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Original/*Intensivos*

Nutrition therapy in sepsis: characterization and implications for clinical prognosis

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Abstract

Introduction: the inflammatory response caused by sepsis leads to metabolic changes, which may result in significant lean mass loss in septic patient. Because of this, when digestive tract is functional, nutritional therapy (NT) must be initiated within 48 hours of intensive treatment to reduce protein loss.

Objective: to evaluate enteral nutritional therapy (ENT) in adult septic patients with exclusive ENT for ≥ 72 hours and length of stay ≥7 days in Intensive Care Unit and its relationship with clinical prognosis.

Methods: we prospectively analyzed the adequacy of enteral nutrition administered, factors associated with non-conformity, gastrointestinal tolerance and outcome. Statistical tests of chi-square and Student's t as well as Mann-Whitney and Spearman and Pearson correlations ($p < 0.05$) were used. A multiple logistic regression model has been done by using the stepwise method to evaluate the association between predictors of clinical outcome.

Results: 53 patients, 67.9% male and 52.8% elderly were enrolled in this study. The average time for starting ENT was 30 (23.5) hours, and 88.7% of patients achieved nutritional goal in 48 hours. The mean volume delivered in relation to prescribed was 78.9%. When the sample was stratified according to administered/prescribed calories, patients who received < 80% had a higher mortality rate ($p = 0.001$) and the caloric intake ≥ 80% was the determining factor in patients' clinical prognosis ($p = 0.021$).

Conclusion: septic patients received early enteral nutrition. The nutritional goal and the mean volume delivered in relation to the prescribed volume meet the intensive care guidelines. The nutritional support was associated with clinical outcome, and caloric intake ≥ 80%

LA TERAPIA NUTRICIONAL EN LA SEPSIS: CARACTERIZACIÓN E IMPLICACIONES PARA EL PRONÓSTICO CLÍNICO

Resumen

Introducción: la respuesta inflamatoria causada por sepsis provoca cambios metabólicos que pueden provocar una pérdida de masa magra significativa en pacientes sépticos. Debido a ello, cuando el tracto digestivo es funcional la terapia nutricional (NT) debe iniciarse dentro de las 48 horas de tratamiento intensivo para reducir la pérdida de proteína.

Objetivo: evaluar la terapia nutricional enteral (TNE) en pacientes sépticos adultos con TNE exclusivo para ≥ 72 horas y duración de ≥ 7 días de estancia en la Unidad de Cuidados Intensivos y su relación con el pronóstico clínico.

Métodos: se analizaron prospectivamente la adecuación de la nutrición enteral administrada, los factores asociados con la falta de conformidad, la tolerancia gastrointestinal y el resultado. Se utilizaron pruebas estadísticas de chi-cuadrado y la t de Student, así como las correlaciones de Mann-Whitney y Spearman y Pearson ($p < 0,05$). Se ha realizado un modelo de regresión logística múltiple mediante el método paso a paso para evaluar la asociación entre factores de predicción de la evolución clínica.

Resultados: 53 pacientes, 67,9% hombres y 52,8% ancianos se inscribieron en este estudio. El tiempo promedio para el inicio de ENT fue de 30 (23,5) horas, y el 88,7% de los pacientes alcanzaron el objetivo nutricional en 48 horas. El volumen medio entregado en relación con el prescrito fue 78,9%. Cuando la muestra se estratificó según calorías prescritas/administradas, los pacientes que recibieron < 80% tenían una tasa de mortalidad más alta ($p = 0,001$) y el consumo de calorías ≥ 80% fue el factor determinante en el pronóstico clínico de los pacientes ($p = 0,021$).

Conclusión: los pacientes sépticos recibieron nutrición enteral precoz. El objetivo nutricional y el volumen medio entregado en relación con el volumen prescrito cumplen las directrices de cuidados intensivos. El soporte nutricional se asoció con el resultado clínico y la ingesta calórica ≥ 80% para determinar el pronóstico clínico. Las pausas causadas por el reflujo fueron significativas

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determining the clinical prognosis. The pauses caused by reflux were significant in the group of patients who died and it may be related to disease severity.

en el grupo de pacientes que murieron y que pueden estar relacionadas con la gravedad de la enfermedad.

Introduction

Hospital malnutrition is directly responsible for higher rates of morbidity and a significant increase in patient mortality[1]. An Ecuadorian Study of Hospital Malnutrition showed malnutrition was dependent upon patient's age and education level; as well as the presence of cancer, chronic organic failure, and sepsis. Among the patients with sepsis, 47.8% had scores B or C in the Subjective Global Assessment[2]. The inflammatory response caused by sepsis leads to metabolic changes, which may result in significant lean mass loss in septic patient. Because of this, when digestive tract is functional, nutritional therapy (NT) must be initiated within 48 hours of intensive treatment to reduce protein loss[3].

To ensure the nutritional intake in these cases, it is suggested to administer oral or enteral feeding according to patients' tolerance, avoiding prolonged fasting or separate administration of intravenous glucose after sepsis diagnosis[4]. Early enteral nutrition (EN) initiation between 24 and 48 hours after admission to intensive care unit (ICU) is recommended in critically ill patients for over a decade[5-8].

The advantages of early enteral nutrition therapy (ENT) in hemodynamically unstable patients include: favoring splanchnic flow distribution, functional preservation of gastrointestinal barrier, modulation of neuroendocrine response, attenuation of metabolic stress and prevention of bacterial translocation[3].

Considering the importance of NT in critically ill patients, this study aimed to assess the quality of ENT in septic patients at the adult intensive care unit of a university hospital.

Methods

Observational study carried out in adult ICU, approved by the Research Ethics Committee of the institution (CEP 603/05). Data collection was made after approval of eligible patients or their legal guardians and signing the informed consent form (IC).

Prospectively collected data were obtained from 2010 to 2013 and patients were considered eligible as following: age ≥18 years old, nutritional support exclusively via enteral tube for ≥72 hours and sepsis diagnosis or septic shock during ICU stay. Patients in palliative care and those who remained in the ICU for time <7 days were excluded in this study.

The estimated energy and protein requirements were calculated considering 25-30 kcal/kg and 1.25-1.5g protein/kg body weight[7] for patients with a body mass index (BMI) ≤30 kg/m² and 20 kcal/kg adjusted weight[9] and from 1.25 to 2.0 g protein/kg[8] for patients with BMI >30 kg/m². Body weight at admission was used for calculating and it was obtained by a crane type scale (scale-Tronix® mark, 2002). The ideal weight was obtained from each group age reference tables, only for patients who were not possible to mobilize[10,11]. The measured height was reported by patient or relatives, and if this information is not available, the stature was estimated by knee height[12].

The enteral formulas used were those available in the hospital during the study period. The nutritional prescription for these patients was preferably based on hyperprotein-hypercaloric, polymeric or oligomeric diets, according to digestive tract condition.

According to hospital-defined protocol, tube position adopted was the post pyloric and this was confirmed by X-ray. When it was not possible to use it, the gastric position was adopted. Silastics tubes were used to deliver enteral nutrition for all patients, regardless their location, with manual insertion. Enteral formulas were administered continuously by infusion pumps, during 22 hours, and the remaining two hours were used for procedures and medication administration[13].

Data related to ENT volume infused, factors associated with interruptions of enteral diet supply and gastrointestinal tolerance were collected in the period from ENT starting until ICU discharge, death or progression to other types of nutritional administration (oral, parenteral or mixed). The analysis of data obtained was performed from the second day of ENT using, according to the protocol defined in the institution.

The percentage of adequacy of volume, calories and proteins was calculated by the ratio of delivered value by prescribed value per day. The calculation of daily energy and protein balance was the result of the difference between prescribed value and delivered value. The cumulative balance included the sum of the daily balance during the period in enteral nutrition.

The index used for severity rating was SAPS III (Simplified Acute Physiology Score)[14,15]. The period of invasive mechanical ventilation (IMV) were monitored from the date of tracheal intubation until the date of extubation, death or tracheostomy.

The reasons for ENT discontinuation were classified as: gastrointestinal complications (gastric reflux,

vomiting and enterorraghia), exams (bronchoscopy, tomography and endoscopy), procedures (extubation, tracheostomy, gastrostomy, insertion and repositioning of the tube, surgery, intubation, diagnostic investigation and hemodialysis) and other unspecified complications.

Statistical analysis was performed using SPSS version 17.0. Kolmogorov-Smirnov test ($p > 0.05$) was used to verify the normality of quantitative variables. When quantitative variable had a normal distribution, mean values and standard deviations were used, otherwise median and interquartile range of values were used. To compare qualitative variables the chi-square test was used and to compare quantitative variables Student t test was used for parametric variables and Mann-Whitney for non-parametric variables. Also, Pearson or Spearman correlations respectively were used to assess associations between parametric or nonparametric variables. For all tests, $p < 0.05$ was considered as statistically significant difference.

To assess the association between predictor variables of clinical prognostic in septic patients it was adopted the multiple logistic regression model using the stepwise method. Age, frequency of fasting >24h, ENT duration and SAPS variables were transformed into catego-

rical variables. Decision-making was based on the test of descriptive value ($p < 0.05$) and variables that could influence clinical outcome as sex, SAPS, ENT duration, gastrointestinal complications and fasting >24h, which were included in the models as control variables. Protein intake variable >80% was excluded from the final model for not presenting significant value and significant colinearity with caloric intake >80%.

Results

53 septic patients in ENT were included, with an average SAPS 64.4 (14.1), and 94.3% of cases remained under IMV with a median of 7 days. Table I shows the demographic and clinical characteristics of these patients. It is found that 67.9% were male, 52.8% were elderly and, according to the focus of sepsis, 49.1% had pulmonary sepsis.

Table I
Demographic and clinical characteristics of septic patients in Enteral Nutrition Therapy from 2010 to 2013

Total	n
Sex*	
Male	36 (67.9)
Female	17 (32.1)
Age (years)	59.2 (15.8)
≥ 60 years*	28 (52.8)
< 60 years*	25 (47.2)
Sepsis origin*	
Pulmonary	26 (49.1)
Urinary	8 (15.1)
Soft tissue, wound	5 (9.4)
Abdominal	4 (7.5)
Other***	10 (18.9)
SAPS	64.4 (14,1)
Invasive mechanical ventilation *	
Yes	50 (94.3)
No	3 (5.7)
IMV (days)	7 (5 - 12)
Patients with oral feeding recovery*	
Yes	26 (49.1)
No	27 (50.9)
Outcome*	
Discharge	30 (56.6)
Death	23 (43.4)

n = 53; SAPS- Simplified Acute Physiology Score; * - Categorical variables expressed in absolute value (n), followed by their frequency (%) ** - parametric continuous variables expressed as mean (standard deviation) and nonparametric median (interquartile range) *** - meningitis, post-surgery, without a defined focus.

Table II
Characteristics of Enteral Nutrition Therapy in septic patients in the period from 2010 to 2013

ICU stay (days)	12 (9-19)
ENT duration (days)	10 (7-16)
Fasting period before ENT(hours)	30 (23.5)
> 48 hours*	12 (22.6)
≤ 48 hours*	41 (77.4)
**Time to target ENT (hours) **	22 (14–36)
≤ 48 hours*	47 (88.7)
> 48 hours*	6 (11.3)
ENT stoppage period (hours)	43 (43.9)
Patients in fast for procedures >24 hours*	12 (22.6)
Calories prescribed	
Average calories (kcal/day)	1633.7 (225.3)
Average calories / kg weight (kcal/kg)	25.0 (2.3)
Protein prescribed	
Average protein (g/daya)	77.5 (14.1)
Average protein / kg weight (g/kg)	1.19 (0.2)
Calorie delivered	
Average calories (kcal/day)	1298.3 (339.1)
Average calories / kg weight (kcal/kg)	20.0 (5.3)
Protein delivered	
Average protein (g/day)	61.8 (18.0)
Average protein / kg weight (g/kg)	0.95 (0.3)
Volume delivered / prescribed (%)	78.9 (17.8)
Caloric daily balance (kcal)	-343.0 (330.6)
Protein daily balance (g)	-14.9 (14.6)
Cumulative caloric balance (kcal)	-3426.5 (3609.2)
Cumulative protein balance(g)	-153.0 (168.3)

n = 53; * - Categorical variables expressed in absolute value (n), followed by their frequency (%) ** - parametric continuous variables expressed as mean (standard deviation) and nonparametric median (interquartile range).

ENT characteristics are presented in Table II. The median ICU days was 12 (9-19), and 10 (7-16) days with ENT. The average fasting time before ENT was 30 hours, and 77.4% of patients started ENT within 48 hours after ICU admission. The median time to achieve nutritional goal was 22 (14-36) hours, and 88.7% reached the target at ≤48 hours and 96.2% at ≤72 hours after starting NT. Regarding tolerance to EN, the frequency of diarrhea episodes during hospitalization was 13.4%. In relation to constipation, 58.5% of patients presented intestinal motility alteration in some time during stay.

A positive correlation was observed between interruptions during ENT duration with periods on IMV (r= 0.504; p <0.001). When the sample was stratified based on the percentage of calories delivered in relation to calories prescribed (≥80% or <80%) it was observed that patients receiving a lower caloric intake had higher mortality (p= 0.001). Amongst 21 patients who received <80%, 15 (71.4%) died and 6 (28.6%) were discharged, and amongst 32 patients who received ≥80% calories, 9 (25.0%) died and 24 (75.0%) were discharged. Patient characteristics receiving ≥80% or <80% of required calories is shown in Table III.

Table IV presents the results of logistic regression analysis, which examined the effect of caloric intake and predictor variables in the clinical prognosis of septic patients. The results showed that caloric intake ≥80% and age <60 years had protective association in the clinical prognosis (p= 0.021 and p= 0.022, respectively).

In figure 1 it can be seen a significant difference in the daily deficit of calories and proteins, according to outcome. Patients who were discharged had a lowaverage energy deficit -218.1 (233.3) kcal/day and protein -10.2 (10.4) g/day, while in patients who died deficits were -505.8 (370.9) kcal/day and -21.1 (17.1) g/day.

The causes of non-conformity in ENT are shown in Table V. In patients who were discharged the most frequent cause was extubation (28.3%), whereas in patients who died gastroesophageal reflux (21, 8%) was significant. Considering the total sample, the stoppage for procedures was more common cause.

Discussion

Early initiation of ENT is recommended by reducing: incidence of infectious complications, duration of mechanical ventilation (MV), length of stay in hospital and ICU and hospital mortality[3,4]; and the EN should be started once the patient is fully resuscitated and hemodynamically stable[16].

The results showed the importance of an early NT and its adequacy to patients' needs and disease severity. Khalid et al[17] evaluated the ENT in 1174 critically ill patients finding that 60% of patients had an early nutritional support starting. In our study, 77.4% of patients had an early start of enteral feeding. It is important to consider that sepsis in digestive tract can be a barrier to enteral nutrition.

Another point to be considered is the time to reach nutritional goal. It is recommended that EN scales up to nutritional target between 48 and 72 hours after starting in patients at nutritional risk[8,16]. Our results

Table III
Characteristics of septic patients admitted in the period from 2010 to 2013, according to delivered and prescribed calories ratio

	≥80% calories	<80% calories
Patients*	**32 (60.4)**	**21 (39.6)**
Sex*		
Male	19 (59.4)	17 (81.0)
Female	13 (40.6)	4 (19.0)
Age (years)**	57.0 (17.3)	62.4 (13.1)
> 60 years*	14 (43.8)	13 (61.9)
≤ 60 years*	18 (56.3)	8 (38.1)
SAPS**	65.3 (14.1)	63.0 (14.2)
ENT duration (days)**	14.8 (10.3)	10,0 (5.5)
Calories delivered/prescribed (%)**	90.8 (6.1)	61.6 (17.5)
ENT stoppage period (hours)**	31.8 (30.7)	59.2 (55.4)
GI complications		
Yes	8 (25.0)	9 (42.9)
No	24 (75.0)	12 (57.1)

Source: Adult ICU - HU-USP. SAPS- Simplified Acute Physiology Score; Complications GI - Gastrointestinal complications. * - Categorical variables expressed in absolute value (n), followed by respective frequency (%) ** - parametric continuous variables expressed as mean (standard deviation) and nonparametric median (interquartile range).

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Table IV
Effect of caloric intake and predictor variables in the clinical prognosis of septic patients in the period 2010-2013

| Variables	OR*	Z (Wald)	CI 95%	p
Caloric intake (≥80%)	10.75	5.32	1.43 – 80.76	**0.021**
Fasting >24 h	0.50	0.48	0.07 – 3.71	0.499
SAPS (>65)	0.72	0.21	0.18 – 2.92	0.645
GI complications	0.44	1.21	0.10 – 1.91	0.271
ENT duration (>10 days)	3.84	2.64	0.77 – 19.44	0.105
Sex	0.55	0.56	0.11 – 2.66	0.453
Age (<60 years)	0.19	5.28	0.05 – 0.78	**0.022**

Source: Adult ICU - HU-USP. OR - odds ratio; 95% - 95% confidence interval; GI Complications - Gastrointestinal complications, TNE - enteral nutrition therapy; * -

meet this recommendation, considering that 88.7% of patients achieved the nutritional goal in less than 48 hours with a median time equal to 22 hours. The goal achievement by enteral feeding occurred at most within 84 hours. We believe that these results are related to the protocol used for ENT progression, which initial rate is 25 ml/h, basing on evaluations every 4 hours with an increase of 10 ml/h in absence of intolerance, until the nutritional target proposed is reached[18].

Inadequate caloric intake results in negative energy-protein balance, associated with increased morbidity, mortality and complications in ICU patients[19,20]. The average energy balance was of -343 kcal/day and the average cumulative balance was -3427 kcal. Dvir et al.[21] in a study conducted with 248 patients on MV found that the cumulative energy balance had correlation with complication occurrence in ICU patients,

and those that calories consumption was higher had a lower incidence of sepsis. The values found in this investigation were close to our study in terms of average daily energy balance that was -460 kcal. The average cumulative balance was different from the results we found, that was -4767 kcal. In this way, it is important to consider that in our analysis 5 (9.4%) patients had energy cumulative deficit exceeding 10,000 kcal, while Dvir et al.[21] found that 22% of the patients had such similar balance.

Regarding protein balance, few studies approach the relationship with complications during hospitalization and, above all, in clinical outcome. The average prescribed protein to patients in this survey was 1.19 g/kg body weight, however, the protein average effectively administered was 0.95 g/kg. Allingstrup et al.[22] carried out a prospective study of 113 ICU patients, 100 of them were septic, with the purpose of comparing
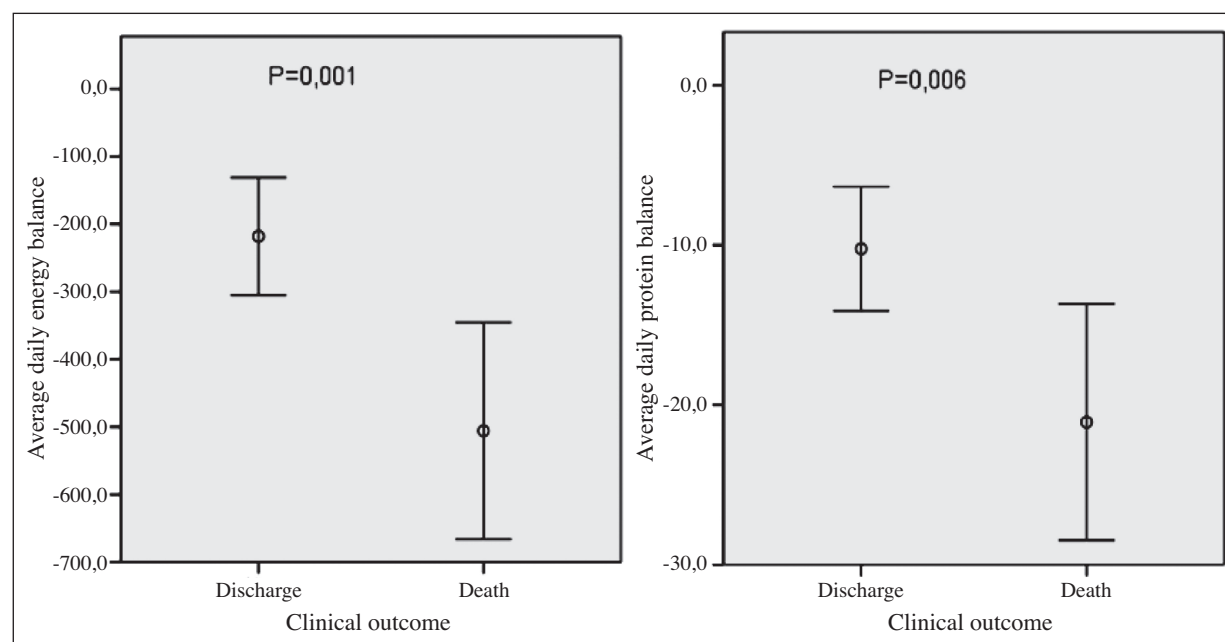
Fig. 1.—Daily defects of calorie sand proteins in septic patients according clinical outcome.

Table V

Frequency of non-conformity causes of Enteral Nutrition Therapy in septic patients admitted during the period from 2010 to 2013, according total sample and clinical

Non-conformity cause	Total		Discharge		Death	
	n	%	n	%	n	%
Gastrointestinal Complications						
Reflux	29	13.6	7	6.2	22	21.8
Vomiting	7	3.3	7	6.2	0	0.0
Enterorrhagia	4	1.9	2	1.8	2	2.0
Subtotal	**40**	**18.7**	**16**	**14.2**	**24**	**23.8**
Exams						
Bronchoscopy	2	0.9	2	1.8	0	0.0
Tomography	20	9.3	10	8.8	10	9.9
Endoscopy	11	5.1	6	5.3	5	5.0
Subtotal	**33**	**15.4**	**18**	**15.9**	**15**	**14.9**
Procedures						
Extubation	43	20.1	32	28.3	11	10.9
Tracheostomy	14	6.5	10	8.8	4	4.0
Gastrostomy	2	0.9	2	1.8	0	0.0
Probe	34	15.9	19	16.8	15	14.9
Surgery	17	7.9	6	5.3	11	10.9
Intubation	6	2.8	4	3.5	2	2.0
Diagnostic research	6	2.8	0	0.0	6	5.9
Hemodialysis	3	1.4	0	0.0	3	3.0
Subtotal	**125**	**58.4**	**73**	**64.6**	**52**	**51.5**
Subtotal - Occurrences and routine	**16**	**7.5**	**6**	**5.3**	**10**	**9.9**
TOTAL	**214**		**113**		**101**	

Source: Adult ICU - HU-USP.

mortality with administration, necessity and balance of calories and proteins. The sample was divided into tertiles, with higher mortality rate observed in patients receiving low protein intake. In this group, complications probably occurred earlier because patients were not properly nourished.

Heyland et al.[23] analyzed data of 7872 patients from multicenter observational studies and also found a significant association between higher energy intake and reduced mortality. By analyzing daily calorie and protein deficits, patients who died during hospitalization had significantly higher averages than those who were discharged from hospital (p= 0.001 and p= 0.006, respectively).

The overall mean caloric intake for all patients of this study was 1298.3 kcal/day and 61.8 g protein/day. In a recent study, Elke et al.[24] analyzed different nutritional strategies in clinical outcome of patients with sepsis enrolled in the study "Efficacy of Volume Substitution and Insulin Therapy in Severe Sepsis". Of the total number of patients, 86 received only ENT with average caloric intake of 918 kcal/day and 33.6 g/day protein. Only patients who received enteral in addition to parenteral nutrition reached 1343 kcal/day and 48.3 g protein/ day, similar to those found in our study.

Make sure the patient receives a minimum of 80% of caloric goal is one of the objectives of the mnemonic tool Nutritional FAST HUG[16]. Relating to the impact of enteral nutrition on clinical prognosis of patients, we observed a significant association between mortality and patients who received <80% of prescribed calories, as being caloric intake ≥80% a determinant factor in clinical prognosis of patients (p= 0.021). Of the total number of patients who received <80% of prescribed calories, 71.4% progressed to death and among those who received ≥80% only 25.0% died. Also, patients who received ≥80% of prescribed caloric intake were 10.75 times more likely to be discharged.

Given that negative balance is due to discrepancies between EN prescribed and effectively delivered, it is necessary to investigate this non-conformity. These may be related to technical problems, elective stoppage for procedures, surgery or examinations, or as a result of patient's gastrointestinal intolerance.

The main cause of non-conformities was stoppage for procedures (58.4%), especially for extubation (19.6%). When patients were stratified according to clinical outcomes (Table V), interruptions for procedures still represented the largest number of causes for patients not receiving EN, but the main reason

of non-conformity amongst patients discharged from hospital was related to extubation (28.3%) and reflux was the main cause in those who died (21.8%).

Early extubation is important to reduce events associated with this procedure, such as increased incidence of pneumonia, hospital stay and mortality[25]. Also, fasting time should be managed by a multidisciplinary team, which has been held in the ICU of this study.

In the analysis of non-conformities, the average stoppage time during EN administration was 43 hours/patient and it showed moderate positive correlation with time on IMV (r= 0.504; p <0.001). We believe that this is especially due to the weaning process, as 26.4% of patients were in fasting for reintubation or because the first attempt of extubation was not sucessful. One should also consider that 49.1% of patients had sepsis with pulmonary focus, which may have influenced the period of fasting before extubation and the higher probability of reintubation.

According to Ukleja[26], gastrointestinal (GI) motility disorders are common in septic patients. Furthermore, other factors such as shock, inflammatory cytokines, electrolyte abnormalities, hyperglycemia and drugs may contribute to GI tract disorders. Considering that the nutritional deficit was higher in the group of patients whose outcome was death and the main single cause of interruption was reflux, it seems that inflammation process severity is the cause of intolerance, as being related to the course of disease, and could hardly be overcome by intervention.

Blaser et al.[27] retrospectively studied 1712 ICU patients in order to determine the most accepted definition of feeding intolerance that may be associated with mortality. Definitions were compared and that presented at least three out of five defined GI symptoms (lack of bowel sounds, vomiting or regurgitation, diarrhea, bowel dysfunction, large gastric residual volumes) was more strongly correlated with mortality in ICU. The presence of ≥3 GI symptoms was 6.3% in survivors vs 23.5% in those who died (p <0.001, odds ratio of 3.39 and 95% CI: 2.23- 5.14). Furthermore, the authors found a relationship between low caloric intake in ENT during ICU stay and 90 days-mortality prediction. The administration of ENT <23% of the target in at least 1 day was 50.7 % in survivors after 90 days and 75.2% in those who died (p <0.001, odds ratio of 2.34 (95% CI:. 1.80 to 3.04). Thus, this research shows that digestive intolerance can be a significant risk factor in ICU.

Concerning the time of stoppage for procedures, we found that 22.6% of patients fasted for a period longer than 24 hours at some time during hospital stay. Considering that interruptions related to procedures account for over 50% of the causes of non-conformity regardless of clinical outcome (Table V), we believe that a detailed study including a logistics proposal to reduce periods of interruptions in planned actions would be necessary.

We emphasize that this study has limitations because it was developed in a single ICU, which resulted in small sample size. Thus, we highlight the importance of other studies that complement this analysis.

Conclusion

Septic patients received early enteral nutrition. The achievement of nutritional goals and mean delivered volume of enteral in relation to prescribed volume is according to intensive care guidelines. The nutritional support was associated with clinical outcome and caloric intake ≥80% was determinant for favorable clinical prognosis. However, in the group that patients did not survive it must be considered the impact of reflux, that is the most common single cause for interruption in ENT in addition to disease severity. In this regard, further studies are needed to better clarify the association between enteral feeding intolerance and mortality.

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