the existing literature, the nutritional implications of trauma patients have received very little attention. This study could serve as a means to comprehend the pre-existing malnutrition state and tailor nutritional interventions based on the medical interventions performed on these patients, as determined by their assessment scores. Given the sudden nature of the traumatic occurrence, the critical and time-consuming nature of the treatment process, and the uncertainty of the outcome, it could be beneficial to consider previous nutrient deposition, metabolic feasibility, and innate immunity when implementing the allocated treatment protocol. This survey investigated the nutrition status of the patients at admission. Eventually, it helped to formulate the diet prescription according to the patients' clinical consequences, severity of trauma, expected mortality rate, sequential organ function. This study adjoined the bridge between physiological and nutritional score of a particular patient and elaborated how it is associated with each other to represent a patient's initial condition and decision making during ongoing treatment.

The relationship between medicine and nutrition is highly significant, which is reflected in the data analysis from the study, and the relationship between various nutritional scores indicates the same level of similarity. This three-dimensional study could help create a standard procedure for checking patients' health and nutrition from the time they are admitted until they are discharged or until their therapy ends in any level I trauma care unit.

The descriptive statistics showed that age is normally distributed, so the mean (95% confidence interval with lower and upper limit) and standard deviation were looked at. Other variables, on the other hand, showed skewed distribution, so the Kolmogorov-Smirnov goodness-of-fit test reported the median and range (25th and 75th percentile). The mean age of 42.48 years suggests a relatively young cohort with moderate variability (SD = 16.5). The median Body Mass Index of 102 patients was 18.34 indicates a predominantly underweight group (normal BMI starts from 18.5). All lower percentiles reflect a low baseline score (3), indicating poor initial Glasgow Coma Scale (GCS) scores for many participants. SOFA and APACHE scores reflected a cohort with varied severity of illness, as evidenced by wide ranges and relatively high medians. SGA and NUTRIC scores described a cohort with varied severity of nutrition risk, as evidenced by wide ranges. ScoreNRS2002 indicated nutrition risk throughout the procedure based on range. [Table 1]

In this phase, we recruited 102 patients to determine the importance and interrelation of assessments. The subjects are all adults; the average age of patients is 42.4 years (± 16.5) and their BMI is 18.3 (from 15.1 to 25.8). Although the patients were bedridden, the body mass index is not a definite indicator of the nutritional condition. Most of the patients had low BMI, indicating pre-existing malnutrition.

Although the patients were bedridden, the body mass index is not a definite indicator of the nutritional condition. Most of the patients had low BMI, indicating pre-existing malnutrition. Very few patients were overnourished, although their condition might degrade on the basis of injury and clinical consequences. [Figure 2]. Other anthropometric measurements, such as mid-upper arm circumference and waist-to-hip ratio, were not possible due to the critical condition. Most underweight patients faced critical nutrition conditions (88.5%), but interestingly, those having normal BMI were also critical (94.5%) after calculating the SGA score (p value = 0.340). [Table2].

Interrelationship analysis

The SGA (Subjective Global Assessment) signifies that the pre-existing malnutrition worsens the health statistics curve. Thereafter, sudden trauma may deteriorate the general health condition and chances of better outcome. SGA is known to highlight functional inability, muscle mass loss, abnormal vitals, oxidative stress, and metabolic and physiological impairments. Almost 60% of patients were underweight on admission, and 36% of patients'

BMI was normal, although it does not indicate a definite association with SGA based on the assessment scores and chi square test.[Table 2]

Patients having high mortality rates derived from SOFA were also suffering from nutritional risk (p-value< 0.001). The interaction between SOFA and NUTRIC SCORE indicates a relevant correlation coefficient. There are some relevant relationships between physiological and nutritional assessment scores corresponding to patients' conditions and prognosis derived from interclass co-relations (p value <0.001). There are some relevant relationships between physiological and nutritional assessment scores corresponding to patients' conditions and prognosis derived from interclass co-relations. [Table 3]

The link between SGA and NUTRIC Scores for figuring out nutritional risk was moderate (Spearman's rho = 0.386; interclass co-relation = 0.4496). It shows a fair degree of direct co-relation, as evidenced by scattered plot Spearman route co-relation efficiency is 0.386 (95% confidence level), which entitles a statistically significant relationship (p-value<0.001 [Table 4]

Nutritional and Physiological Score Interpretation

The Body Mass Index (BMI) revealed that over 60% of patients had malnutrition upon admission. 92% of patients required immediate nutritional intervention, which also revealed the fact of pre-existing malnutrition and clinical conditions. : The graphical representation of key findings shows that 90% of patients were critical, and only 10% needed intervention as per SGA.55% of patients had a high mortality rate (between 40% and 73%) as per APACHE IV. It is evident that the risk was prevalent due to severe trauma, so the disease-adjusted mortality rate was higher. According to the GCS score (Glasgow Coma Scale), 88.2% of patients were severe, 2.9% were moderate, and 8.8% had minor coma. Apparently, the NUTRIC SCORE implies that 63.7% of patients had low risk in terms of nutrition. Eventually, the doctors prescribed a nutrition intervention to ensure the smooth continuation of treatment. 100% nutrition risk was evident through NRS2002 [Figure 3-8].

Dietary Administration

In 90% of cases, enteral nutrition was started. The diets used are different, with a balanced diet making up 35%, a high-protein diet making up 28%, a renal diet making up 16%, and a diabetic diet making up 9%. These diets are chosen after keeping an eye on the patient's biochemical parameters, vital signs, input-output, and clinical outcomes [Table 5]. This suggests that the studied group necessitates intensive nutritional support (EN), similar to that of hospitalized or critically ill patients. Monitoring and optimizing EN strategies might be crucial for patient outcomes. The oral diet primarily recommended scientific supplements, but it also recommended kitchen feeds. The oral diet primarily recommended scientific supplements, but it also recommended kitchen feeds. Most patients receive recommendations for balanced diets, likely as a general guideline for optimal health. The prominence of high-protein diets highlights conditions such as malnutrition, recovery, or illness-specific nutritional needs. Diets for renal, hepatic, and diabetic patients appear with relatively low frequencies, suggesting specific but limited requirements. This distribution reflects diverse nutritional needs in the patient population, with a focus on general health maintenance and high-protein intake for specific cases.

But the worldwide guidelines suggest incorporating scientific supplements into enteral nutrition. The formula was suggested based on the health of the endocrine, renal, and liver systems, as well as the stability of the blood flow, the integrity of the metabolism, the motility of the gut, biochemical parameters, and other important clinical effects [Figure 9–10].

Limitation

As the patients are critically ill at admission and the severity of the incidence is highly unpredictable, assessment at admission becomes very challenging. All the patients were bedridden or profusely injured; thus, performing anthropometric measurements was very difficult. Many patients' parties were not bound to give consent. Furthermore, due to the high mortality rate, many patients either died in emergencies or were not in a position to receive nutritional intervention. The propaganda of nutrition assessment isn't included in the centre, so introducing these tools under protocol needs more research and validation.

CONCLUSION

This study aimed to explore the association between nutritional risk scoring and outcome. Most trauma patients are at high nutrition risk and face high mortality. Early nutritional intervention may improve the outlook and speed up recovery in people who have recently been through a traumatic event in a hospital setting, where secondary infections and persistent catabolism can make things more difficult. A single nutrition risk assessment tool cannot be the best interpreter. Therefore, we used multiple tools to investigate the medical and nutritional condition during admission and expand the scope of the Nutrition Care Process (NCP). There should be a standardized protocol for every hospital to validate NCP through proper assessment and intervention. We can conclude that patients at high risk of malnutrition also have a higher mortality rate. There is no relationship between BMI and nutritional risk, and there is a moderate relationship between physiological state, mortality rate, and nutrition. Further multicentre studies can confirm these observations.

ACKNOWLEDGEMENT

I'd like to thank the entire authority of the Institute of Postgraduate Medical Education & Research and SSKM Hospital for performing this study and the University of Burdwan for escalating my research work. I would like to express my heartfelt gratitude to all my mentors, Dr. RAJAT CHOUDHURI, Dr. SARBARI SWAIKA, Dr. JOTIDEB MUKHOPADHYAY, Dr. AVIJIT HAZRA, Dr. ANIMESH DEY, Dr. SANDIP, MUKHERJEE, and Dr. ALAK K. SYAMAL, for their invaluable guidance, expertise, and support throughout the course of this research. Their extensive knowledge, insightful feedback, and unwavering encouragement have been instrumental in shaping the direction and quality of this study. I'd like to acknowledge the contributions of all patients stakeholders, like the whole medical team and patients' relatives.

REFERENCES

1. M. Y: Practice Guidelines for Nutrition in Critically ill Patients: A Relook for Indian Scenario. Indian J Crit Care Med, 2018; 224: 263-267. 10.4103/ijccm.IJCCM-3-18
2. Singer P: ESPEN Guideline on Critical Care Nutrition in the Intensive Care Unit. Critical Nutrition. Published online, 2019; 1-32. 10.1016/j.clnu.2018.08.03
3. Peterson S: Orally fed patients are at high risk of Calorie and Protein deficit in ICU. CurrOpin Crit NutrMetab Care, 2011; 14: 182-185. 10.1097/MCO.06013e3283428e65
4. Dsouza M: Modified Nutrition Risk in Critically Ill Score. A Prognostic Marker of Morbidity and Mortality in Mechanically Ventilated Patients: A Prospective Observational Study. Journal of the Association of Physicians of India, 2022; 70: 53-56. 10.5005/japi-11001-0132.
5. Starr K, Young K, McDonald S. NUTRITION ASSESSMENT IN HIGH-RISK PATIENTS: NRS-2002, PG-SGA, AND NFPE IN OLDER ADULTS PREPARING FOR ELECTIVE SURGERY: Innovation in Aging, 2020; 3: 392-392. 10.1093/geroni/igz038
6. Wischmeyer PE: Tailoring Nutrition Therapy to illness and recovery. Crit Care, 2017; 21: 316. 10.1186/s/3054-017-1906-8

7. L. Genton: Basics in Clinical Nutritional Support in Trauma. e-SPEN The . European e-journal of Critical Nutrition & Metabolism, 2010; 5: 107-9. 10.1016/J.eclnm.2009.06.013
8. Haltmeir T: Factors affecting the calorie and protein intake over time in critically ill trauma patients. J Surg Res, 2018; 226: 64-71. 10.1016/J.JSS2018.01.022
9. Marguine M: Doing a Thematic Analysis: A Practical step-by-step Guide for Learning and Teaching Scholar. 1Dundalk Institute of Technology, 2017, 3: 10.62707/aishej.v9i3.335
10. Rodrigvez A. Smith J: Phenomenology as a Healthcare Research Method. Evidence-Based Nursing, 2018; 21: 96-98. 10.1136/eb-2018-102990
11. Chapp LA: Barriers to Nutrition Intervention for Patients with a Traumatic Brain Injury: View and Attitudes of Medical and Nursing Practitioners in Adequate Care Settings. JPEN J Parenteral Enteral Mutr, 2018; 42: 318-326. 10.1177/0148607116687498
12. Wang Y: Clinical observation of the application of different EN preparations in patients with severe traumatic injury. Editorial Board of Chinese Critical Care Medicine, 2019; 31: 209-213. 10.3760/cma.j.issn.2095- 4352.2019.02.017.
13. Dijkink S: Malnutrition and its effects in severely injured trauma patients. Eur J Trauma Emerg Surg, 2020; 46: 993-1004. 10.1007/s00068-020-01304-5. Epub 2020 Jan 23.
14. Narayan SK: Assessment of Nutritional Status in the Critically Ill. Indian Journal of Critical Care Medicine, 2020, 10.5005/jp-journals-10071-23617.
15. Prasad N: Subjective Global Assessment (SGA) of Malnutrition. Handbook of Famine, Starvation, and Nutrient Deprivation. Published online, 2019; 10.1007/978-3-319-55387-0_116
16. Zangmo K, Khwannimit B: Validating the APACHE IV score in predicting length of stay in the intensive care unit among patients with sepsis. Sci, 2023; 13: 5899. 10.1038/s41598-023-33173-4
17. Lambden S: The SOFA score—development, utility, and challenges of accurate assessment in clinical trials. Crit Care, 23. 374: 2019. 10.1186/s13054-019-2663-7
18. Bakshi N: Nutrition Screening and Assessment among Critically Ill Patients. IntechOpen, 2024; 10.5772/intechopen.1007337
19. Kondrup J: Nutritional risk screening (NRS 2002): a new method based on an analysis of controlled clinical trials. Clinical Nutrition, 2019; 3: 321-336. 10.1016/S0261-5614(02)00214-5