Clinical Nutritional Practices among Critically Ill Patients in Intensive Care Units: A Cross-Sectional Study at a Tertiary Care Hospital, Nepal

Allen Suwal[1,2]; Sujan Dhakal[4]; Jenny Bajracharya[1]; Sudip Sapkota[1,2];
Elija Gautam[5]; Salin Dhakal[6]; Nirjana Bajiko[7]; Sita Dhakal[3]

[1]Lecturer, Department of Anaesthesiology, Patan Academy of Health Sciences, Nepal
[2]Registrar, [3]Clinical Nutritionist; Department of Critical Care,
Manmohan Memorial Medical College and Teaching Hospital, Nepal
[4] Consultant; Department of Anaesthesiology,
[5] Department of Gynecology, Bhadrapur Provincial Hospital, Nepal
[6]MBBS, National Medical College, Nepal
[7]Consultant, Department of General Practice &Emergency Medicine, Khwopa Hospital, Nepal

Abstract:

➢ *Background:*
Proper nutrition is essential for managing critically ill patients in intensive care units (ICUs) and significantly influences their recovery and outcomes. Understanding patient demographics, dietary habits, and effective nutritional strategies is crucial for optimizing care quality in ICU settings.

➢ *Objectives:*
This study aimed to investigate the clinical nutritional practices among critically ill patients in ICUs at Manmohan Memorial Medical College and Teaching Hospital in Kathmandu, Nepal. Specifically, it sought to analyze demographic profiles, dietary habits, types of nutritional support utilized (oral, tube feeding, intravenous), and their associations with health conditions such as Hypertension (HTN), chronic kidney disease (CKD), Chronic Obstructive Pulmonary Disease (COPD), and Diabetes Mellitus (DM).

➢ *Methodology:*
A retrospective and descriptive cross-sectional research design was employed, involving 89 ICU patients selected through purposive sampling. Data were collected from the ICU Diet Prescription Form and Registry 2023. Statistical analyses included descriptive statistics and chi-square tests to assess associations between nutritional variables and health conditions across patient groups.

➢ *Result:*
The study found that most ICU patients were aged 55-74 years (39.3%), with equal gender distribution (50.6% male). Non-vegetarian diets were prevalent (83.1%), and specialized diets (e.g., renal, high-protein) were prescribed based on medical needs. Meal frequency averaged every 3 hours (50.6%), highlighting tailored nutritional care practices. Oral feeding was the predominant nutritional support method (42.7%), followed by tube feeding (32%) and intravenous feeding (19.1%). Significant associations were observed between specific nutritional variables like special diet provided, amount of fluid balance and length of hospital stay, and health conditions (HTN, CKD, COPD, DM), emphasizing the importance of personalized nutrition based on health conditions. COPD patients exhibited longer ICU and hospital stays compared to other conditions.

➢ *Conclusion:*
This study underscores the critical role of personalized nutrition plans tailored to individual patient needs in ICU settings. Implementation of evidence-based nutritional guidelines and multidisciplinary approaches is crucial to enhance patient care and improve clinical outcomes. Future research should focus on refining nutritional protocols and exploring innovative nutritional therapies to further optimize ICU patient management in Nepal and beyond.

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I. INTRODUCTION

Critical illness is a major health problem worldwide, and it often requires intensive care support. In Nepal, critical illness is a leading cause of hospitalization, and patients with critical illnesses are often admitted to intensive care units (ICUs). ICU admission can be a stressful experience for patients and their families, and it is essential to provide optimal care to improve patient outcomes[1].

Nutrition is a crucial component of critical care, and adequate nutrition support is essential for critically ill patients[2]. There is growing recognition of the significance of nutrition for critically ill patients, particularly those who spend a lot of time in the intensive care unit (ICU), where they frequently need life-sustaining care and experience severe catabolism[3]. Malnutrition is common in critically ill patients, and it can lead to poor outcomes, including prolonged hospital stay, increased morbidity, and mortality. Therefore, it is essential to provide optimal nutrition support to critically ill patients to support their recovery and improve their outcomes[4].

Nutritional support in critically ill patients is complex and requires a multi-disciplinary approach. Nutritional support should be individualized based on the patient's nutritional status, metabolic status, and clinical condition. Different nutritional interventions, such as enteral and parenteral nutrition, can be used to support critically ill patients' nutritional needs[5].

Several studies have evaluated the nutritional practices of critically ill patients in ICUs worldwide, but limited data are available from Nepal. Therefore, this study aims to assess the current clinical nutritional practices of critically ill patients in ICUs at a tertiary care hospital in Kathmandu. The findings of this study will provide valuable insights into the current nutritional practices of critically ill patients in Nepal and identify areas for improvement in nutritional support in ICUs.

Critical illness, characterized by severe disease or injury requiring intensive medical care, often leads to significant physiological stress and catabolism. Patients in the Intensive Care Unit (ICU) frequently experience hypermetabolism and protein-energy malnutrition, which can negatively impact clinical outcomes[6]. Nutritional support is therefore a cornerstone of care for critically ill patients, aiming to mitigate the effects of catabolic stress and support recovery. Both enteral nutrition (EN) and parenteral nutrition (PN) are employed, with a strong global preference for early EN due to its association with improved outcomes[7].

Clinical nutritional practices play a pivotal role in the management of critically ill patients in Intensive Care Units (ICUs). These patients are often at risk of malnutrition due to their hypermetabolic state, underlying disease processes, and the catabolic effects of critical illness. Ensuring optimal nutritional support is essential for improving clinical outcomes, reducing morbidity and mortality, and enhancing recovery rates.

Recent guidelines by the European Society for Clinical Nutrition and Metabolism (ESPEN) emphasize the importance of early and individualized nutritional support in critically ill patients[8]. ESPEN recommends initiating enteral nutrition within 24-48 hours of ICU admission, provided that the patient's hemodynamic status is stable. This approach has been associated with a reduction in infectious complications and a shorter duration of mechanical ventilation[6].

The American Society for Parenteral and Enteral Nutrition (ASPEN) similarly advocates for the timely initiation of enteral nutrition, while also recognizing situations where parenteral nutrition may be. According to ASPEN guidelines, parenteral nutrition should be considered when enteral nutrition is not feasible or sufficient to meet the patient's nutritional requirements[9]. This dual approach ensures that nutritional goals are met, even in the most complex clinical scenarios.

II. OBJECTIVES OF THE STUDY

➢ *General Objective:*
The general objective of this study is to assess the current clinical nutritional practices of critically ill patients in ICUs at a tertiary care hospital in Kathmandu.

➢ *Specific Objectives:*

- To Assess Dietary Intake Patterns and Nutritional Support provided in ICU patients.
- To determine the clinical Impact of ICU patients.
- To examine the association between different Variables and provide Nutritional Support to their health conditions.

III. MATERIALS AND METHODS

This was a hospital-based observational study, carried out over two month period from February 14th, 2023 to 13th April 2023 at Manmohan Memorial Medical College and Teaching Hospital Kathmandu, Nepal. Patients who were critically ill patients diagnosed with Hypertension, Chronic Kidney Diseases, Pulmonary Obstructive Diseases, and

Diabetes Mellitus and admitted to the ICUs were purposively selected from the ICU department of the hospital. A retrospective and descriptive cross-sectional design was adopted. Institutional consent was taken from the hospital administration before data collection.

The secondary data were collected through the patient Diet prescription form and medical record register from February 14th, 2023 to 13th April 2023. The patient's structured nutrition prescriptions and the patient's medical record file were used as tools for data collection. The obtained report results from the hospital were entered into Statistical Package for Social Science (SPSS) 26 version and Microsoft Excel and necessary analysis was made.

IV. RESULT

➢ *Demographic Characteristics*

The majority of ICU patients were aged 55-74 years (39.3%), with a balanced gender distribution (50.6% male and 49.4% female). This indicates a high representation of middle-aged and elderly individuals in critical care**.**

➢ *Dietary Habit of ICU Patients*

This study showed, 83.1% of patients followed a non-vegetarian diet. Special diets varied significantly: low sodium diets were common among patients with hypertension (80%), diabetic diets were predominantly given to those with diabetes mellitus (90.9%), and renal diets were exclusively provided to patients with chronic kidney disease. High protein diets were most frequently administered to patients with chronic obstructive pulmonary disease (55.6%).

Regarding meal frequency, 50.6% of patients received meals every 3 hours. Fluid intake varied by condition: chronic kidney disease patients received less than 100 ml per feeding (88.2%), while those with hypertension and chronic obstructive pulmonary disease commonly received 100-200 ml per feeding. This approach demonstrates tailored nutritional care based on individual health conditions to optimize ICU patient outcomes.

➢ *Nutrient Intake Pattern of ICU Patients*

The analysis of nutrient intake among ICU patients revealed distinct patterns based on health conditions. For caloric intake, the majority of patients, particularly those with COPD, received between 1500-2000 Kcal, which supports the need for balanced energy provision. Protein intake was predominantly in the range of 50-75 grams, especially among COPD patients, highlighting a focus on adequate protein support for recovery. Fat intake was mainly below 30 grams, aligning with guidelines to manage lipid levels, while carbohydrate intake varied, with most patients consuming between 100-200 grams.

These results underline the importance of individualized nutritional strategies tailored to specific health conditions, ensuring effective metabolic support and promoting recovery in ICU patients.

➢ *Nutritional Support Practices of ICU Patients*

In the nutritional support practices for ICU patients across various health conditions, several key findings emerged. Oral administration was the most common route, with 10 patients with hypertension (40.0%), 11 with CKD (34.4%), and 15 with COPD (41.7%) receiving oral nutrition. Enteral nutrition (EN only) was used by 7 patients with hypertension (28.0%) and 8 with COPD (22.2%), while parenteral nutrition (PN only) was predominantly used for 6 patients with diabetes mellitus (54.5%). The combination of EN + PN was less frequent and applied to a few patients primarily with hypertension and COPD.

➢ *Clinical Impact on ICU Patients*

Most patients across all health conditions had an ICU stay of 3-5 days, with notable proportions: 32% of those with hypertension, 34.4% with CKD, 55.6% with COPD, and 45.5% with diabetes mellitus. Shorter ICU stays (<3 days) were seen mainly in patients with hypertension and COPD, while longer stays (>10 days) were rare. Hospital stays of 6-9 days were most common, with significant numbers from all health conditions, especially CKD (34.4%). Mortality rates were low, with only one patient with CKD recorded as deceased. Most patients were discharged to the ward, indicating generally positive outcomes. The data underscores the effective management and favorable outcomes in ICU nutritional support practices across different health conditions.

➢ *Associations between Nutritional Practices and Health Conditions among ICU Patients*

A highly significant relationship (p < 0.001) was found between the type of special diet prescribed and the patient's health condition, highlighting that specific diets such as low sodium for hypertension and diabetic diets for diabetes are crucial for effective management. Additionally, the amount of fluid administered per feeding was significantly associated with the health condition of the patients (Pearson Chi-Square = 26.533, df = 6, p < 0.001), indicating that fluid intake needs to be tailored according to individual health conditions.

Furthermore, a significant link was observed between the length of hospital stay and the type of health condition (p = 0.016), suggesting that the severity and complications associated with different conditions influence recovery times.

• *Association between Dietary Patterns and Health Condition of ICU Patients*

Table 1 Dietary Pattern and Health Condition n=89

Variable Category	Nutritional Variable	Values	Types of Health Condition				Chi-Square Value	p-value
			HTN	CKDs	COPDs	DM		
Dietary Pattern	Dietary Habit	Vegetarian	4	3	5	3	1.099	0.777
		Non-Vegetarian	21	14	31	8		

Variable Category	Nutritional Variable	Values	Types of Health Condition				Chi-Square Value	p-value
			HTN	CKDs	COPDs	DM		
	Special Diet to Patients	None	1	4	3	1	164.196	0.000
		Low Sodium	20	0	3	0		
		Diabetic Diet	0	2	1	10		
		Renal Diet	0	9	0	0		
		High Protein Diet	0	1	20	0		
		Normal Diet	4	1	9	0		
	Frequency of Meal Taken	Every 2 Hours	5	7	4	10	7.095	0.627
		Every 3 Hours	11	10	19	5		
		Every 4 Hours	4	1	1	0		
		Other	1	1	0	0		
	Amount of Fluid Per Feeding	<100 ml	4	15	10	4	26.533	0.000
		100-200 ml	11	2	16	3		
		300-400 ml	10	0	10	4		
		>400 ml	0	0	0	0		

Source: ICU Diet Prescription Form and Registry, 2023

- *Association between Clinical Impact on Patients and Health Condition of ICU Patients.*

Table 2 Clinical Impact on Patients and Health Condition n=89

Variable Category	Variables	Values	Types of Health Condition				Chi-Square Value	p-value
			HTN	CKDs	COPDs	DM		
Clinical Impact on Patients	Length of ICU Stay	<3 days	10	4	5	2	11.222a	0.510
		3-5 days	8	11	20	5		
		5-7 days	5	1	6	3		
		7-10 days	1	1	4	1		
		>10 days	1	0	1	0		
	Length of Hospital Stay	3-6 days	9	1	6	1	20.375a	0.016
		6-9 days	8	11	7	3		
		9-12 days	6	2	10	3		
		>12 days	2	3	13	4		
	Mortality Rate	Yes	0	1	3	0	3.006a	0.391
		No	25	16	33	11		
	Discharge Destination	Home	0	0	1	0	7.944a	0.540
		Ward	25	16	31	10		
		Ventilator	0	0	1	1		
		Expire	0	1	3	0		

Source: ICU Diet Prescription Form and Registry, 2023

V. DISCUSSION

The majority of ICU patients were aged 55-74 years (39.3%), with 19.1% over 74 years. The gender distribution in this study was nearly equal, with 50.6% males and 49.4% females. The study found that 83.1% of ICU patients were non-vegetarian. Oral nutrition was the predominant method (43.8%).

The majority of patients consumed between 1500-2000 kcal daily, with the highest intake observed in COPD (61.1%), hypertension (60.0%), and CKD (52.9%) patients. This intake range aligns with Heyland et al. [7] recommended moderate calorie intake to manage metabolic demands.

Protein intake predominantly fell within the 50-75 gm range, with COPD patients consuming the highest percentage (80.6%), consistent with regional dietary patterns. Fat intake was primarily below 30 gm per day, with COPD patients showing a preference for higher fat intake within the 30-59 gm range (44.4%). Carbohydrate intake varied widely, with a significant proportion of COPD patients consuming over 400 gm per day (36.1%).

A highly significant association was found between the type of special diet prescribed and health conditions (p < 0.001). For example, low-sodium diets were commonly prescribed for hypertension, and diabetic diets were essential for managing diabetes. The chi-square test indicated a

significant association between the amount of fluid per feeding and health conditions (Pearson Chi-Square = 26.533, df = 6, p < 0.001), suggesting a relationship between fluid intake and specific health conditions. Additionally, the length of hospital stay was significantly associated with health conditions (p = 0.016), reflecting varying recovery times based on condition severity. Patients with hypertension had shorter hospital stays, with 68.0% discharged within 3-9 days. COPD patients exhibited more variable hospital stays, with 36.1% requiring stays exceeding 12 days. CKD patients typically had stays of 6-9 days (64.7%), while diabetes mellitus patients had a balanced distribution of stay lengths. Mortality rates were notably low overall, with higher rates among CKD (5.9%) and COPD (8.3%) patients, emphasizing the need for targeted care strategies.

In summary, the study highlights the critical role of personalized nutritional strategies in ICU settings. Significant associations between specialized diets, fluid intake, and hospital stay duration reflect the tailored approaches necessary for managing specific health conditions. The moderate to strong associations between nutrient intake patterns (calorie, protein, fat, carbohydrate) and health conditions underscore the importance of customized nutritional interventions. Additionally, regional variations in nutritional requirements and their impact on patient outcomes, as observed in this study, reflect the influence of local healthcare practices and resource availability.

VI. CONCLUSION

This study provides insights into the demographic characteristics and dietary practices of ICU patients, highlighting nutritional strategies that consider age, gender, dietary preferences, and clinical conditions to optimize patient outcomes in diverse ICU settings. Continuous assessment and adaptation of nutritional interventions based on local population needs are essential for enhancing recovery and improving the quality of ICU care.

In conclusion, this study provides comprehensive insights into the association of nutrient balance with gender, health conditions, dietary intake patterns, and nutritional support routes among ICU patients in Kathmandu, Nepal. The findings underscore the need for personalized nutrition strategies aligned with specific health conditions to optimize patient outcomes. By comparing and contrasting these findings with global, South Asian, and Nepalese studies, this research contributes to the broader understanding of nutritional practices in critical care, highlighting areas for further research and clinical practice improvement.

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