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Nutritional support and outcomes in critically ill patients after one week in the intensive care unit

Aporte nutricional e desfechos em pacientes críticos no final da primeira semana na unidade de terapia intensiva

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ABSTRACT

Objective: This study evaluated the relationship between nutritional intake and protein and caloric requirements and observed clinical outcomes on the 7th day of intensive care unit stay.

Methods: This was a retrospective cohort study of 126 patients who were admitted to the intensive care unit for ≥7 days. The patients were categorized according to the adequacy of energy and protein intake in relation to requirements (a ≥60% Adequate Intake Group and a <60% Inadequate Intake Group). The length of stay, ventilator free time and mortality in the intensive care unit and hospital were evaluated.

Results: Enteral nutrition was used in 95.6% of the 126 included patients, and nutrition was initiated 41 hours after admission to the intensive care unit. The adequacy of intake was 84% for energy and 72.5% for protein. No differences in the length of stay [16 (11-23) *versus* 15 (11-21) days, p=0.862], ventilator free time [2 (0-7) *versus* 3 (0-6) days, p=0.985] or mortality in the intensive care unit [12 (41.4%) *versus* 38 (39.1%), p=0.831] and hospital [15 (51.7%) *versus* 44 (45.4%), p=0.348] were observed between the adequate and inadequate energy intake groups, respectively. Similar results in protein intake and the length of hospital stay [15 (12-21) *versus* 15 (11-21) days, p=0.996], ventilator free time [2 (0-7) *versus* 3 (0-6) days, p=0.846], and mortality in the intensive care unit [15 (28.3%) *versus* 35 (47.9%), p=0.536)] and hospital [18 (52.9%) *versus* 41 (44.6%), p=0.262] were observed between groups.

Conclusion: The results did not establish that energy and protein intakes of greater or less than 60% of nutritional requirements were reliable dividers of clinical outcomes.

Keywords: Energy requirement; Nutrition therapy; Mortality; Respiration, artificial; Length of stay; Intensive care units

INTRODUCTION

Hospitalization is an independent risk factor for malnutrition.(1) In a Brazilian survey, the prevalence of hospital malnutrition was 48.1%, and 12% of these patients present a severe form of the condition.(2) Malnutrition in critically ill patients is associated with an increased risk of morbidity and prolonged hospitalization.(3)

As critically ill patients may be partially or totally unable to ingest and/or digest food orally, enteral feedings becomes an important therapeutic modality.(4)

The goal of nutrition therapy (NT) in critically ill patients include providing of adequate nutrition support, prevention of nutritional deficiencies, mitigating loss of lean body mass, decreasing complications and improving clinical outcomes.[5] Critically ill patients receive a lower volume of enteral nutrition (EN) and do not obtain the prescribed target energy.[6-9] McClave et al.[7] demonstrated that patients received an average daily volume of 51.6% of prescribed EN, but only 14% of patients achieved 90% or more of the daily amount prescribed at 72 hours after the initiation of EN infusion. However, Teixeira et al.[8] demonstrated a 74% adequacy of the volume of nutrition administered in relation to prescription in an intensive care unit (ICU) in Brazil. A similar adequacy level (76%) was observed in 193 patients in five ICUs in England.[6]

Negative energy balance in the first week in the ICU is a strong predictor of clinical outcomes, and a delay in starting of NT may expose patients to energy deficits that will likely remain uncompensated during the ICU stay.[10]

Tsai et al.[9] recently evaluated the associations between amounts of energy and protein intake during the first week of hospitalization in critically ill patients in a clinical ICU and outcomes in patients who survived for at least 7 days. These authors observed that patients who received <60% of the prescribed calories exhibited a higher risk of ICU mortality compared to patients who received ≥60% (OR=2.43, p=0.020) after adjustment for confounding factors.

In contrast, a randomized clinical trial conducted by Arabi et al.[11] evaluated the effect of permissive underfeeding (60 to 70%) *versus* adequate intake (90 to 100%) and intensive insulin therapy *versus* conventional insulin therapy on clinical outcomes in critically ill patients. The group that received a mean 59±16.1% of their energy requirements exhibited lower hospital mortality rates compared to the group who received an average of 71.4±22.8% of their requirement. Importantly, nutritional support was initiated within the first 24 hours.

The optimal amount of energy and protein that critically ill patients should receive remains a controversial issue because previous studies which evaluated the ideal caloric intake in critically ill patients have yielded contradictory results. Therefore, this study evaluated the association between energy and protein intake on the 7th day of intensive care unit stay and the ventilator free time and ICU and hospital mortality in the Hospital de Clínicas de Porto Alegre (HCPA).

METHODS

This study was a retrospective cohort study that was performed in the ICU HCPA from July to October 2011. All patients who were admitted to the ICU during this period were consecutively assessed for inclusion criteria. Patients older than 18 years who were hospitalized in the ICU for at least 7 days were included. Patients who received EN or parenteral nutrition (TPN) prior to ICU admission, transferred from other institutions or progressed to oral feeding concomitant with EN or TPN during the first 7 days of hospitalization were excluded. The HCPA Research Ethics Committee approved this project (registration number 110.243). Participant signatures for informed consent were not required because the data analysis was conducted after patient discharge. The authors agreed to maintain the anonymity of patients and professionals in the use of data according to guidelines and rules for research involving humans.

Demographic, clinical and nutritional characteristics were collected from patient records by a standardized instrument. A trained nutritionist collected all samples. Age, gender, weight, height, ICU admission diagnosis, Acute Physiology and Chronic Health Evaluation (APACHE II) score, GLASGOW coma scale and Sequential Organ Failure Assessment (SOFA) score related to the patient's admission were collected. Body mass index (BMI) [kg/m^2 (weight (kg) / height (m)^2] was calculated based on data that was obtained at admission and classified according to age of the patient.[12,13] Hospital length of stay, length of mechanical ventilation and ventilator free time were calculated using the referenced dates in the chart. ICU and hospital mortality were recorded for deaths from all causes during hospitalization.

Energy and protein requirements were estimated individually. Malnourished adults (BMI<18.5 kg/m^2) and elderly malnourished (BMI<22 kg/m^2) or adults at nutritional risk (BMI 18.5 to 20.5 kg/m^2)[14] should receive 30 kcal/kg per day. Eutrophic adults (BMI≥20.5 and <30 kg/m^2) and elderly eutrophic adults (BMI≥22 kg/m^2) should receive 25 kcal/kg per day. The target provision of protein was 1.5 g/kg per day. A specific recommendation was followed for obese patients (BMI≥30 kg/m^2).[15] Therefore, energy intake was estimated at 11-14 kcal/kg of current weight or 22 to 25 kcal/kg of ideal body weight. Protein intake was estimated using ideal weight: patients with a BMI between 30-40 kg/m^2 should receive ≥2 g/kg protein, and patients with BMI ≥40 kg/m^2 should receive ≥2.5 g protein per kg of ideal body weight.[15]

The daily energy intake included calories from EN, TPN, glucose solutions and propofol. A calorie and protein conversion was performed based on the volume administered and according to the composition of each substance. The daily protein intake was calculated using the volume of EN and TPN administered. None of the EN and TPN formulas contained immunonutrients.

Nutritional data were analyzed on the 7th day of hospitalization considering that patients should have reached their nutritional requirements during this period. Analysis at this time point also facilitates comparisons with previous studies with contradictory results for administered energy intake.[9]

Patients were grouped according to the adequacy of caloric and protein intake; the concomitant adequacy of the two variables was not necessary. Patients who received ≥60% of their caloric or protein requirements were grouped into the Adequate Intake Group (AIG), and patients who received <60% of their caloric or protein requirements comprised the Inadequate Intake Group (IIG). This cutoff point was based on the goal of nutritional support recommended by ASPEN for critically ill patients during the first week of ICU stay[15] and the similarity to Tsai et al.[9] to facilitate comparisons.

A sample size calculation was performed considering a 26% difference in mortality between patients who received <60% of energy requirements and patients who received ≥60%.[9] Considering a significance level of 5%, 80% power and 2 patients in the AIG compared to 1 patient in the IIG, a sample size requirement of 39 patients in the IIG and 79 patients in the AIG was calculated, for a total of 118 patients.

Parametric and nonparametric tests for independent samples were adopted to compare the analyzed characteristics, and the Kolmogorov-Smirnov test compared the distribution of variables.

The results are expressed as the means ± standard deviation (SD), medians (interquartile range) or numbers (%). Differences were considered statistically significant at p<0.05. Analyses were performed using the Statistical Package for the Social Sciences (SPSS), version 16.0 (SPSS, Inc., Chicago, IL) and Bioestat 5.0.[16]

RESULTS

A total of 126 patients were included in the study. The mean time for EN start was 41 hours (range 0 to 6 days). NT was started at ICU admission because the patient was admitted to the hospital directly into this unit or the patient was admitted to the unit after a determining event (e.g., surgery or unexpected clinical instability). Patients who received enteral NT prior to ICU admission were excluded. Early EN intake (within 48 hours of ICU admission) occurred in 66 (55%) patients. The adequacy of energy intake administered on the 7th day of hospitalization was 84% (range 62 to 102%) of the estimated energy requirement, and the adequacy of the protein requirement was 72.5±32%. A total of 120 (95.2%) patients received EN during the 7 days of hospitalization. Six (4.8%) patients received TPN, 115 (91.3%) patients received glucose solutions, and 19 (15.1%) patients received propofol.

The epidemiological and clinical characteristics of the included patients are described in table 1. Nutritional data according to the energy and protein intake on the 7th day of admission are described in table 2. No differences between the AIG and IIG groups for either calories and protein were observed for gender, age, BMI, APACHE II score, SOFA score and IMV use, which suggested that these groups were comparable.

Almost all patients who achieving >60% used EN. EN was initiated considerably earlier for patients in both caloric and protein AIG groups.

Table 1 - Epidemiological and clinical characteristics of patients according to group

Characteristics	Energy intake administered			Protein intake administered		
	IIG (N=29)	AIG (N=97)	p value	IIG (N=34)	AIG (N=92)	p value
Male Gender	15 (51.7)	55 (56.7)	0.636	31 (58.5)	39 (53.4)	0.591
Age (years)	60±11	59±18	0.745	61±12	59±19	0.487
BMI (kg/m²)	27.6±7.6	25.5±7.0	0.195	25.8±8.3	26.0±6.2	0.891
APACHE II	23±9	21±8	0.394	23±9	21±7	0.098
SOFA	7±3	7±4	0.800	7±3	7±4	0.704
IMV	28 (96.6)	95 (97.9)	0.547	33 (97.1)	90 (97.8)	0.614
Clinical	17 (18.3)	76 (81.7)	0.100	32 (34.4)	61 (65.6)	<0.001
Sugical	12 (36.4)	21 (63.6)		21 (63.6)*	12 (36.4)*	
Clinical			0.488			0.488
Respiratory	8 (8.6)	41 (44.1)		9 (9.7)	40 (43.0)	
Sepsis	4 (4.3)	21 (22.6)		5 (5.4)	20 (21.5)	
Neurological	2 (2.1)	7 (7.5)		2 (2.1)	7 (7.5)	
Cardiological	2 (2.1)	6 (6.4)		2 (2.1)	6 (6.4)	
Gastroenterological	1 (1.1)	1 (1.1)		1 (1.1)	1 (1.1)	
Surgical			0.096			0.006
Digestive surgery	1 (3.4)	3 (3.1)		1 (2.9)	3 (3.3)	
Neurological surgery	1 (3.4)	8 (8.2)		1 (2.9)	8 (8.7)	
Laparotomy	6 (20.7)	5 (5.2)		8 (23.5)*	3 (3.3)*	
Cardiac surgery	1 (3.4)	2 (2.1)		2 (5.9)	1 (1.1)	
Thoracic surgery	2 (6.9)	2 (2.1)		2 (5.9)	2 (2.2)	
Vascular/plastic surgery	1 (3.4)	1 (1)		1 (2.9)	1 (1.1)	

IIG - inadequate intake group (patients who received <60% of energy or protein requirements); AIG - Adequate Intake Group (patients who received ≥60% of energy or protein requirements), BMI - body mass index, APACHE II - *Acute Physiology and Chronic Health Evaluation II*, SOFA - *Sequential Organ Failure Assessment*, IMV - invasive mechanical ventilation. Results are expressed as the means ± standard deviation, medians (interquartile range) or number (%). The clinical and surgical groups and their subgroups were analyzed with a residue analysis at p<0.05. Significantly different groups are marked with an asterisk.

Table 2 - Nutritional data of patients according to group

Characteristics	Energy intake administered			Protein intake administered		
	IIG (N=29)	AIG (N=97)	p value	IIG (N=34)	AIG (N=92)	p value
Used EN	25 (86.2)	95 (97.9)	0.009*	47 (88.7)	73 (100.0)	0.003*
Days to EN initiation	4 (1.5-5)	1 (1-2)	<0.001**	3.5 (1.7-5)	1 (0-2)	<0.001**
Energy requirement (kcal/kg/day)	24.5±3,9	25.4±3,3	0.221***	24.6±3.8	25.4±3.3	0.220***
Energy administered (kcal/kg/day)	8.0 (0.7-16.0)	23.7 (9.5-39.5)	<0.001**	9.5 (0.7-24.1)	23.9 (9.5-39.5)	<0.001**
Protein requirement (g/kg/day)	1.6±0.2	1.6±0.2	0.768[1]	1.6±0.2	1.6±0.2	0.793***
Administered protein (g/kg/day)	0.3 (0.0-0.7)	1.4 (0.6 -2.1)	<0.001**	0.4 (0-1.0)	1.4 (0.9-2.1)	<0.001**

IIG - inadequate intake group (patients who received <60% of energy or protein requirements); AIG - Adequate Intake Group (patients who received ≥60% of energy or protein requirements), EN - enteral nutrition. Results are expressed as the means ± standard deviation, medians (interquartile range) or numbers (%) *Binomial test; **Mann-Whitney U test; ***chi-square or Fisher's exact test.

Clinical patients more frequently received ≥60% of protein intake for the estimated nutritional requirements compared to surgical patients. Surgical patients required 2 (1-4) days to start nutrition therapy compare to clinical patients (1-2) day (p=0.002). No differences in estimated caloric and protein requirements were observed between the AIG and IIG groups when these values were adjusted for calories per kg of weight and g of protein per kg of weight. In addition, no differences between groups were observed for calories and protein regarding length of stay, ventilator free time, ICU and hospital mortality (Table 3).

Table 3 - Relationship between total energy value and protein administration according to groups

Characteristics	Energy intake administered			Protein intake administered		
	IIG (N=29)	AIG (N=97)	p value	IIG (N=34)	AIG (N=92)	p value
Lenght hospital stay	16 (11-23)	15 (11-21)	0.862	15(12-21)	15(11-21)	0.996
Ventilator free time	2 (0-7)	3 (0-6)	0.985	2 (0-7)	3 (0-6)	0.846
ICU mortality	12 (41.4)	38 (39.1)	0.831	15 (28.3)	35 (47.9)	0.536
Hospital mortality	15 (51.7)	44 (45.4)	0.348	18 (52.9)	41 (44.6)	0.262

IIG - inadequate intake group (patients who received <60% of energy or proteins); AIG - Adequate Intake Group (patients who received ≥60% of energy or proteins); ICU - intensive care unit. Results are expressed as medians (interquartile range) or numbers (%).

DISCUSSION

No association was observed between energy and protein intake of more and less than 60% of estimated requirements on the 7th day of intensive care unit stay and the ventilator free time and ICU and hospital mortality.

EN was initiated within 24 to 48 hours of ICU admission. This result is consistent with the current recommendations for early NT.[15,17] Doig et al.[18] demonstrated that the initiation of NT within 24 hours significantly reduced mortality in a meta-analysis (OR=0.34, 95%CI=0.14-0.85). Early NT is supported by the association of a negative energy balance with worse outcomes[19] and an improvement of energy balance with earlier intake adjustments reduces extremes in energy balance.[20]

The adequacy of energy and protein administration in relation to requirements on the 7th day of hospitalization was 84% and 75.2%, respectively. This trend was similar to previous studies in Brazil,[8,21] and adequacy levels were superior to McClave et al.[7] Energy and protein intakes did not reach the defined amounts estimates for patients despite the similarities of adequacy in previous studies.

This study indicates a possible underutilization of TPN for the optimization of caloric and protein support in this group of patients, as the data for proportion of EN usage *versus* TPN usage was 95.2% *versus* 4.8%, and the percentage adequacy of energy and protein intakes were 84% and 75.2%, respectively, on the 7th day of hospitalization. Experts have suggested that the complementary administration of TPN to EN as a strategy to achieve energy targets and reduce deficits.[20] However, the recommendation of TPN between the 2nd and 10th day, when energy and protein intake does not reach the goal, is controversial due to the lack of high quality studies. The American Society for Parenteral and Enteral Nutrition (ASPEN) guidelines[15] propose the use of EN only, even when the energy intake does not achieve the goal; TPN is only recommended after the 7th day. The European Society for Clinical Nutrition and Metabolism (ESPEN)[17] guidelines propose complementary TPN only when EN is contraindicated or if EN is not tolerated by the 3rd day. Van der Berghe et al. evaluated early *versus* late TPN and suggested that TPN is beneficial from the 7th day,[22] which reinforces the ASPEN guidelines.[15] However, this study has been criticized due to the prevalence of well-nourished surgical patients and hyperalimentation in the early TPN group. Therefore, the low level of evidence (level C) presented by current guidelines may explain the differences in the literature. Combined EN and TPN was observed in approximately 70% of patients, but only 16.8% of patients received NT with EN alone.[23] This study reinforced the combined form of NT as an alternative for success in early NT, which avoids the delay in the adequate supply of calories that is associated with worse outcomes.[20]

Current guidelines[15,17] recommend the administration of nutritional support as close as possible to the patient's requirements to prevent nutritional deficiencies, reduce the loss of lean body mass, decrease complications and improve clinical outcomes. Several studies have demonstrated that critically ill patients receive nutritional support lower than their nutritional needs.[4-7] The nutritional status of patients is often compromised due to iatrogenic factors that are intrinsic to the acute phase of the disease, which act as barriers to the administration of NT.[24] The present study only assessed mortality in the ICU and hospital, but significant mortality is observed in critically ill patients after hospital discharge. Over 50% of 6-month mortality in patients with severe sepsis occurs after discharge from the ICU.[25] A large proportion of this mortality occurs indirectly as a result of catabolism, the loss of lean body mass, weakness and inability to ambulate, which are often observed in chronic critically ill patients.[26] A clear relationship between polyneuropathy as a complication of septic shock in critically ill patients and multiple organ and system dysfunction is observed, which prolongs ICU stay and a gradual reduction in the probability of survival.[27] These patients survive the acute phase of the disease and are discharged from the ICU, but the impact of polyneuropathy and nutritional depletion may limit the quality of life. The underfeeding of energy and protein may act cumulatively determining limitations in quality of life after discharge from the ICU but not directly impact patient mortality during the ICU stay, emerging a special group of patients known as the critically ill.[28]

On the other hand permissive caloric underfeeding with a guaranteed intake of adequate protein for the patient's requirements is associated with better outcomes.[11] These effects are attributed to a reduction in oxidative stress, inflammatory response and an improved insulin sensitivity.[29,30] Arabi et al.[11] demonstrated that hospital mortality from all causes at 28 days was lower in patients who were randomized to permissive caloric underfeeding compared to the target calorie intake group (30 *versus* 42.5%, p=0.04, RR=0.71, 95%CI=0.50-0.99). The target energy intake group reached only 71.4% of adequate energy intake in this study, not 90% to 100% as originally aimed. The authors would like to stress the difficulty of providing patients the estimated amount.

The EDEN study conducted by the National Heart, Lung and Blood Institute Acute Respiratory Distress Syndrome (ARDS) Clinical Trials Network (2012)[31] for the assessment of trophic enteral nutrition compared to target enteral nutrition in patients with acute lung injury demonstrated no protection ventilator free time, mortality at 60 days and infectious complications. The group that received target enteral nutrition exhibited higher gastrointestinal intolerance than the trophic enteral group. The ICU were this study was conducted lacked an NT protocol that defined measures for the management of complications during NT use, reductions in fasting for routine procedures, tests, extubation and physiotherapy and other reasons that are usually cited in the literature as causing dietary interruptions. The design and implementation of an NT protocol by multidisciplinary care teams that are directly involved in the care of critically ill patients could optimize the use of NT.[32] A multicenter comparison of ICUs that used protocols for NT administration *versus* units that did not, demonstrated that EN was administered earlier in ICUs with protocols and more patients exhibited higher nutritional adequacy from NT.[33] The benefits of NT protocols may be attributed to the promotion of patient feeding, which decreases inadvertent pauses from NT, organizes an early beginning of NT and reduces the barriers to NT delivery.[34]

The present study has some limitations. The total number of patients according to the sample calculation was reached, but the target number of patients in the IIG was not attained (29 studied patients of the 39 calculated). This limitation may be due to the existence of a routine that focuses on a progression to the estimated goal within 72 hours. The actual proportion between groups was 1 to 3.3 patients, and not 1 to 2 patients as used in the sample calculation. The simulation of a sample calculation using the actual proportions but maintaining a mortality difference of 26% revealed that the IIG and AIG should be composed of 32 and 101 patients, respectively, for a total of 133 patients. The shortfall in the IIG would be only three patients in this case. The power of the present study was 70.15% with a difference in expected mortality of 26%. The inclusion of patients in the IIG may not have materially altered the proportion of outcome between the groups. The average BMI was >25 kg/m². Patients with lower BMIs may be more susceptible to the impact of early *versus* late nutrition therapy and the adequacy of intake on clinical outcomes. The inclusion of patients after the 7th day of admission may have influenced the rate of adequate intakes for nutritional requirements because patients who stay in the ICU longer are more likely to achieve their requirements. The absence of post-hospital monitoring for the assessment of mortality and the single-center characteristic of this study are significant limitations.

Patients who are critically ill may benefit from an early intake of nutrients in the first hours after hemodynamic stabilization, and defined protocols in the institution facilitate an early nutrition therapy. The stratification of patients into groups in which energy and protein intake was greater and less than 60% of the prescribed amount did not reveal a difference in mortality between these groups, which is consistent with a previous study.[9] Therefore, the optimal dose of nutrients remains unknown. In addition, an intake of 100% of the nutrients that are prescribed by the guidelines is likely unnecessary because these guidelines assume that the requirements remain constant throughout the different phases of critical illnesses. One strategy would be to adapt nutrient intake to different stages of the illness in the planning of nutritional requirements using estimates from indirect calorimetry at different times with constant adjustments in energy intake according to these results.[34]

CONCLUSION

An intake of greater or less than 60% of planned nutritional requirements was not a reliable divisor of groups for clinical outcomes in this cohort. Additional studies are required to establish a minimum energy intake for critically ill patients that improve clinical outcomes of interest, such as the length of hospital stay, ventilator free time and ICU and hospital mortality.

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RESUMO

Objetivo: Avaliar a relação entre a oferta comparada às necessidades calóricas e proteicas no 7º dia de internação e desfechos de interesse em uma unidade de terapia intensiva.

Métodos: Estudo de coorte, retrospectivo, realizado na unidade de terapia intensiva, com 126 pacientes internados por ≥7 dias, que foram categorizados de acordo com a adequação da oferta energética e proteica administrada, em relação às necessidades. O Grupo Oferta Adequada ≥60% e o Grupo Suboferta <60% foram avaliados em relação ao tempo de internação, tempo livre de ventilação mecânica invasiva e mortalidade na unidade de terapia intensiva e hospitalar.

Resultados: Nutrição enteral foi utilizada em 95,6% dos 126 pacientes incluídos e iniciada 41 horas após a admissão na unidade de terapia intensiva. A adequação da oferta energética foi de 84% e, de proteínas, 72,5%. Não houve diferença entre os grupos oferta adequada e suboferta de energia em relação ao tempo de internação [16 (11-23) *versus* 15 (11-21) dias; p=0,862], tempo livre de ventilação mecânica invasiva [2 (0-7) *versus* 3 (0-6) dias; p=0,985], mortalidade na unidade de terapia intensiva [12 (41,4%) *versus* 38 (39,1%); p=0,831] e hospitalar [15 (51,7%) *versus* 44 (45,4%); p=0,348], respectivamente. Resultados semelhantes foram encontrados em relação à oferta proteica e ao tempo de internação [15 (12-21) *versus* 15 (11-21) dias; p=0,996], tempo livre de ventilação mecânica invasiva [2 (0-7) *versus* 3 (0-6) dias; p=0,846], mortalidade na unidade de terapia intensiva [15 (28,3%) *versus* 35 (47,9%); p=0,536)] e hospitalar [18 (52,9%) *versus* 41 (44,6%); p=0,262].

Conclusão: Não foi possível demonstrar que as ofertas energética e proteica, superior ou inferior a 60% das necessidades nutricionais, sejam divisores confiáveis, em termos de desfechos clínicos.

Descritores: Necessidade energética; Terapia nutricional; Mortalidade; Respiração artificial; Tempo de internação; Unidades de terapia intensiva

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