Suzana Meira de Oliveira[1], Maria Goretti Pessoa de Araújo Burgos[2], Eduíla Maria Couto Santos[3], Leila Virgínia da Silva Prado[4], Marina de Moraes Vasconcelos Petribú[5], Flávia Myrna Tenório de Sousa Bomfim[6]

Gastrointestinal complications and protein-calorie adequacy in intensive care unit enteral nutrition patients

Complicações gastrointestinais e adequação calórico-protéica de pacientes em uso de nutrição enteral em uma unidade de terapia intensiva

1. Resident Nutritionist, of the Clinical Nutrition Residency Program of the Hospital das Clínicas da Universidade Federal de Pernambuco – Recife (PE), Brazil.
2. PhD, Nutritionist of the Hospital das Clínicas da Universidade Federal de Pernambuco – Recife (PE), Brazil.
3. MSc, Professor for the Universidade Federal de Pernambuco (UFPE) – Recife (PE), Brazil.
4. Resident Nutritionist, of the Clinical Nutrition Residency Program of the Hospital das Clínicas da Universidade Federal de Pernambuco – Recife (PE), Brazil.
5. MSc, Professor for the Universidade Federal de Pernambuco (UFPE) – Recife (PE), Brazil.
6. Nurse of the Intensive Care Unit of the Hospital das Clínicas da Universidade Federal de Pernambuco – Recife (PE), Brazil.

Received from the Hospital das Clínicas da Universidade Federal de Pernambuco – Recife (PE), Brazil.

Submitted on May 19, 2009
Accepted on April 27, 2010

Author for correspondence:
Suzana Meira de Oliveira
Rua Louis Pasteur, 35 – Imbiribeira
Zip Code: 51190-520 – Recife (PE), Brazil.
Phone: +55 (81) 3339-6952/ 9295-8907
E-mail: suzanameira@hotmail.com

ABSTRACT

Objective: To evaluate the prevalence of gastrointestinal complications and protein-calorie adequacy in critical patients using enteral nutrition therapy.

Methods: This was a retrospective study in the intensive care unit of the Hospital das Clinicas of the Universidade Federal de Pernambuco involving analysis of nutritional records evaluating the most frequent gastrointestinal complications during the patients' hospitalization and protein-calorie supply requirements. It was considered offered, the volume and formula effectively received by the patient on the last hospitalization day. The SPSS version 13 software was used for statistical analysis.

Results: The sample consisted of 77 patients aged in average 54.7 ± 18.1 years who were predominantly female (54.5%). The diet offered was appropriate and all patients had some type of gastrointestinal complications, being high gastric residuals the most prevalent (39%), followed by constipation (36.4%).

Conclusion: Despite the high prevalence of gastrointestinal complications, no mismatches were observed in protein-calorie intake. Multidisciplinary approaches to these complications should be standardized in order to provide their early resolution.

Keywords: Critical care; Nutritional status; Nutritional requirements; Enteral nutrition

INTRODUCTION

Enteral nutrition is defined by ANVISA (Agência Nacional de Vigilância Sanitária, the Brazilian Health Surveillance organ) as "food for special ends, with controlled nutrients ingestion, either alone or in combination, having defined or estimated chemical profile, specially prepared to be used by means of tubes or orally, either industrialized or not, exclusive or partially used to replace or supplement patients' either or not undernourished nutrition according to their nutritional requirements, either during hospitalization, outpatient care or home care, aiming the maintenance of tissues, organs or systems synthesis".[1]

Intensive care unit (ICU) patients are frequently in hypermetabolic status, that is characterized by a critical phase for the supply to organ function preservation, tissue repair and immune system substrates. This response produces severe body protein and calorie stocks losses, and when prolonged, may cause multiple organs and systems failure.[2] Thus, the enteral nutrition therapy (ENT) should be started as early as possible within 48 to 72 hours from

admission, as mitigates the toxins-mediated acute phase inflammatory response, and preserves the intestinal mucosa integrity from bacterial translocation risks.[3,4]

Some intercurrences during ENT administration are known to eventually cause temporary and/or permanent enteral nutrition discontinuation, preventing the appropriate nutritional requirements supply[5] and, consequently, exposing the patient to malnutrition, which is prevalent in hospitalized patients.[6]

Gastrointestinal complications (GICs) are intolerances frequently found in critically ill ENT patients, specially nausea/vomiting, diarrhea, constipation and high gastric residuals, with several studies confirming their high prevalence.[7-10]

This study aimed to evaluate the gastrointestinal complications prevalence and the protein-calories adequacy in critically ill patients under enteral nutrition therapy.

METHODS

This retrospective study was conducted in the ICU of the Hospital das Clínicas da Universidade Federal de Pernambuco (HC/UFPE), involving the analysis of the nutrition therapy records of patients hospitalized from January to December 2006. Patients compliant with the following eligibility criteria were screened: age above 18 years, exclusive ENT, no dialysis therapy and no terminal disease.

The most frequent GICs during the hospitalization were collected, as well the protein-calorie requirements and offer. The GICs were defined according to the current literature concepts: vomiting (> once in 12 hours),[10] diarrhea (3 or more liquid stools episodes in 24 hours),[11] high gastric residue (> 150 mL in 12 hours),[8] constipation (no intestinal evacuation for 3 days)[7]. It was considered offered the volume and formula effectively received by the patient during the last hospitalization day.

The nutrition evaluation was performed using the HC/UFPE established protocol, being the height estimated with the knee length formula (different for the genders) and the ideal weight (IW) estimated from the mean age-estimated body mass index (BMI), when both were unknown. The energetic and protein requirements calculation was made according to the patient's disease and nutrition status, according to the recommendations for critically ill patients.

The analysis identified the absolute and percent distributions for the descriptive results evaluation. The Statistical Package for the Social Sciences (SPSS) version 13 software was used for statistical analysis.

This study was approved by the Human Health Sciences Center (CCS/UFPE) Ethics Committee, in compliance with the Resolution nr 196/96 of the Brazilian National Health Council, under the number 272/07.

RESULTS

From the 262 patients admitted to the ICU during 2006, the study included 77 patients compliant with the inclusion criteria. The patients' age averaged 54.7 ± 18.1 years, 54.5% were female, and the mean ICU stay ranged from 2 to 13 days, average 9.3 ± 4,2 days.

The proteins and calories adequacy is shown on table 1. All studied patients had at least one CGI, being high gastric residuals the most prevalent (39%), followed by constipation in 36.4% (Table 2).

Table 2 – Most frequent gastrointestinal complications in the intensive care unit of the Hospital das Clínicas during 2006

	Overall group	
	N	%
Constipation	28	36.4
Diarrhea	18	23.4
Gastric residue	30	39.0
Vomiting	2	2.6
Total	77	100.0

DISCUSSION

The critically ill patient bears metabolic changes caused by a reactions cascade which may cause malnutrition risks.[12] A generalized response is seen, involving energetic mobilization to stimulate the immune response and repair damaged tissues.[3] Thus, the nutrition

Table 1 – Nutrition requirements, offered diet and diet appropriateness

Statistics	Caloric need (Kcal/day)	Protein need (g/day)	Offered calories (Kcal/day)	Offered proteins (g/day)	% calorie appropriateness (Kcal/day)	% protein appropriateness (g/day)
Mean	1717.9 ±243.6	75.9 ± 14.4	1621.3 ± 430.8	67.4 ±20.2	94.5 ± 21.8	89.7 ± 23.7
CV	14.18	18.94	26.57	29.99	23.05	16.06

CV – coefficient of variation.

support offered to the patient aims to prevent visceral and muscular protein losses, in addition to provide sufficient energy and substrates for the physiologic status maintenance.[13]

Regarding protein-calorie requirements, our findings were similar to the literature. In a five months evaluation of 31 general public hospital ICU adult patients under exclusive ENT, Campos et al.[14] found that before the protocols implementation the protein-calorie requirements were significantly larger than the prescribed (80% of the total energy and 60% of proteins) and received. Equally, Adam and Batson[15] report that only 87% of the prescriptions met the patients' requirements; in this study 94.5% of caloric and 89.7% of protein adequacy was identified, likely due to the use of low protein containing diets.

Some intercurrences may lead to inappropriate ENT in these patients, being the GICs the most prevalent due to hemodynamic instability among other underlying pathology features.[13]

In this study all patients had any type of GIC. Montejo et al.[7] also found high prevalence in 62.8% of the patients, with one or more complications, being high gastric residuals the most prevalent (39%), followed by constipation (15.7%), diarrhea (14.7%), vomiting (12.2%), among others, leading to diet discontinuation in 15.2% of the patients due to uncontrolled complications. Equally, Mentec et al.[9] identified high gastric residuals in 32% of the patients after an average 2 days hospitalization, and one episode of vomiting in 26% of the patients.

Similar results were also found by Montejo et al.[10], with high gastric residuals in 25% of the patients, diarrhea in 14%, abdominal distension in 9%, vomiting in 6%, constipation in 5% and with 61% presenting at least one GIC. Nonino-Borges et al., evaluating severely ill patients' enteral nutrition complications, identified 27.7% of patients with some gastrointestinal complication, being regurgitation/vomiting the most prevalent (50%), followed by diarrhea (32.6%), abdominal distension (13%) and constipation (4.3%).[16] These authors confirm our findings regarding high GICs prevalence, as well as high gastric residues as the main complication.

CONCLUSION

Nevertheless the high gastrointestinal complications prevalence, no calorie-protein offer unbalance was identified. The protocol use in critically patients is very important, as the rate of gastrointestinal complications in this population was high, and considering the need of standardization of multidisciplinary approaches to these complications.

RESUMO

Objetivo: Avaliar a prevalência de complicações gastrointestinais e a adequação calórico-protéica de pacientes críticos em uso de terapia de nutrição enteral.

Métodos: Estudo retrospectivo realizado na unidade de terapia intensiva do Hospital das Clínicas da Universidade Federal de Pernambuco, onde foram coletados, mediante análise das fichas de acompanhamento nutricional, as complicações gastrointestinais mais freqüentes durante o período de internamento do paciente, bem como a necessidade e a oferta calórico-protéica. Considerou-se como ofertado, o volume e o tipo de fórmula efetivamente recebido pelo paciente no último dia de internamento hospitalar. Foi utilizado o programa SPSS, versão 13 para análise estatística.

Resultados: A amostra foi composta de 77 pacientes com idade 54,7 ± 18,1 anos e predominância do sexo feminino (54,5%). A dieta ofertada foi adequada e todos os pacientes apresentaram algum tipo de complicação gastrointestinal, sendo o retorno gástrico o mais prevalente (39%), seguido da constipação com 36,4%.

Conclusão: Apesar da elevada prevalência de complicações gastrointestinais, não foi observada uma inadequação na oferta calórica-protéica. As condutas multidisciplinares frente à resolução dessas complicações necessitam ser padronizadas para que soluções precoces possam ser tomadas.

Descritores: Cuidados críticos; Estado nutricional; Necessidades nutricionais; Nutrição enteral

REFERENCES

1. Brasil. Ministério da Saúde. Agência Nacional de Vigilância Sanitária – ANVISA. Portaria nº 337/MS, de 14 de abril de 1999. Aprova o Regulamento Técnico para fixar os requisitos mínimos exigidos para a Terapia de Nutrição Enteral. D.O.U. de 15/04/99.
2. Campos ACL. Terapia nutricional na sepse. In: Campos ACL. Nutrição em cirurgia. São Paulo: Atheneu; 2001. p 257-80.
3. Barr J, Hecht M, Flavin KE, Khorana A, Gould MK. Outcomes in critically ill patients before and after the implementation of an evidence-based nutritional management protocol. Chest. 2004;125(4):1446-57.

4. Roberts RP, Zaloga GP. Enteral nutrition in the critically ill patient. In: Grenvick A, Ayres SM, Holbrook PR, Shoemaker WC, editors. Textbook of critical care. 4th ed. Philadelphia: WB Saunders; 2000. p .875-98
5. Bernard AC, Magnuson B, Tsuei BJ, Sswintosky M, Barnes S, Kearney PA. Defining and assessing tolerance in enteral nutrition. Nutr Clin Pract. 2004;19(5):481-6.
6. Waitzberg DL, Ccaiaffa WT, Correia MI. Hospital malnutrition: the Brazilian national survey (IBRANUTRI): a study of 4000 patients. Nutrition. 2001;17(7-8):573-80.
7. Montejo JC. Enteral nutrition-related gastrointestinal complications in critically ill patients: a multicenter study. The Nutritional and Metabolic Working Group of the Spanish Society of Intensive Care Medicine and Coronary Units. Crit Care Med. 1999;27(8):1447-53.
8. Lameu E. Complicações gastrointestinais, respiratórias e metabólicas. In: Lameu E, editor. Clínica nutricional. Rio de Janeiro: Revinter; 2005. p. 377-93.
9. Mentec H, Dupont H, Bocchetti M, Cani P, Ponche F, Bleichner G. Upper digestive intolerance during enteral nutrition in critically ill patients: frequency, risk factors, and complications. Crit Care Med. 2001;29(10):1955-61.
10. Montejo JC, Grau T, Acosta J, Ruiz-Santana S, Planas M, García-De-Lorenzo A, Mesejo A, Cervera M, Sánchez-Alvarez C, Núñez-Ruiz R, López-Martínez J; Nutritional and Metabolic Working Group of the Spanish Society of Intensive Care Medicine and Coronary Units. Multicenter, prospective, randomized, single-blind study comparing the efficacy and gastrointestinal complications of early jejunal feeding with early gastric feeding in critically ill patients. Crit Care Med. 2002;30(4):796-800.
11. David CM. Terapia nutricional no paciente grave. Rio de Janeiro: Revinter; 2001.
12. Aranjues AL, Teixeira ACC, Caruso L, Soriano FG. Monitoração da terapia nutricional enteral em UTI: indicador de qaulidade? Mundo Saúde (1995). 2008; 32(1):16-23.
13. Lemos CFS, Paula CA, Rocha R. Alterações gastrintestinais de pacientes críticos em uso de norepinefrina e terapia nutricional enteral. Rev Bras Nutr Clin. 2008;23(1):34-40.
14. Campos DJ, Silva AFF, Souza MH, Shieferdecker ME. Otimização do fornecimento calórico-protéico na terapia de nutrição enteral em unidade de terapia intensiva com o uso de protocolo. Rev Bras Nutr Clin. 2006;21(1):2-5.
15. Adam S, Batson S. A study of problems associated with the delivery of enteral feed in critically ill patients in five ICUs in the UK. Intensive Care Med. 1997;23(3):261-6.
16. Borges RM, Nonino-Borges CB, Campos AD, Basile-Filho A. Incidência de complicações em terapia nutricional enteral de pacientes em estado grave. Rev Bras Ter Intensiva. 2005;17(2):98-103.