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Prescription and Delivery of Enteral Nutrition for ICU Patients: A Case Study of a Hospital in the Interior of Brazil

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Abstract

Background: The objective of the present study was to evaluate during one year the total delivery of volume, calories, and proteins and compare them with the total prescribed to ICU patients using ENT (Enteral Nutrition Therapy) exclusively. **Methods:** Data on the prescribed or infused volume, calories, and protein, as well as their respective needs for each individual, were collected. Anthropometric parameters and age data were also collected from the medical records of 41 patients admitted to the intensive care unit. **Results:** Prescribed versus infused enteral diet volume was presented in 5 weeks which corresponds to the maximum duration of ICU treatment. Regarding sampling, the majority corresponded to elderly people (>64 years old) and males (63.4%). The total average prescribed was 719.2 mL of enteral diet on an average of 649.7 mL delivered. In addition, there was no significant difference between the prescribed and delivered volume, caloric value, and protein content of the diet only in the last week of hospitalization, which corresponded to the range of 29 - 36 days. Several factors make it difficult to reach the patient's caloric and protein recommendations. Most of the reasons are not recorded, corresponding to 57.1%, indicating the difficulty of assessing the inadequacy of the prescribed and delivered volume. **Conclusion:** To our knowledge, this is the first time that a prescription vs. delivery assessment has been carried out for patients in the Brazilian Midwest. In addition, although our research is a difficulty reported worldwide (in most hospitals), we also provide opportunities for how the problem was solved in our case, which may contribute to other cases.

Keywords

Caloric-Protein Diet, Enteral Formula, Nutritional Needs, Daily Intake, Patients Ill

1. Introduction

Enteral nutritional therapy (ENT) refers to the system of supplying nutrition directly into the gastrointestinal tract (GIT) when patients have malnutrition or high nutritional risk, even if they present with a functional gastrointestinal tract and are unable to meet nutritional needs orally [1].

Patients diagnosed with critical illnesses are admitted under extreme physiological and metabolic stress, as well as a systemic inflammatory response, which is an inflammatory reaction triggered by the body in the face of any infectious or non-infectious aggression. These diseases increase the susceptibility to malnutrition and infection due to the intense state of catabolism (division of biomolecules into smaller particles), resulting in a long recovery period as well as high morbidity and mortality rates [2] [3]. A critical patient's prognosis is directly connected to adequate nutritional support—the supply of nutrients, especially calories and proteins, which is essential to reduce the incidence of hospital malnutrition and improve the proper immune response and muscle loss, leading to proteolysis (protein degradation by enzymatic hydrolysis), enabling morbidity and mortality reduction. In this way, the nutritional strategy chosen can directly impact the patient's quality of life and often be decisive in the treatment of the disease related to hospitalization [2] [4] [5] [6].

Some of the main objectives of ENT are to prevent nutritional deterioration in patients, corroborate clinical results, and support adjuvant therapies [7]. Furthermore, in some cases, the early and adequate detection of malnutrition in hospitalized patients, particularly in intensive care units (ICU), plays a fundamental role in patient management. Early ENT is one of the most important approaches for optimal nutritional support in ICU patients [8] [9], especially when patients have one or more of the following clinical conditions: pre-existing severe malnutrition or oral intake of less than 50% of energy and/or protein requirements, as well as when the patient does not present stable conditions [10]; uses of mechanical ventilation [11]; or specific cases of surgical or medical treatment [7]. After evaluating the patient, the individualized nutritional prescription is a fundamental step in starting the ideal treatment and must be accompanied and monitored daily and readjusted according to the clinical evolution [9] [12].

The literature recommended that early and adequate ENT present satisfactory results in the clinical condition of patients, resulting in a reduction in the infection rate, hospital stay, and health costs [9] [13] [14] [15] [16]. The advantages of early and adequate enteral nutrition were confirmed by Lu *et al.* [17], who evaluated early enteral nutrition in patients receiving extracorporeal membrane oxygenation. The authors found that there was a significant reduction in hospital mortality of patients when compared to patients with delayed enteral nutrition, with 52.8% of patients surviving on early nutrition versus only 20.7% on delayed nutrition. Furthermore, intolerance to enteral nutrition was 36.1% for early administration and 82.6% for delayed administration.

Nutritional monitoring in critically ill patients aims to ensure that adequate nutritional support is chosen and provided as planned and prescribed, ensure that estimated energy and protein needs are met, avoid or detect any possible complications early, and assess the response to feeding to detect specific electrolyte or micronutrient deficiencies in patients at risk due to special losses (e.g., drains, renal replacement therapy) or pathologies (e.g., major burns) [18]. Given the variability and unforeseen events that occur in the intensive care unit (ICU) during the follow-up of patients using ENT [19], this study aimed to evaluate the delivered volume, calories, and proteins and compare the total delivered volume with that prescribed for ICU patients using ENT exclusively for 12 months.

2. Material and Methods

2.1. Ethical Guidelines

The project was approved by the Research Ethics Committee of Goiano Instituto Federal Institute (protocol no. 4, 944, 240). The research protocol was based on the provisions of national and international ethical standards for human research following the Declaration of Helsinki and Resolution 466/2012 of the National Health Council.

2.2. Study Design

This was a quantitative, retrospective, descriptive, observational study of adult patients using ENT exclusively and hospitalized in the ICU of a philanthropic hospital (Rio Verde City, Goiás, Brazil). A retrospective observational design was used to evaluate the frequency with which enteral nutrition exposures occur in different groups of patients and whether the system adopted by the hospital is positive, meeting the nutritional needs of patients.

Data were collected using a secondary system with complete medical records. In the intentional non-probabilistic sample, patients of both sexes, adults (over 18 years old) admitted to the ICU with different diseases and nutritional needs, exclusively submitted to ENT, and were hospitalized in the ICU with a stay longer than 24 hours between January and December 2021 were included. All patients who met the inclusion criteria defined in the work were included in the research. The information collected included the volume, calories, and proteins prescribed and administered, as well as reasons for suspending or interrupting ENT.

The database exclusion criteria were records of patients younger than 18 years of age; those who received concomitant oral and/or parenteral diet; those who did not have their fundamental anthropometric measurements taken; those who died or were transferred within 24 hours; those who did not have enough information about volume, calories, and protein prescribed and administered for at least one week of ICU stay; and those who received mixed nutritional therapy (enteral + parenteral).

Adult patients were classified according to BMI using the WHO classification (1998) as lean or underweight (<18.5), eutrophic (18.5 - 24.9 kg/m^2), overweight or pre-obese (25.0 - 29.9 kg/m^2), grade I obesity (30.0 - 34.9 kg/m^2), grade II obesity (35.0 - 39.9 kg/m^2), and severe or grade III obesity (≥40.0 kg/m^2). Based on BMI, elderly patients (>60 years) were classified as underweight (<22 kg/m^2), eutrophic (22 - 27 kg/m^2), or overweight (>27 kg/m^2) [20]. These results were classified in the number of patients who fit each nutritional classification by the total number of patients × 100 to obtain the value in percentage.

2.3. General Principles of Nutrition

All patients received commercially available standardized enteral nutrition formulas. The products comprising polymeric formulas were routinely prescribed at this hospital, which contained 1 kcal/mL of energy (16% proteins, 35% lipids, and 49% carbohydrates).

The start of enteral feeding was encouraged no later than 24 h after patient admission using standard isomolar polymeric commercial formulas, starting with 50% of previously prescribed nutritional requirements and progressing as tolerated by the patient while monitoring gastrointestinal intolerance, hemodynamic instability, and metabolic disturbances [21].

The caloric target for each participant was estimated based on the ideal body weight as 30 kcal/kg of the ideal body weight for men and 25 kcal/kg of the ideal body weight for women, and the protein requirements as 1.2 g/kg of ideal body weight on the day 0.

The water balance was calculated by the doctor, and rigorously performed in all patients admitted to the ICU, through the sum of infused and eliminated liquids performed at the end of each 12-hour shift by nursing technicians. The calculations and the total outcome of the water balance are performed by the nurse every 24 hours.

Hospital practices that increase patient ill exposure such as indirect calorimetry to calculate daily requirements were avoided due to the patient's health conditions.

The enteral diet management approach was performed continuously through a closed system with an infusion pump, using industrialized formulas to meet the daily energy and protein requirements based on the parameters established for individualized diagnosis by the nutritional team. All evaluations in the study took place after the patients' hospitalization (considered the second day of ingestion) and were followed up daily until the patients were discharged (last day of the experiment, suspension of exclusive enteral therapy, discharge from the ICU, or death). Volume adequacy was determined by comparing the volume of the enteral diet prescribed and administered in the last 24 hours, based on Equation (1).

$$\text{Infused volume adequacy}(\%) = \frac{\text{infused volume}}{\text{prescribed volume}} \times 100 \quad (1)$$

2.4. Nutritional Support Follow-Up

Information on the date of ICU admission, disease type (which was divided into the main reason for admission to the ICU and secondary reasons for admission), age, sex, knee height (cm), recumbent height (cm), arm circumference (cm), weight (kg) on the first day of care and every 10 days (weight was obtained using bed scales available at all ICU beds), calculated body mass index (BMI), volume (mL), calories and protein (required, prescribed, and administered) of the enteral formula, start date and duration of ENT, and complications of patient hospitalization were all collected through the Conect System and Nursing Care Systematization.

The main reason for admission to the ICU and secondary reasons for admissions were used to verify the frequency of diseases that caused (primary or secondary) the reasons for hospitalization and expressed in percentage of frequency.

2.5. Statistical Analysis

The results were treated by analysis of variance (ANOVA) and t-Student test, using the Statistica 5.0 software (Statsoft, USA). Statistical analysis was performed considering a statistical significance (a) set at $p < 0.05$. Data were expressed as mean ± standard deviation.

3. Results and Discussion

From January to December 2021, 103 patients were admitted to the ICU and referred to the emergency room, operating room, or hospital ward, presenting with a diagnosis of malnutrition due to a previous severe loss of appetite. A total of 60.1% of the patients were excluded from the present study because they stayed less than 24 hours in the ICU (17.47%) and used an oral diet (20.38%), special diet (16.50%), or parenteral diet (5.82%). The study sample consisted of 41 hospitalized patients (26 patients aged > 60 years) in an intensive care unit using exclusive enteral nutritional therapy. **Table 1** presents the mean weight, age, and days of hospitalization in relation to the sex of patients evaluated in the present study.

The sample studied (range from 24 to 90 years) consisted mostly of male patients (63.4%) with an average age of 66.3 years, while 36.6% of the sample were women with a mean age of 64 years. The number of hospitalization days was 19 and 21 for men and women, respectively.

Figure 1(a) shows the primary reason for ICU admission reported in the

Table 1. Mean of age, weight, and days of hospitalization in relation to the gender of the patients from the intensive care unit (n = 41).

Variable	Male	Female	General
Sample (%)	63.4	36.6	-
Age (years)	66.3 ± 15.6	64.0 ± 15.2	65.6
Knee height (cm)	49.63 ± 2.50	45.56 ± 1.97	48.05 ± 3.04
Arm circumference (cm)	28.88 ± 5.64	28.50 ± 6.58	28.73 ± 5.91
Weight (kg)	62.5 ± 16.5	62.7 ± 16.4	62.6
Days of hospitalization	18.8 ± 12.4	20.2 ± 12.1	9.4

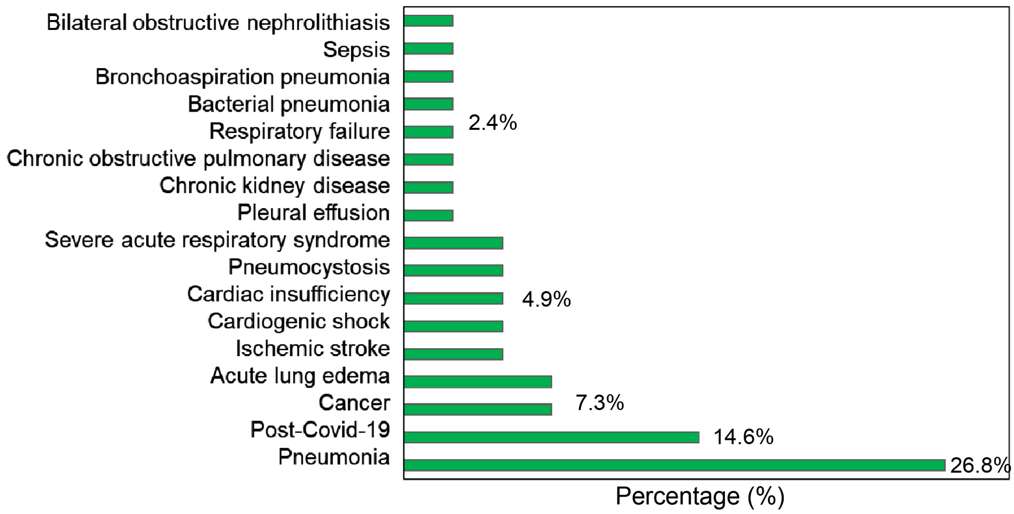
Mean ± standard deviation.

patient chart, whereas **Figure 1(b)** shows secondary reasons for ICU admission reported in the patient chart. This was because some patients demonstrated the occurrence of more than one pathology according to the accessed medical records. The main pathologies reported in ICU patients were pneumonia (broncho-aspiration, nosocomial, associated with mechanical ventilation, unspecified bacteria, and community), arterial hypertension, and diabetes mellitus, problems associated with post-covid infection, cancer, and kidney disease.

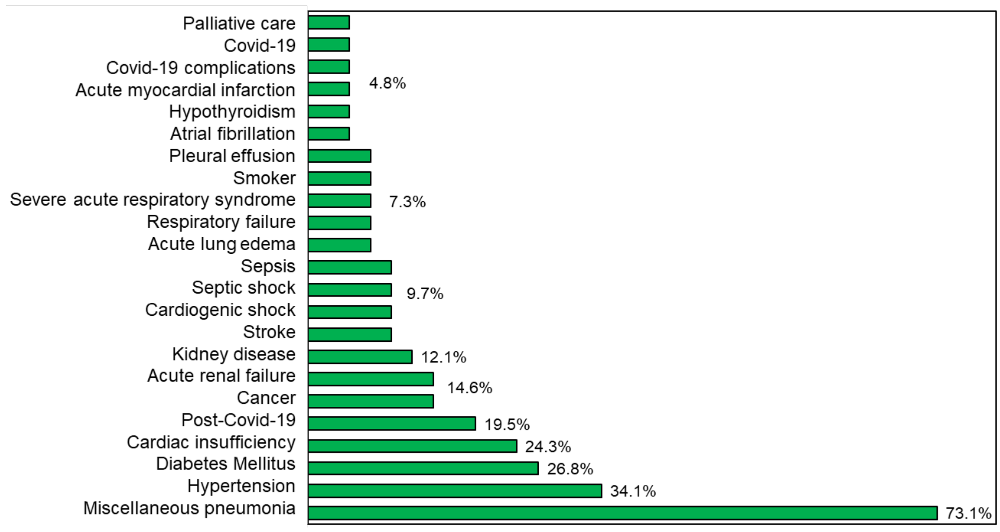
Patients received three types of discharge: transfer to another health unit to continue medical treatment (24.3%), discharge to the ward due to improvement of the clinical condition but to continue medical treatment (19.5%), or death (56.2%) by the occurrence of septic shock (19.0%), renal failure (12.1%), cardiogenic shock (9.7%), respiratory failure and respiratory cardiac arrest (4.8%), and severe acute respiratory syndrome and acute hemorrhage (2.4%).

The percentage of ICU patients who died in the present study (56.2%) was higher than what had been reported by Saand *et al.* [22] who evaluated patients hospitalized for COVID-19 (n = 495) and found that approximately 24% died. However, it is necessary to point out that in the present study, 63% of the evaluated patients were elderly. Elderly individuals are more susceptible to hospitalization or avoidable complications, especially in cases of pre-existing chronic diseases [23]. Among the vulnerabilities of individuals over 60 years of age, the presence of diseases such as chronic lung, liver, or kidney diseases, diabetes mellitus, and obesity is common, in addition to the fact that they have a depressed immune system and a high risk of acquiring infection [24]. The ideal approach in these cases is to strengthen primary health to avoid hospitalizations or complications and promote healthy aging using preventive medicine [25].

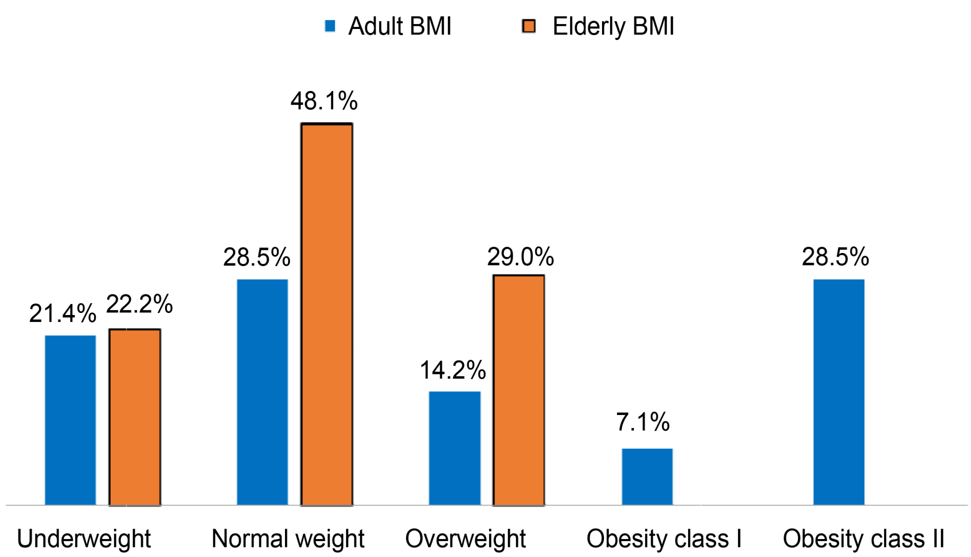
Figure 1(c) and **Figure 1(d)** present the classification of the nutritional status of the ICU patients. Among adult patients, 28.5% were classified as normal weight and obesity class II, 21.4% were underweight, 14.2% were overweight, and 7.1% were in obesity class I, whereas among elderly patients, 48.1% were classified as normal weight, 29.6% were overweight, and 22.2% were underweight.


Bilateral obstructive nephrolithiasis
Sepsis
Bronchoaspiration pneumonia
Bacterial pneumonia
Respiratory failure
Chronic obstructive pulmonary disease
Chronic kidney disease
Pleural effusion
Severe acute respiratory syndrome
Pneumocystosis
Cardiac insufficiency
Cardiogenic shock
Ischemic stroke
Acute lung edema
Cancer
Post-Covid-19
Pneumonia
2.4%
4.9%
7.3%
14.6%
26.8%
Percentage (%)

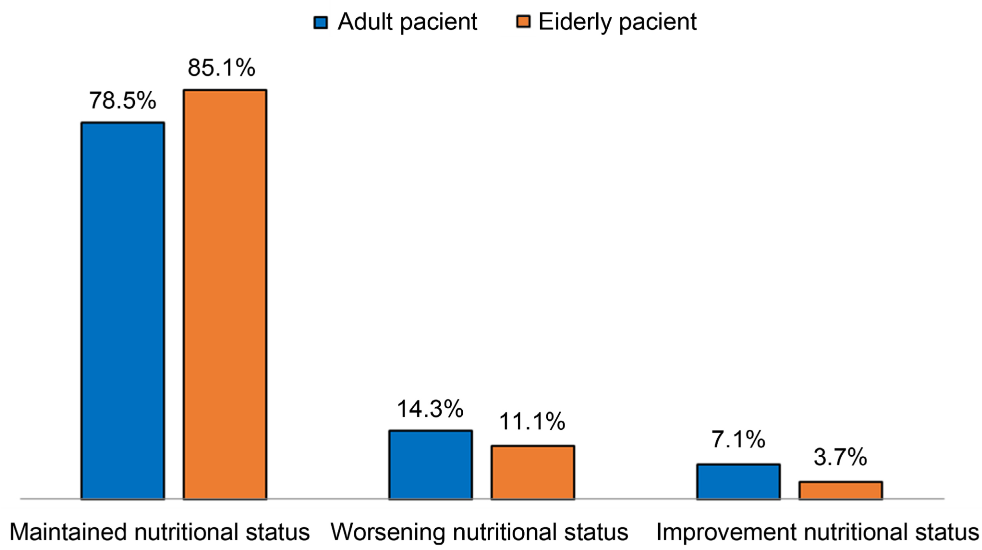
(a)


Palliative care
Covid-19
Covid-19 complications
Acute myocardial infarction
Hypothyroidism
Atrial fibrillation
Pleural effusion
Smoker
Severe acute respiratory syndrome
Respiratory failure
Acute lung edema
Sepsis
Septic shock
Cardiogenic shock
Stroke
Kidney disease
Acute renal failure
Cancer
Post-Covid-19
Cardiac insufficiency
Diabetes Mellitus
Hypertension
Miscellaneous pneumonia
4.8%
7.3%
9.7%
12.1%
14.6%
19.5%
24.3%
26.8%
34.1%
73.1%

(b)


Adult BMI
Elderly BMI
21.4%
22.2%
28.5%
48.1%
14.2%
29.0%
7.1%
28.5%
Underweight
Normal weight
Overweight
Obesity class I
Obesity class II

(c)



(d)

Figure 1. (a) Primary reason for ICU admission evaluated in the presented study, (b) Secondary reasons for ICU admission evaluated in the presented study, (c) classification of the nutritional status of the patients from intensive care unit, and (d) comparison of the nutritional status of the patients from intensive care unit at the time of administration and hospital discharge (n = 41).

Although the prevalence of malnutrition in ICU patients can reach up to 30% - 80% [26] [27] [28], in the present study, 21.4% and 22.1 % of the adult and elderly patients, respectively, were evaluated as underweight. Even so, malnutrition in critically ill patients in general, has been a concern for the team, as it is associated with a higher mortality rate than the length of stay in the ICU, especially in elderly patients with pre-existing comorbidities (diabetes, hypertension, obesity, etc.) [29].

In addition, in underweight ICU patients, the caloric and protein targets of the prescribed diet, whether orally or enterally, are difficult to achieve, consequently increasing the nutritional, disease, and inflammation risks and making recovery difficult [27].

In the present study, almost 30% and 50% of elderly and adult patients, respectively (**Figure 1(c)**), were classified as overweight/obese, this result was almost twice as high as the worldwide prevalence of overweight/obesity reported in the literature (approximately 20%) [30]. However, the values demonstrated in the present study were lower than those reported by Osuna-Padillha *et al.* [10] (approximately 87%) for COVID-19 critically ill patients. Obesity has been associated with chronic diseases such as type 2 diabetes, hypertension, dyslipidemia, liver and kidney diseases, sleep apnea, and hypoventilation syndrome [31], and some of these diseases were reported as pathologies in the medical records (**Figure 1(a)** and **Figure 1(b)**). The literature has discussed that the occurrence of overweight and obesity in ICU patients is a paradox: while it may have a "protective" effect compared to patients with normal or underweight BMI, it may also increase the risk of respiratory and cardiovascular complications, and infections, in addition to being associated with negative attitudes related to the social stigma of obesity and the lack of infrastructure and logistics in hospitals to care for patients living with overweight/obesity [30] [31] [32] [33].

Figure 1(d) shows a comparison of the nutritional status of patients in the intensive care unit at the time of administration and hospital discharge. Most ICU patients maintained their nutritional status at hospital discharge as compared to hospital admission (78.5% and 85.1% for adult and elderly patients, respectively).

On the other hand, 14.3% and 11.1% of adult and elderly patients, respectively, had a worse nutritional status at hospital discharge than those at hospital admission. The problem with this worsening nutritional status is that, although it is a simplistic assessment of decreased body weight in ICU patients, it is usually associated with accelerated loss of muscle mass regardless of the nutritional status of hospitalized patients, especially those who are bedridden [34]. Therefore, nutritional intervention plays an important role in muscle catabolism by reducing or reversing the loss of muscle mass or maintaining the nutritional status of the patient, reducing pressure injuries, and improving signs of nutrient deficiency [35].

Table 2 presents the prescribed and administered volumes of ENT for the ICU patients evaluated in the present study. The maximum hospitalization duration of ICU patients was 5 weeks, and the participants of this study were allocated into groups according to hospitalization duration, with group I staying from 1 to 7 days, group II from 8 to 14 days, group III from 15 to 21 days, group IV from 22 to 28 days, and group V from 29 to 36 days.

Reports from the literature indicate that ICU patients using ENT end up receiving a smaller volume of diet and, consequently lower caloric and protein intake than desirable/prescribed [36]. In the first four weeks of hospitalization, there was a significant difference between the volume of ENT prescribed and infused, as well as calories and proteins (**Table 2**). There was no significant difference between what was prescribed and what was administered only in the last week of hospitalization (Group V). The average ENT-administered volume

Table 2. Mean prescribed and administered volume of enteral diet in patients from intensive care unit.

Group	Hospitalization days	Patients	Age mean (years)	BMI mean	Enteral diet volume (mL)		Administrated volume (%)	Enteral diet calories (kcal)		Administrated calorias (%)	Enteral diet proteins (g)		Administrated proteins (%)
					Prescribed	Administrated		Prescribed	Administrated		Prescribed	Administrated	
I	1-7	41	65.4	25.1	683.2^a ± 203.0	597.4^b ± 317.0	87.44	1078.8^a ± 304.5	974.5^b ± 475.5	90.33	51.6^a ± 18.9	46.7^b ± 25.3	90.50
II	8-14	20	60.4	23.7	820.8^a ± 204.4	796.1^b ± 319.5	96.99	1086.5^a ± 306.9	980.8^b ± 479.0	90.27	52.0^a ± 19.0	47.0^b ± 25.5	90.38
III	15-21	6	56.5	22.7	724.2^a ± 207.9	648.0^b ± 309.5	89.48	1086.8^a ± 311.9	972.7^b ± 464.3	89.50	51.8^a ± 19.4	46.4^b ± 24.8	89.58
IV	22-28	2	75.5	20.7	733.3^a ± 212.7	665.1^b ± 315.5	90.70	1097.8^a ± 319.1	977.7^b ± 473.4	89.06	52.1^a ± 19.9	46.6^b ± 25.2	89.44
V	29-36	1	67	24.7	725.0^a ± 108.9	708.6^a ± 254.7	97.74	1087.5^a ± 163.5	1062.9^a ± 382.1	97.74	55.8^a ± 8.3	54.6^a ± 19.6	97.85
General mean		**41**	**65.4**	**25.1**	**719.2^a**	**653.0^b**	**90.80**	**1087.48**	**993.72**	**91.38**	**52.66**	**48.26**	**91.64**

Mean ± standard deviation (SD) Different letters indicate statistical differences according to Student's t-test ($P < 0.05$).

increased from 87% to 91% over 36 days in ICU patients, while the difference between the ENT-prescribed and -infused volumes was 66 mL, with a statistical difference between them. These values are close to those reported by Heyland *et al*. [37] who proposed a protocol for enteral nutrition based on daily volume goals, as observed in the hospital evaluated in the present study.

In the first week of hospitalization, it is very common to not reach the average prescribed dose for ENT, regardless of the patient, hospital, or technical team. Furthermore, according to Preiser *et al*. [38] the prescription should be calculated to deliver the full amount of calories only 4 - 7 days after admission, especially to avoid gastrointestinal intolerance, such as vomiting, increased gastric residual volume, sudden abdominal pain, distension, gastrointestinal paralysis, or increased abdominal pressure.

In the present study, regardless of the evaluated group (with regards to the length of stay in the ICU), the percentage of enteral diet administered was always greater than 87%. This value was close to that reported by Lakenman *et al*. [39] in patients (n = 150, mean age = 64 years, and BMI from 28 to 30 kg/m^2) who received protein-rich polymeric formulas (when macronutrients were present in their intact form, mainly proteins). These authors found that 98% of the prescribed volume was administered on the 4th day and 96% of the prescribed volume was administered on the 10th to the 14th day).

Rives-Lange, Zimmer, Merazka, Carette, Martins-Bexinga, Hauw-Berlemont, Guerot, Jannot, Diehl and Czernichow [26] reported that 79% of patients have prolonged malnutrition due to hospitalization stay in the ICU. In the present study, approximately 22% of the patients were underweight on admission and ~81% of them maintained their nutritional status, while ~12% had a worsening nutritional status, which could be related to the question of inadequate intake of nutrients combined with the increase in body metabolism caused by the diseases that led the patient to hospitalization is one of the main nutritional risk factors [40].

In the present study, although the volume of the diet was the lowest compared to the other groups, ~90% of the calories were administered to the group I, following the recommendations of the American Society for Enteral and Parenteral Nutrition (ASPEN), which indicates that if the digestive tract is viable and the patient hemodynamically stable, enteral nutrition should reach 50% to 65% of energy needs within 48 to 72 h of hospitalization [1]. Hartl *et al*. [41] found that in the first 96 hours, an amount less than 30% of the caloric goal was provided, and the administration remained inadequate until the 11th day of hospitalization, increasing the risk of death in patients admitted to the ICU in the first 30 days.

The significant differences observed between the volume, caloric value, and protein content prescribed and administered in groups I, II, III, and IV (from 1 to 28 days) found in the present study (**Table 2**) may have been caused by numerous factors. In the present study, upon finding a percentage of administration of the prescribed enteral diet <100%, we resorted to medical records to better understand this issue. However, the medical records demonstrated a recording failure by the care team who did not correctly report the interruption of supply of the diet or incorrectly reported the volume infused (found in 57.1% of the medical records) (**Figure 2(a)**).

In addition, not administering the prescribed enteral diet was justified by health professionals because of the need to interrupt, allowing them to perform procedures such as computed tomography, tracheostomy, radiography, and tube change (25.6%); gastrointestinal intercurrences such as the occurrence of diarrhea (9%); removal of tube by the patient or by the team due to carelessness (6%); and suspensions by medical order in case of therapeutic limitation (0.8%).

To reduce the occurrence of this issue of non-registration of the complications of non-administration of the prescribed enteral diet, it is very important to carry out training with a multidisciplinary team as the nutritional risk results in a longer hospitalization time. It is due to the prolongation of the symptoms and

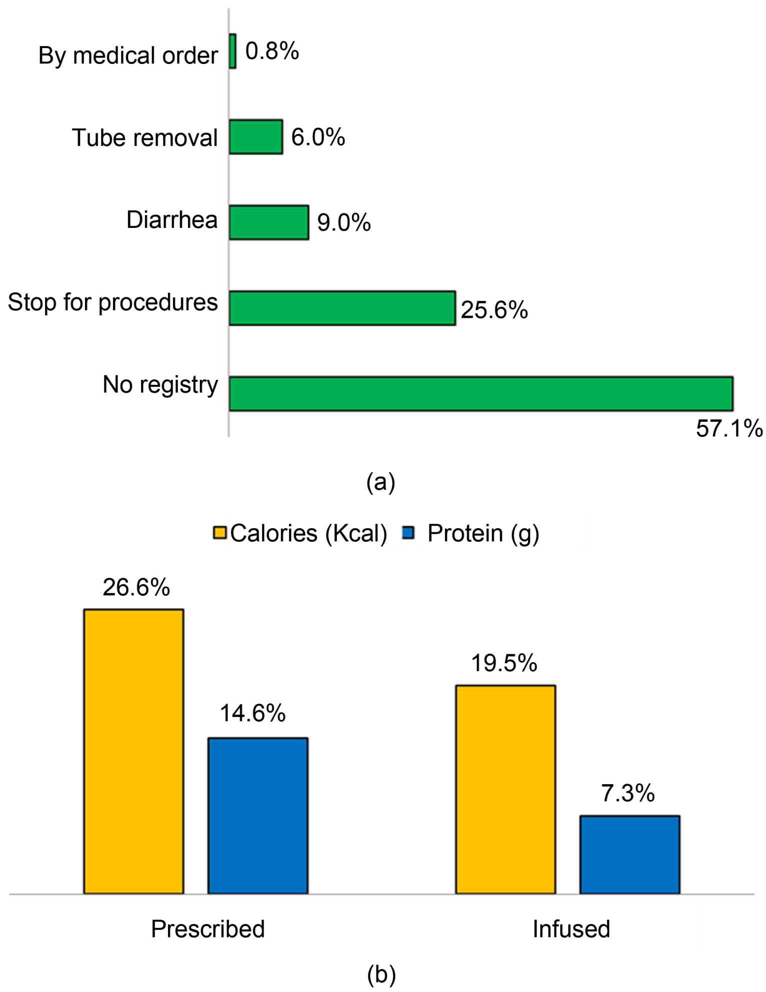


Figure 2. (a) Reasons for not administering or discontinuing the administration of enteral diets for ICU patients and (b) Percentage of patients who achieved values above 80% of prescribed and infused protein caloric needs.

consequences related to the disease that led to hospitalization, as well as a greater occurrence of muscle atrophy due to age and physical inactivity, since in most cases the patients are bedridden [42].

Although the number of unrecorded occurrences was high in the present study, when evaluating the reasons for not administering or for discontinuing the ENT that was performed continuously in patients, it was possible to observe a low percentage of feeding intolerance (9% of diarrhea). Ma *et al.* [43] concluded in their review that although intermittent feeding delivers more calories to the ill patient, it ends up being responsible for a higher percentage of intercurrences regarding feeding intolerance such as incidence of high gastric volume and aspiration. On the other hand, continuous ENT has been associated with an incidence of vomiting and constipation rate [43] [44]

Figure 2(b) demonstrated that only 26.6% of ICU patients were planned to receive ENT resulting in acaloric value above 80% of the recommended daily value and only 19.5% of ICU patients received, which was lower than what had been reported by Osuna-Padilha *et al.* [10] who reported from 90% of ICU patients receiving more than 80% of the energy and protein requirements. A retrospective study evaluated the electronic medical records of patients admitted from September 2016 to April 2017 in a cancer hospital in Juiz de Fora city (Minas Gerais, Brazil). The results showed that 95.8% of the patients used a polymeric, normoproteic, and normocaloric enteral diet with fibers (1.23 kcal/mL), with infusion via nasoenteric tube, jejunostomy, and nasogastric tube. The authors concluded that patients did not receive the programmed volume, calories, and proteins, with a significant difference being observed between the prescribed and infused volumes [45].

Although the difference between prescribed/delivered enteral diets in the present study did not seem significant, our study demonstrated a high mortality rate (56.2% of patients). Yeh *et al.* [46] indicated that an inadequate supply of macronutrients is associated with lower hospital discharge rates, which should be further investigated in the hospitals studied.

In general, when the ENT fails to deliver the necessary nutrients to the patient, the multidisciplinary team decides to initiate parenteral nutrition (PN). As in our work, we wanted to evaluate only ENT alone, patients who received PN were excluded from the research (5.82%). However, Alsharif *et al.* [47] demonstrated in their systematic review that no significant difference was demonstrated for the combined use of ENT and PN in the length of hospital stay, hospital mortality, length of ICU stay, and duration of mechanical ventilation, but that it may contribute to decreasing nosocomial infections and ICU mortality, as well as to offering energy and protein needs with no negative effects on other clinical outcomes.

One of the limitations of our work is that although we obtained data from a hospital in a location that, to our knowledge, has not yet been reported in the literature using a good period (retrospective of one year), the hospital is not dedicated to receiving patients of a specific specialty. Thus, our sampling was very random, which, although it may demonstrate more of the real condition, made it difficult to conclude the data obtained.

4. Conclusions

After evaluating the results, it can be stated that the highest prevalence of seriously ill patients was found to be elderly men, but the highest average number of days of hospitalization was found to be female patients (20.2%). As for the total calories and proteins infused compared to the patient's needs, there was no significant difference in the last week (from 29 to 36 days), demonstrating satisfactory results.

The assistance team's dietary procedures need to be improved, to reduce the recurrences that the study's findings imply there may be and to achieve an adequate level of infused diet.

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Institutional Review Board Statement

The study was conducted following the Declaration of Helsinki, and approved by the Ethics Committee) of Goiano Federal Institute (protocol code 4,944,240 of August 31, 2021), and data collection was carried out only after this approval. In this project, it was proposed to waive patient consent to avoid embarrassment to former patients and their guardians (as the death rate is high) due to subsequent contact between the hospital and them. In this way, data from unidentified patients was obtained through contact with the hospital.

Conflicts of Interest

The authors declare no conflict of interest.

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