EAS Journal of Anaesthesiology and Critical Care
Abbreviated Key Title: EAS J Anesthesiol Crit Care
ISSN: 2663-094X (Print) & ISSN: 2663-676X (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-7 | Issue-6 | Nov-Dec-2025 | DOI: https://doi.org/10.36349/easjacc.2025.v07i06.004

Original Research Article

Practice of Enteral Nutrition Support in Adult Patients Admitted to the Intensive Care Units of Two University Hospitals in Abidjan

Ouattara A[1*], Bédié YV[1], Ouakoubé AJP[1], Ganame A[2], Kakou KM[1], N dah E.S[3], Gnazebo AD[4], Kadjo AHT[4], Gnohité Grace[4], Abhé CM[4], Anin AL[5]

[1]UFR Medical Science of Félix Houphouët Boigny University; Anesthesia-intensive care unit of CHU Cocody
[2]Nutrition Department of Nangui Abrogoua University
[3]UFR Medical Science of Félix Houphouët Boigny University; Emergency unit of CHU Cocody
[4]Anesthesia-intensive care unit of CHU Cocody
[5]Nutrition Department of Nangui Abrogoua University

Article History
Received: 29.09.2025
Accepted: 15.11.2025
Published: 20.11.2025

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: ***Introduction***: enteral nutrition is a key component of the management of critically ill patients. The objective was to describe the current practices of enteral nutrition support among admitted patients in the polyvalent intensive care units of two university hospitals in Abidjan. ***Methods***: it was a retrospective descriptive study. Socio-demographic, clinical, outcome related and nutritional parameters were analyzed along the biochemical composition of blended fluid feeds. ***Results***: a total of 101 patients (55 in one center and 46 in the other) were included. Men represented 60% and the mean age was 45.69 years. Neurological disorders were the leading cause of admission (78.57%). Nutritional status could not be reliably assessed, as weight and height were recorded in only 62.16% and 16% of patients respectively. Likewise, biological markets of malnutrition risk (albumin, transthyretin and CRP) were not routinely ordered. The mean length of stay was 10.8+- 3.79 days, and mortality was high (69.1%). ***Conclusion*****:** these findings strongly support the need to implement systematic nutritional assessment ad structured enteral feeding protocols in the ICU with the aim of improving patients' outcomes.

Keywords: Enteral Nutritional Support, Intensive Care, Blended Feeds.

INTRODUCTION

Malnutrition is a major public health concern and its impact is even more pronounced among patients admitted to the intensive care units. These patients frequently present a hyper metabolic and hyper catabolic state, driven by the severity of their illness, the systemic inflammatory response and the multiple treatments required to stabilize them. Without timely and appropriate nutritional support, these disturbances can rapidly worsen the patients nutritional reserves, weaken immune function, increase susceptibility to infections and ultimately contribute to longer hospital stays and higher mortality. Among the variables, enteral nutrition holds an essential place in the management of critically ill patients. Beyond providing calories and protein, early enteral feeding helps preserve the integrity of the intestinal mucosa, limits bacterial translocation and reduces metabolic complications that are often associated with parenteral nutrition. Despite well-established recommendations from international societies such as ESPN and ASPEN the practical implementation of enteral nutrition frequently encounters obstacles. These may relate to limited resources, insufficient training of healthcare personnel, and irregular monitoring of nutritional intake or digestive intolerance that is not always anticipated or documented. In many African settings and particularly in Cote d'Ivoire few studies have explored how enteral nutritional support is actually delivered in intensive care units. Understanding real world practices is essential in order to identify gaps between recommendations and routine care. The purpose of this study was therefore to describe the practices of enteral nutritional assistance in adult's patients admitted to two university hospitals ICUs in Abidjan with the broader aim of highlighting areas that may require improvement to optimize the nutritional management of critically ill patients.

PATIENTS AND METHODS

This was a retrospective review of medical records for patients admitted to the intensive care units between January 1st and June 30th 2022. It was

***Corresponding Author:** Ouattara Abdoulaye
UFR Medical Science of Félix Houphouët Boigny University; Anesthesia-intensive care unit of CHU Cocody

complemented by a biochemical analysis of the formulas used for enteral nutrition during the same period. Eligible patients were adults aged 18 years or older, who remained in the ICU for at least three days and received exclusively enteral feeding through a nasogastric tube. Patients who had undergone digestive surgery, those with incomplete files, and those discharged against medical advice were not included. The study was conducted in two ICUs referred to here as 'center 1' and 'center 2' each with an average capacity of 12 beds and an occupancy rate close to 80%.The variables studied included socio-demographic characteristics (age, sex), Aspects related to enteral nutrition (type and quantity of ingredients, composition of blended fluid feeds and feeding modalities), Nutritional assessment parameters (anthropometric measures (weight, height) and biological markers such as albumin and pre-albumin), Clinical and outcome data (reason for ICU admission, length of stay and patient outcome).

We do the biochemical analysis of blended feeds. Moisture and dry matter content of the blended fluids were determined using the Association of Official Analytical Chemists (AOAC, 1990) method. Crude protein levels were calculated from total nitrogen content using the Kjeldahl method (AOAC, 1990). Energy values were estimated based on the Atwater and Rosa (1899) conversion factors.

All patients' files were reviewed with strict respect for confidentiality. Identifying information was removed each file received an anonymous code used for data entry. Administrative authorization was obtained from the general management of both university hospitals prior to the start of the study. Data were entered in Microsoft excel and analyzed using SPSS version 23. Qualitative variables are reported as frequencies and percentages, while quantitative variables are expressed as means with standard deviations.

RESULTS

Socio-Demographic, Clinical and Outcome Characteristics

The mean age of the study population was 44 +-17 years. In center 1, the average age was 45.6+-1.51 years, while in center 2 it was 43.54+-16 years ages ranged from 18 to 89 years. The sex ratio was 1.3 in both centers, with a predominance of male patients. Medical conditions accounted for most admissions (85.14%), and within this group neurological disorders were by far the most frequent (78.57%). The average length of stay for all patients was 10.8 +-3.79 days and overall mortality was high reaching 69.1%. These elements are summarized in **table I.**

Table I: socio-demographic, clinical and outcome characteristics of patients

Parameters	Variables	Center 1	Center 2
Age (years)	< 40	26	20
	40-60	9	11
	> 60	17	8
Sex	Male	33	26
	Female	22	20
Diagnosis	**Medical condition**	**46**	**40**
	stroke	9	9
	disorders of consciousness	23	20
	others	15	11
	Surgical conditions	**10**	**6**
	Severe trauma	8	5
	Postoperative	2	1
Outcome	Mean length of stay	9,27 ± 5,09	12,6+/- 3,07
	Mortality	67,3%	70,4%

Characteristics Related to Enteral Nutrition

In center 1 meals were prepared weekly and then used for daily patient feeding. In center 2, two alternating menus were used throughout the study period. In both hospitals, menus were developed by the kitchen staff in collaboration with a nutritionist, without direct involvement from medical or nursing teams. Once prepared, blended feeds were refrigerated and later reheated before administration. Prescriptions were based on a simplified approach: 1 millimeter of blended feed was considered equivalent to 1 kilocalorie. The feeding method in both centers relied on intermittent administration, typically delivered in 3-to-6-hour intervals between meals. Enteral nutrition was generally initiated within the 1st 48 hours of admission and then gradually increased until reaching a maximum of 2500 kilocalories a level that tended to remain unchanged until discharge. More than half of the patients received additional nutritional supplements (60% in center 1 and 78% in center 2). No record of pro-kinetic use was found in the charts, and no enteral nutrition related complications such as diarrhea or aspiration were documented. In center 1, the daily menu consisted of three distinct blended preparations: one for breakfast (also as a mid-morning snack), one for lunch and one for dinner each with specific ingredients (**Table II**).

Table II: Ingredients of blended fluid feeds in center 1

Morning (breakfast and/or snack)		**Midday (lunch and/or snack)**		**Evening (Dinner)**	
Ingredients	Quantity (g)	Ingredients	Quantity (g)	Ingredients	Quantity (g)
Quaker oats	50	potato	450	potato	350
Milk	150	Fish	250	Fish	300
Sugar	20	Onion	150	Onion	150
oil	10	Bell pepper	150	Bell pepper	150
		Tomato	150	Tomato	150
		Onion leaves	150	Onion leaves	150
		Oil	10	Oil	10
		Sugar	2,5	Sugar	2,5

Center 2 used two 24 hour alternating menus with identical compositions across feeding times (**Table III**).

Table III: Ingredients of blended fluid feeds in center 2

Menu 1		**Menu 2**	
Ingredients	**Quantity (g)**	**Ingredients**	**Quantity (g)**
Potato	500	Rice	500
spinach	200	Sweet potato leaves	250
Egg yolk	75	zucchini	300
Milk	250	milk	250
Onion	200	Onion	200
oil	20	oil	20
Fish	500	meat	400
Carrot	300		

For the biochemical analysis, 500ml of each blended foundation was collected. The results highlighted discrepancies between the expected nutritional contributions based on ingredient lists and the actual biochemical content, particularly in center 2 (**Table IV**).

Table IV: biochemical analysis of blended fluid feeds in the two centers

Composition pour 100 ml	**Centre 1**			**Centre 2**	
	Morning	**Midday**	**evening**	**Menu 1**	**Menu 2**
Proteins (g)	3,02	7,12	7,32	2,72	3,01
Lipids (g)	2,44	5,12	5,03	0,01	1,11
carbohydrates (g)	12,21	8,13	8,83	30,58	28,02
Energy value (Kcal)	82,88	107,05	109,89	133,23	134,02

Nutritional Assessment Parameters

Regarding anthropometry, admission weight was recorded for 60% of patients in Center 1 and 65% in center 2. During hospitalization, weight was reassessed in only 9% of patients (12% in center 1 versus 8% in center 2). Height was documented at admission in 20% of patients in center 1 and 12% in center 2. Neither center recorded mid upper arm circumference or any other anthropometric indicator. As for biological markers, serum albumin was never requested in center 1. In center 2, it was ordered only for three patients, and this was after more than 21 days of hospitalization.

DISCUSSION

Socio-Demographic, Clinical and Outcome Characteristics

The study population was relatively young, and most patients were admitted with acute medical conditions. At first glance, one might expect such patients to have a satisfactory nutritional status on arrival. However, the long duration of ICU stays and the high mortality rate observed in both centers suggest either severe initial illness or the development of complications during hospitalization. Adequate and timely nutritional support is known to help reduce the risk of these complications and may contribute to better outcomes [2].

Enteral Nutrition Practices

The practices observed in both centers reflect a largely empirical approach to enteral feeding. The absence of individualized prescriptions and the limited involvement of medical and nursing teams in nutritional planning illustrate this gap. Early initiation of enteral feeding, which was practiced in both units, is nevertheless a positive aspect. Early feeding helps preserve intestinal trophicity, maintain mucosal integrity and limit bacterial translocation. In a retrospective study of 4049 ICU patients, Artinian *et al*., reported a significant reduction in in ICU mortality among patients who received enteral nutrition within the first 48 hours

of admission [3], other studies have also shown that enteral nutrition lowers the risk of nosocomial infections, shortens hospital stay and allows patients to reach caloric goals more quickly [4-6].The high mortality observed in our series raises legitimate questions. Could nutritional practices have contributed to these outcomes, or were other clinical factors more decisive? A key issue is whether the formulations used actually met the caloric and protein needs of critically ill patients. Because feeding pumps were not available, intermittent administration was used in both centers. Although this technique can be acceptable in resource limited settings, the absence of any recorded complications such as diarrhea or aspiration should be interpreted cautiously. The lack of recorded events may reflect incomplete documentation rather than an absence of adverse effects. Similarly, increasing the volume of blended feeds progressively is a reasonable way to assess digestive tolerance, but structured monitoring tools were not in place.Current French guidelines (SRFL and SFAR) recommend continuous enteral feeding to minimize digestive intolerance and to ensure that caloric goals can be reached within 48 hours [7]. In center 1, the composition of the blended feeds appeared more balanced, although the nutrient profile closely resembled that of a healthy, non-stressed adult rather than a critically ill patient in a hyper-catabolic state. In contrast the discrepancy between expected nutrient content and actual biochemical analysis in center 2 highlights the need for regular quality control of feed preparation and better traceability. Repeated reheating of preparations may also alter their nutritional value.

In high income countries, such homemade preparation have progressively been replaced by standardized industrial formulas, which offer several advantages: sterile packaging that reduces infectious diarrhea, consistent viscosity that minimizes feeding tube obstruction, and reliable, reproducible nutrient composition including electrolytes, vitamins and trace elements [8, 9]. The nutrient profile noted in center 2, with a predominance of carbohydrates and relatively low protein and lipid content, could promote persistent hyperglycemia [10]. Hyperglycemia reduces lipid oxidation, increases CO2 production which may prolong mechanical ventilation and enhances hepatic glycogen synthesis [11]. At the same time, low protein intake in a context of marked catabolism exposes patients to worsening malnutrition and impaired immune function. [11] Thuong and Leteurtre suggest that caloric intake in critically ill adults should include 40-60% carbohydrates, 20-40% lipids, and 15-25% proteins [12]. According to ASPEN recommendations, protein needs may reach 2g/kg/day in critically ill adults. No clear recommendations exist for carbohydrates needs, but basic requirement (up to 20g glucose/kg/day) should be adjusted to avoid hyperglycemia, which may require insulin therapy. Lipid intake generally starts at 1g/kg/day and can be increased gradually to 2-4g/kg/day, representing up to 30-40% of total energy intake [2].

Nutritional Assessment

Screening for malnutrition is a fundamental step in the nutritional care of the ICU patients. Ideally, every patient admitted to intensive care should undergo an early nutritional assessment that identifies nutritional risk, estimates energy especially protein needs and evaluates whether actual intake matches these requirements [13]. In our study, this essential step was essentially absent. The lack of reliable anthropometric data (weight recorded in only 62.16% of cases and rarely reassessed, height documented in only 20%) makes it impossible to evaluate the nutritional status of the patients. Biological markers were also seldom requested. Serum albumin and pre-albumin, though imperfect, remain useful indicators of protein reserves and decrease in proportion to the severity of the inflammatory and hyper-catabolic responses [14]. Low albumin levels (<30g/l) have been associated with increased complications and higher morbidity and mortality [15]. Assessing energy expenditure in critically ill patients is challenging. Their metabolic needs differ substantially from those of healthy adults due to changes in thermogenesis and muscle work. While indirect calorimetry is the gold standard, most ICUs rely on predictive equations based on age and weight data that were often missing in this study making accurate assessment even more problematic [16].

CONCLUSION

Enteral nutritional support in the two intensive care units studied was essentially empirical. There was no structured protocol for nutritional assessment, and medical or nursing involvement in the planning of nutritional therapy was limited. In addition, prescriptions were not individualized and a significant discrepancy was observed between the ingredients listed for the blended feeds and their actual biochemical composition. These findings highlight the need for better organization and closer supervision in the preparation of blended formulas.

Taken together, the results of this study emphasize the importance of establishing clear protocols for nutritional management in intensive care units. Strengthening collaboration between teams, nutritionists and kitchen staff would help ensure more consistent safe and more effective enteral nutritional support for critically ill patients.

The Authors Declare No Conflict of Interest: There is no conflict on the source of funding or on the affiliation of author.

Distribution of Tasks:

The authors confirm that all authors have made substantial contributions to all of the following:

- ✓ The conception and design of the study, critical reading.
- ✓ Drafting the article or revising it critically for important intellectual content.

- ✓ Data collection and analysis, bibliographic research and writing.
- ✓ Final approval of the version to be submitted.

REFERENCES

1. Walter L, Ernest E, James B. Nutrition support of the trauma patient. Nutrition 2002; 18(11): 960-965
2. Charlene Compher RD, Angela L, Bingham PharmD, Michele McCall MSc, RD. Guidelines for the provision of nutrition support therapy in the adult critically ill patient: The American Society for Parenteral and Enteral Nutrition. JPEN 2022; 46 (1): 12-41
3. Artinian V, Krayem H, DiGiovine B. Effects of Early Enteral Feeding on the Outcome of Critically Ill Mechanically Ventilated Medical Patients. CHEST Journal 2006; 129 :960–7. doi :10.1378/chest.129.4.960.
4. Gianotti L, Alexander JW, Nelson JL, Fukushima R, Pyles T, Chalk CL Role of early enteral feeding and acute starvation on postburn bacterial translocation and host defense: prospective, randomized trials. Crit. Care Med 1994.;22(2):265-272
5. Minard, Gayle ; Kudsk, Kenneth A.. Nutrition postopératoire en chirurgie pour traumatisme majeur. Opinion actuelle en nutrition clinique et soins métaboliques 1998 1(1) : p35-39.
6. Singer P., Berger M.M., Van den Berghe G., Biolo G., Calder P., Forbes A. et al,. ESPEN guidelines on parenteral nutrition : intensive care. Clin Nutr 2009 ;28 :387–400.
7. Hulst JM, van Goudoever JB, Zimmermann LJ, et al. The effect of cumulative energy and protein deficiency on anthropometric parameters in a pediatric ICU population. Clin Nutr ; 23 : 38-9.ICU patients. Clinical Nutrition 2004 ; 24 :502–9
8. Heyland D.K., Dhaliwal R., Drover J.W., Gramlich L. et Dodek P. Canadian clinical practice guidelines for nutrition support in mechanically ventilated, critically ill adultpatients. JPEN J Parenter Enteral Nutr2003; 27 :355.676
9. Mehta NM, Compher .,: Clinical Guidelines2009: nutrition support of the critically ill child. PEN J Parenter Enteral Nutr 2009 33(3):260-76. Larger É, Ferré P. Physiologie du métabolisme énergétique. Médecine des Maladies Métaboliques. 2016 ;10(6):560-7
10. Nutenberg G, Chioléro R, Leverve X 2002.,eds. Nutrition artificielle de l'adulte en réanimation. Paris : Elsevier. 15-40
11. Briassoulis, George MD, Venkataraman, Shekhar MD; Thompson, Ann E. MD, FCCM. Energy expenditure in critically ill children .Critical Care Medicine 28(4):p 1166-1172, April 2000.
12. Thuong M, Leteurtre S. 2003. Recommandations des experts de la Société de Reanimation de Langue Française Nutrition Reanimation 12 :350-354
13. Kreymann KG, Berger MM, Deutz NEP, Hiesmayr M, Jolliet P, Kazan. Guidelines for nutrition support in critically ill patient. Ann FrAnesthReanim 2014; 33(3):202-218.
14. Cynober L, Christian A.. Exploration biologique du statut nutritionnel. Nutri clin et metabo 2004 18 :49-5
15. Goiburu ME, Goiburu MM, Bianco H, Díaz JR, Alderete F and al.. The impact of malnutrition on morbidity, mortality and length of hospital stay in trauma patients. Nutr Hosp. 2006 21(5):604-10. PMID: 17044607.
16. Van der Kuip M, Oosterveld MJS, Van Bokhorst-de van der Schueren and al Nutrition therapy in apediatric intensive care unit: indications, monitoring, and complications. JPEN J Parenter Enteral Nutr 2011.;35(4):523-529.

Cite this article: Ouattara A, Bédié YV, Ouakoubé AJP, Ganame A, Kakou KM, N dah E.S, Gnazebo AD, Kadjo AHT,Gnohité Grace, Abhé CM, Anin AL (2025). Practice of Enteral Nutrition Support in Adult Patients Admitted to the Intensive Care Units of Two University Hospitals in Abidjan. *EAS J Anesthesiol Crit Care*, *7*(6), 172-176.