

EVALUATION OF ENTERAL NUTRITION IN AN INTENSIVE CARE UNIT

AVALIAÇÃO DA NUTRIÇÃO ENTERAL EM UNIDADE DE TERAPIA INTENSIVA

EVALUACIÓN DE LA NUTRICIÓN ENTERAL EN UNA UNIDAD DE CUIDADOS INTENSIVOS

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Objective: to evaluate the infusion of enteral nutrition in adult patients admitted to an intensive care unit. **Method:** a descriptive, quantitative and longitudinal study, carried out over four months in a high-complexity public hospital, with patients using enteral nutritional therapy. Descriptive statistical analyses were performed with mean, standard deviation and percentage. **Results:** enteral nutrition was administered early after admission to the intensive care unit in most of the cases (64%). In 71% of the patients, the infusion volume of enteral nutrition was between 80% and 100% of that prescribed. The factors that most limited the infusion were complications in the use of the feeding tube (14%), hemodynamic and clinical instability (12%), and gastric stasis (12%). **Conclusion:** the infusion of enteral nutrition proved to be satisfactory and, among the factors that limited the infusion, many are preventable with the improvement of Nursing care, requiring the training of the team.

Descriptors: Enteral Nutrition. Intensive Care Units. Nursing Care.

Objetivo: avaliar a infusão da nutrição enteral em pacientes adultos internados em unidade de terapia intensiva. Método: estudo descritivo, quantitativo e longitudinal, desenvolvido ao longo de quatro meses em hospital público de alta complexidade, com pacientes em uso da terapia nutricional enteral. Foram realizadas análises estatísticas descritivas com média, desvio-padrão e percentual. Resultados: a administração da nutrição enteral ocorreu de forma precoce após a admissão na unidade de terapia intensiva na maioria dos casos (64%). Em 71% dos pacientes, o volume de infusão da nutrição enteral foi entre 80 e 100% do prescrito. Os fatores que mais limitaram a infusão foram complicações no uso da sonda de alimentação (14%), instabilidade hemodinâmica e clínica (12%), e estase gástrica (12%). Conclusão: a infusão da nutrição enteral mostrou-se satisfatória, e dentre os fatores que limitaram a infusão muitos são passíveis de prevenção com o aprimoramento dos cuidados de enfermagem, requerendo a capacitação da equipe.

Descritores: Nutrição Enteral. Unidades de Terapia Intensiva. Cuidados de Enfermagem.

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Objetivo: evaluar la infusión de nutrición enteral en pacientes adultos internados en una unidad de cuidados intensivos. Método: estudio descriptivo, cuantitativo y longitudinal, desarrollado en el transcurso de cuatro meses en un hospital público de alta complejidad, con pacientes sometidos a terapia nutricional enteral. Se realizaron análisis estadísticos descriptivos con media, desvío estándar y porcentaje. Resultados: la administración de la nutrición enteral tuvo lugar en forma temprana después del ingreso a la unidad de cuidados intensivos en la mayoría de los casos (64%). En el 71% de los pacientes, el volumen de infusión de la nutrición enteral fue entre el 80% y el 100% de lo prescrito. Los factores que más limitaron la infusión fueron complicaciones en el uso de la sonda de alimentación (14%), inestabilidad hemodinámica y clínica (12%), y estasis gástrica (12%). Conclusión: la infusión de la nutrición enteral evidenció ser satisfactoria y, entre los factores que limitaron la infusión, muchos son pasibles de prevenirse con una mejora de la atención de Enfermería, lo que requiere capacitación del equipo.

Descriptores: Nutrición Enteral. Unidades de Cuidados Intensivos. Atención de Enfermería.

Introduction

Malnutrition in hospitalized patients is a worldwide reality, demonstrated in several studies. In a systematic review⁽¹⁾ in which 66 studies were included, carried out in 12 Latin American countries and covering 29,474 patients, it was found that the prevalence of malnutrition varied between 40% and 60% at the time of admission. This prevalence increases even more during hospitalization due to several factors, such as those related to the disease itself in its acute phase and those related to the treatment. This situation is of great concern due to its correlation with the increase in morbidity, resulting in slower wound healing, increased infection rate, increased length of hospital stay and number of readmissions, as well as higher costs, in addition to mortality⁽¹⁾.

This context is even more complex when it comes to patients admitted to the Intensive Care Unit (ICU), when they most of the time remain unable to eat orally. Added to this is the stress caused by their critical state, which triggers hormonal changes that, in turn, cause hypercatabolism, with significant protein and caloric losses, favoring the occurrence or worsening of malnutrition⁽²⁾.

In order to face the problem of hospital malnutrition and/or mitigate its impact on patients previously unable to maintain oral intake, they have the resource of nutritional therapy, which can be offered through the oral, enteral or parenteral route. Enteral Nutritional Therapy (ENT) has been widely used in Brazilian

hospitals, and requires that the patient has a preserved and functioning gastrointestinal tract in order to be administered.

Enteral Nutrition (EN) can be infused through the feeding catheter, better known as a nasoenteral tube (NET), a term adopted in order to avoid confusion with other catheters, thus preventing possible errors. EN can also be infused through food ostomies (gastro or jejunostomies) in patients who need this therapy for a longer period, greater than four weeks⁽³⁾.

The infusion of food through the gastrointestinal tract, in addition to being more physiological, is essential to maintain the body's metabolic and immunological integrity. In addition, the earlier it is started in intensive care patients, the better the outcome, with a considerable reduction in the rates of complications and risk of mortality. Early enteral nutritional therapy consists of starting the prescription and infusion of enteral nutrition within 48 hours and, preferably, within the first 24 hours after admission to the intensive care unit⁽⁴⁻⁵⁾.

However, a number of studies show that a considerable number of patients admitted to the intensive care unit receive a lower volume of enteral nutrition than prescribed or with a late start, compromising the recovery of the patients. This problem is justified by factors such as hemodynamic instability, use of vasoactive drugs, and due to medical, Nursing and Physiotherapy procedures during the hospitalization period and also to interruptions in the infusion of the diet

due to gastrointestinal complications, problems with the feeding tube, as well as delays in turning on enteral nutrition⁽⁶⁻⁷⁾.

The infusion of EN is the responsibility of the Nursing team to meet the basic human need for nutrition. It is up to this professional to pay attention to all aspects that can cause delays in the procedure, avoiding them as much as possible, given the importance of nutrition for the restoration of health status and prevention of complications, especially in critically ill patients. Thus, it is necessary to monitor the infusion of enteral nutrition in different institutions, identifying weaknesses in the process that can compromise the provision of the planned contribution to the patients, which can vary according to the profile of the institution.

Thus, the aim of this study was to evaluate the infusion of enteral nutrition in adult patients admitted to the intensive care unit. It is expected to contribute with information that favors the improvement of care practice aimed at the recovery of the patients.

Method

A descriptive and longitudinal study with a quantitative approach. Monitoring of EN infusion was carried out in all patients aged 18 years or older, who were using the therapy, and admitted to the intensive care unit, these being the inclusion criteria. Patients who spent less than 72 hours on enteral nutrition were excluded, as well as those whose information, for various reasons, could not be collected in full.

The intensive care unit where data was collected is inserted in a general hospital, of public education and large size, and is a reference in medium- and high-complexity care in the state of Minas Gerais. The institution has approximately 540 beds. The intensive care unit has 90 beds; and patient care is essentially provided by graduated nurses. The hospital has a very active multidisciplinary nutritional therapy team, which establishes care protocols and supports frontline nurses in all aspects related

to nutritional therapy, as well as it monitors its effectiveness.

Data collection was performed daily by a properly trained Nursing student, over four months (from August to November 2017). Collection took place on the first day of beginning the use of enteral nutritional therapy until its definitive suspension, either due to the restoration of the oral route, discharge from the intensive care unit or death. In order to characterize the study population, sociodemographic information (gender and age) was collected, as well as clinical data such as hospitalization diagnosis and the outcome of the monitored patient, in addition to data related to the beginning of the use of enteral nutrition, if the infusion was interrupted and the causes for its interruption, and the final balance of the infusion. All the data were collected from the medical charts and recorded in a specific form especially developed for this study.

It is an institutional protocol that every patient in an intensive care unit and in nutritional therapy must have their water balance performed daily, partially closed every six hours. Thus, the continuous infusion pump used to administer enteral nutrition is reset and the programming is restarted, making it possible to quantify the volume of EN administered. In addition, the calculation of the prescribed volume is made considering the infusion schedule in 20 hours during the day, already anticipating four hours of interruptions for the provision of care and the performance of different procedures, such as assistance from the multi-professional team.

The data were entered and analyzed in Excel, version 2013. Descriptive statistical analyses of percentage and relative frequency, and calculations of mean and standard deviation for continuous variables were performed.

The study was approved by the institution involved, as well as by the Research Ethics Committee (REC) of the *Universidade Federal de Minas Gerais* (UFMG), obtaining Opinion No. 2,232,124, CAAE: 72683417.3.0000.5149,

and respecting the guidelines of Resolution No. 466/12 of the National Health Council.

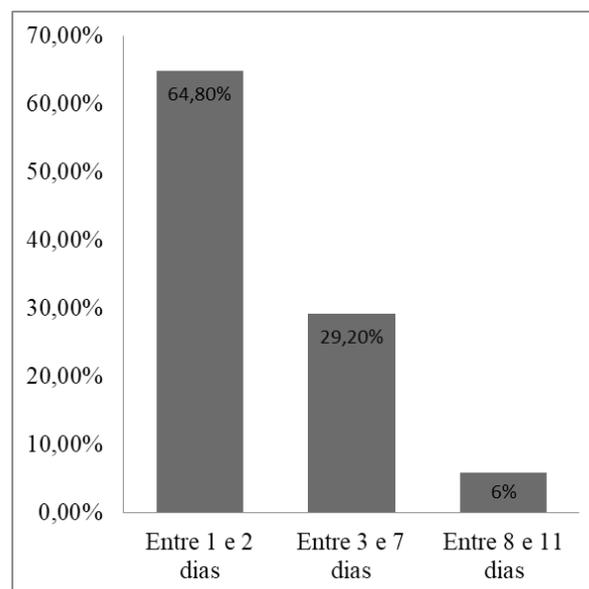
Results

Initially, 107 patients using enteral nutritional therapy for follow-up were included; of these, 28 were excluded for failing to meet any of the pre-defined criteria. In the end, the study included the analysis of the infusion of enteral nutrition in 79 patients, 50.6% of whom were female. The maximum age of the patients followed-up was 88 years old and the minimum was 18, the mean age in years old was 56.8 ± 18.88 . Among

the causes for hospitalization in the intensive care unit, neurological diseases prevailed (34%), followed by cardiac diseases (19%), respiratory diseases (12%), sepsis (10%), others (9%), postoperative period (6%), and neoplasms and transplants (5% each).

As for the start of enteral nutrition in relation to the admission of the patient to the intensive care unit, this occurred with a mean of 2.8 ± 2.4 days of hospitalization; the minimum time to start was 1 day and the maximum, 11 days. The majority (64.6%) began to receive EN 1 and 2 days after admission to the intensive care unit (Graph 1).

Graph 1 – Start of Enteral Nutrition in relation to the patient's admission to the Intensive Care Unit. Belo Horizonte, Minas Gerais, Brazil – 2017. (N=79)

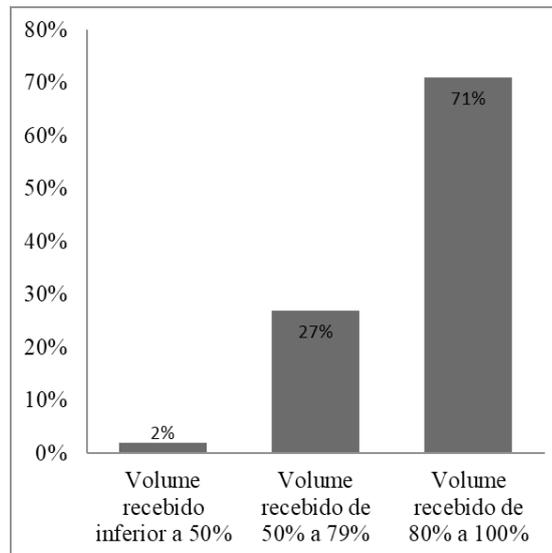


Source: Created by the authors.

According to Graph 1, a mean of 12.3 ± 11.8 days of use of enteral nutritional therapy was identified. As for the balance of the infusion of enteral nutrition, 71% of the patients

followed-up reached a percentage between 80% and 100% of the prescribed volume, as shown in Graph 2.

Graph 2 – Balance of the Infusion of Enteral Nutrition in Intensive Care Units. Belo Horizonte, Minas Gerais, Brazil – 2017. (N=79)



Source: Created by the authors.

During the follow-up period, 222 interruptions of EN infusion were recorded, of which 14% was due to complications with the nasoenteric tube (exit and obstruction), 12% due to the

patient's hemodynamic instability, and 12% due to gastric stasis. In 16% of the interruptions, the justification was not recorded (Table 1).

Table 1 – Distribution of the causes of interruptions in the Infusion of Enteral Nutrition in Intensive Care Units. Belo Horizonte, Minas Gerais, Brazil – 2017. (N=79)

Variables	Percentage (%)
No justified reason	16
Complication with the nasoenteral tube	14
Hemodynamic instability	12
Gastric residual volume	12
Exams	11
Tracheostomy/Surgery	9
Flow at Continuous Infusion Pump < Prescribed Flow	9
Complication of the Gastrointestinal Tract(vomiting/diarrhea)	6
X-ray	5
Other reasons	4
Extubation	2

Source: Elaborated by the authors.

Regarding the outcome of the monitored patients, 63.2% were discharged from the ICU, 7.7% returned to oral nutrition, and 29.1% died.

Discussion

In general, the results found show that the use of enteral nutritional therapy in intensive

care patients at the institution where the data was collected can be considered satisfactory. The therapy was started early in most of the cases followed-up, showing to be valued, and this conduct was able to effectively contribute to the patient's recovery. In addition, the early initiation of this therapy contributes to the prevention of harmful consequences from

prolonged fasting, which can cause bacterial and toxin translocation, increased permeability of the intestinal mucosa, bacterial overgrowth, hypermetabolism in response to injury, and release of pro-inflammatory mediators^(4-5,8). In a study developed with 32 patients, only in 50% was enteral nutrition started early⁽⁹⁾. However, in another study, a higher percentage was found than the results of this research, in which 77.2% also had an early infusion start⁽¹⁰⁾, indicating that this percentage can be improved in the researched institution.

In addition to having an early start, the results showed that 71% of the patients received 80% to 100% of the planned contribution, a result higher than the majority of the results of similar studies available in the literature. In one of them, in which the total volume of enteral nutrition received by 55 participants was analyzed and where the administration of at least 90% of the prescribed volume was considered adequate, it was observed that only 42% of the patients received the minimum expected volume of enteral nutrition, indicating that the majority did not reach 90% of the total target volume⁽¹¹⁾. In another study, only 36.1% of the patients reached a value $\geq 90\%$ of adequacy of the prescribed volume⁽⁶⁾ and in another, only 48% reached the contribution planned⁽¹²⁾.

Even though they are a minority, there are studies that show a closer proximity to the planned infusion target. In one of them, in which 53 adult patients were evaluated in the intensive care unit, it was found that the patients received 82.7% of the prescribed volume⁽¹³⁾. In another study, in which 93 patients were evaluated, a mean adequacy of 82.6% of the infused volume of enteral nutrition was found⁽¹⁴⁾. It should be noted, however, that in these studies it was not clear whether the infusion calculation was made foreseeing breaks for daily procedures, such as baths and dressings, as well as for physiotherapy, which can cause differences in the assessment of the findings.

In the case of patients admitted to the intensive care unit, interruptions in the infusion of enteral nutrition resulting from clinical and

hemodynamic complications have a high probability of occurrence due to the severity of the patients' clinical condition, which makes it difficult to achieve 100% effectiveness in the final balance of the enteral nutrition infusion⁽¹⁵⁾. In this study, clinical and hemodynamic instability was responsible for 12% of the interruptions; in these cases, there is no alternative but to interrupt the infusion of enteral nutrition, since its continuity would cause greater risks to the patients, such as aspiration of gastric content.

However, a significant percentage of interruptions in the infusion of enteral nutrition also occurred for other reasons, the most prevalent being mechanical problems with the nasoenteral tube (14%), followed by complications related to enteral nutrition tolerance, with presence of gastric residual volume (12%), and also related to the exam (11%), findings that corroborate results of other published papers, varying in their proportions⁽¹²⁻¹³⁾. In one of them, the main cause of interruption was fasting to perform procedures (20.2%), differing from the findings of this study, with 18% of the complications related to the nasoenteral tube and 15.9% to gastric residue, in addition to intensive care unit procedures (11.5%) and hemodynamic instability (9.3%)⁽¹³⁾. Gastrointestinal complications, such as high gastric residue, diarrhea, vomiting and constipation, combined, represented 26.8% of the complications⁽¹³⁾. In another study, the causes of interruption were, for the most part, mechanical problems with the catheter (36%), followed by hemodynamic or clinical instability (33%), complications of the gastrointestinal tract (15%), fasting for exams (12%) and fasting for procedures and surgeries (4%)⁽¹²⁾.

Even presenting a better result compared to other studies regarding mechanical complications with the nasoenteral tube, it is a complication preventable with Nursing care and which can reach even lower percentages with training of the team. The externalization of the nasoenteral tube can result from psychomotor agitation, neurological disorder or during the patient's locomotion, as well as from coughing, nausea

or vomiting, or withdrawal^(3,16), situations that can be discussed and controlled with multi-professional performance, aiming to avoid harms to the patient. An essential care measure for the prevention of nasoenteral tube loss is in the daily assessment of the fixation of the nasoenteral catheter with care when handling the patient, as well as protecting its external position in order to hinder its removal by the patient⁽³⁾.

Among the mechanical complications related to the use of the nasoenteral tube, obstruction stands out, which almost always results from lack of irrigation with water at necessary times and/or periodically, such as before start and at the end of the infusion of the diet, and before and after the infusion of medications. It can also result from the interaction between medications or between medications and enteral nutrition, which should be discussed with the multi-professional team, by consulting the available literature on the subject matter, in order to avoid interactions that favor obstructions^(3,16-17).

Regarding interruptions related to gastric stasis, in this study, the results were more difficult to compare with the literature, since it was scarcely mentioned as the cause of interruption of infusion in isolation, often being included in the category of gastrointestinal complications in an expanded manner. In a study in which the gastric residual volume was described in isolation, a slightly higher percentage (15.9%) was found when compared to the findings of this research (12%)⁽¹³⁾.

It is worth noting that, in the institution where the research was conducted, the recommended institutional protocol in force at the time of data collection for patients admitted to the ICU was the verification of gastric stasis every 6 hours and guided towards interruption, in case the volume found was equal to or greater than 250 ml. It was recommended that 3 hours should be waited until a new patient evaluation was carried out, only then to restart enteral nutrition.

It should be noted that this protocol was being reviewed at the end of data collection by the institution's Multi-professional Nutrition Therapy Team (MNTT), with a propensity for its suspension,

in compliance with the recommendations of the American Society of Parenteral and Enteral Nutrition (ASPEN) and the European Society of Parenteral and Enteral Nutrition (ESPEN), which recommend that monitoring of gastric residual volume should not be routine in critically ill patients. This approach is indicated in specific situations, and EN suspension should only occur in volumes greater than 500 ml, when other strategies have been adopted without positive results⁽¹⁸⁻¹⁹⁾.

In a study conducted in Japan, 14% of gastrointestinal complications were found, as well as diarrhea in 13% of the cases. These complications are also problems related to diet tolerance, as well as to the presence of gastric residual volume, and the use of prokinetics should be discussed with the team, as well as the formula used and the infusion speed, in order to contribute for them to be corrected⁽²⁰⁾.

Few studies cited problems related to the lack of records on the causes of interruption, as found in this research (16%). This result signals the existence of problems of effective communication among the team members, which ends up compromising not only safety and quality of care, but also care management, noting that complete and clear records about the patient's situation and complications are professional duties provided for in the legislation. A study carried out with patients admitted to the intensive care unit and wards concluded that frequent interruptions in the infusion of enteral nutrition signal lack of awareness about the importance of enteral nutritional therapy by the health professionals and show communication failures in the team⁽²¹⁾, which is corroborated in this study.

As for the interruption due to fasting for exams and procedures, this is a difficult cause to avoid; however, it should be considered both when planning the infusion of enteral nutritional therapy and when evaluating the infusion balance in these units. However, these interruptions should be as brief possible, with a request to streamline the procedures/exams and determine fasting in the shortest period

of time necessary. It is worth mentioning that, currently, diverse means for the confirmation of faster positioning have been tested, such as by checking the pH, performed by the Nursing team at the bedside, which can contribute to the speed of the infusion of enteral nutrition, since it does not require any X-ray and time lost with its performance⁽²²⁾.

To the factors related to the effectiveness of the infusion of enteral nutrition, we must add flaws in the programming of the infusion pump and delays in starting the infusion of enteral nutrition. These are results that reinforce the need for permanent education of the Nursing team, based on current recommendations and evidence aimed at the practice of safe and quality nutritional therapy, since it is a therapy that involves risks and requires trained staff for its conduction⁽²³⁾.

It is believed that the results of this research may contribute to improvements in care planning, not only for the institution's intensive care unit where the data were collected, but also for other institutions, even for allowing the comparison of findings. In this study, the priority was to compare the findings with the national literature in view of the greater similarity with the working conditions of the intensive care units. In North American and European countries, for example, the composition of the Nursing team differs greatly from the Brazilian context, in which there is a technical division within Nursing with the performance of nursing technicians, and not only of graduated professionals, as occurs in other countries.

Conclusion

The findings of this study allow us to assert that the infusion of EN in ICU patients can be considered satisfactory, with early initiation of this therapy and the contribution achieved in the infusion of enteral nutrition close to that planned. These data indicate the quality of the care team, mainly composed of graduated nurses, as well as the performance of the nutritional therapy multidisciplinary team.

However, the findings also show weak points to be improved, specifically with regard to the prevention of complications related to the use of the nasoenteral tube, as well as in the records related to the causes of diet interruption. The information in this research may support the training of the Nursing team, aiming to improve the care practice not only in the institution where the study was conducted, but also in other institutions. It is suggested to carry out new studies on this theme in view of the importance of ensuring the effectiveness of the infusion of enteral nutrition in different services, aiming at maintaining the nutritional status of patients in intensive care, an essential condition for their full recovery.

Contributions:

1 – conception, design, analysis and interpretation of data: Sterline Therrier, Clara Marize Carlos, Raquel Fernandes Costa and Jaqueline Almeida Guimarães Barbosa;

2 – writing of the article and relevant critical review of the intellectual content: Sterline Therrier, Clara Marize Carlos, Raquel Fernandes Costa, Giovana Paula Rezende Simino and Jaqueline Almeida Guimarães Barbosa;

3 – final approval of the version to be published: Sterline Therrier, Clara Marize Carlos, Raquel Fernandes Costa, Giovana Paula Rezende Simino and Jaqueline Almeida Guimarães Barbosa.

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