

Chapter 2

Guidelines for specialized nutritional and metabolic support in the critically-ill patient. Update. Consensus SEMICYUC-SENPE: Indications, timing and routes of nutrient delivery

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Abstract

This article discusses basic features of nutritional support in critically-ill patients: general indications, the route of administration and the optimal timing for the introduction of feeding. Although these features form the bedrock of nutritional support, most of the questions related to these issues are lacking answers based on the highest grade of evidence. Moreover, prospective randomized trials that might elucidate some of these questions would probably be incompatible with good clinical practice. Nevertheless, nutritional support in critically-ill patients unable to voluntarily meet their own nutritional requirements is currently an unquestionable part of their treatment and care and is essential to the successful management of their illness.

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Key words: *Early enteral nutrition. Parenteral nutrition. Postpyloric nutrition.*

Introduction

Nutritional support (NS) is an essential part of the treatment of the critically-ill patient who cannot take oral food. The hypermetabolism characterizing these patients leads them quickly to a state of acute malnutrition¹. This state of malnutrition and lack of nutritional support is associated with a poorer clinical prognosis².

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SEMICYUC: Spanish Society of Intensive Care Medicine and Coronary Units.
SENPE: Spanish Society of Parenteral and Enteral Nutrition.

RECOMENDACIONES PARA EL SOPORTE NUTRICIONAL Y METABÓLICO ESPECIALIZADO DEL PACIENTE CRÍTICO. ACTUALIZACIÓN. CONSENSO SEMICYUC-SENPE: INDICACIONES, MOMENTO DE INICIO Y VÍAS DE APORTE

Resumen

En este artículo se recogen aspectos básicos del soporte nutricional en los pacientes críticos: el relacionado con las indicaciones generales, la vía de administración y el momento más indicado para su inicio. pese a ser aspectos referidos a los cimientos del soporte nutricional, todavía no se ha podido responder con grado máximo de evidencia a la mayoría de las cuestiones que plantea y, además, probablemente no puedan realizarse estudios prospectivos y aleatorizados en el futuro que den respuesta a estas cuestiones, por invadir aspectos incompatibles con la buena práctica clínica. pese a todo ello, hoy día el soporte nutricional de los pacientes críticos, con incapacidad para recibir de forma voluntaria todos los requerimientos nutricionales necesarios, es un punto indiscutible del tratamiento y cuidado que necesitan los pacientes críticos para afrontar con éxito la enfermedad.

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Palabras clave: *Nutrición enteral precoz. Nutrición parenteral complementaria. Nutrición pospilórica.*

Specialized NS (SNS) not only has nutritional interest, but is also a tool to modify the response of the body against aggression. Certain nutrients and their route of administration have a prominent role at specific times in the course of the critically-ill patient.

NS can be administered by the enteral route (EN, enteral nutrition) and/or by the intravenous route (PN, parenteral nutrition), with different access routes, different complications and disparate efficacy.

Is specialized nutritional support indicated in critically-ill patients?

Many patients cannot be nourished orally while admitted to the intensive care unit (ICU). It is not possi-

ble to conduct controlled studies, on ethical grounds, to establish what period of fasting should be considered for indicating SNS. There have been reports of increased mortality and longer ICU stay in malnourished than normonourished patients³. Although it is necessary to go back to the study by Sandstrom et al.⁴ to confirm increased mortality due to nonadministration of NS to patients who did not take oral food for 14 consecutive days, recent studies in critically-ill patients have shown that the cumulative deficit in calorie intake is associated with more complications, both infectious and noninfectious, and a longer period of mechanical ventilation than with complete nutritional intake⁵. A recent meta-analysis analyzing published intention-to-treat studies showed greater mortality in patients receiving delayed enteral nutrition than in those receiving early parenteral nutrition, suggesting that combating malnutrition is more important than the route of nutritional support itself⁵ (Ia). In critically-ill patients who will not receive a complete oral diet for 3 days, specialized nutritional support should be started, both enteral⁶ (IV) and parenteral⁷ (IV).

Does early administration result in a different prognosis?

Early administration of SNS is an indicator of healthcare quality in critically-ill patients⁸. At present, there are several clinical guidelines recommending that EN should be started in these patients within 24-48 h of admission to the ICU^{7,9,10} (IV).

Early administration has been associated in some groups of critically-ill patients with improved tolerance of the diet, decreased intestinal barrier dysfunction, reduction of infections and days of hospitalization¹¹ (Ia), and a decrease in days of mechanical ventilation¹² (Ib).

A problem when analyzing this subject is the inconsistency in the definition of early administration, ranging from 24 to 72 h from admission to the ICU. In addition, the control groups were not uniform, comparing early EN with PN, with delayed EN, with standard care/ intravenous fluids or oral nutrition, once intestinal transit is reestablished.

Currently, several meta-analyses in different patient groups in which this problem has been studied have confirmed a significant decrease in mortality and hospital stays in patients with intestinal surgery. A significant reduction in infections and hospital stay was confirmed in a mixed group of acute patients¹³ (Ia).

In a meta-analysis that analyzed 14 randomized trials of patients admitted to ICUs¹⁰, a downward trend in mortality ($p = 0.06$) and a statistically significant reduction in infectious complications was found in the early EN group¹⁰ (Ia), though there were no differences in other variables, including length of stay or days on mechanical ventilation. In another recent meta-analysis, early initiation of EN support in the first 24 hours

after admission or the aggression was analyzed. Six randomized clinical trials involving 234 patients were included, revealing a significant decrease in mortality and the incidence of pneumonia in the group nourished within 24 hours. While this is the first meta-analysis that has shown a reduction in mortality attributable to early administration of NS, as not all groups of critically-ill patients are represented, the authors themselves recommend the judicious application of these findings in clinical practice¹⁴ (Ia).

When should the calorie objective be achieved?

Several studies have reported that the cumulative calorie deficit in critically-ill patients is associated with an increased rate of infectious complications and a longer ICU stay^{5,6} (III).

However, it is not clear what the calorie objective should be and in what period it should be reached. The studies analyzed show that an increase for a short interval in energy intakes may be associated with a better course. A randomized study in patients with severe head injury (SHI) who were administered early EN with a rapidly progressing regimen, showed that patients with a more rapid administration had a significant reduction in the rate of infections and improved neurological scores¹⁵ (Ib). A program for implementing nutritional guidelines in critically-ill patients revealed that patients who achieved a greater nutritional intake during the first week had a downward trend in mortality (27 vs 37%; $p = 0.058$) and hospital stay¹⁶ (Ib).

There are no studies proposed on the period to achieve the established energy objectives. The period in which these objectives are to be reached, according to the recommendations of some authors, would be about 48-72 hours after the start of nutritional support⁹ (IV).

Does the administration route of nutritional support influence the prognosis of critically-ill patients?

Studies in experimental animals have shown that NS via the parenteral route leads to a change in the intestinal microbiota, loss of intestinal barrier function, disturbances in intestinal macrophage function, and increased release of cytokines¹⁷. Studies in humans conducted in the 1990s, referring particularly to patients with abdominal trauma and in the postoperative context of abdominal surgery, have shown that when administration of PN is compared with the enteral route in patients with a functional gastrointestinal tract, the use of PN is associated with a significantly higher rate of infection and days of hospitalization^{18,19} (Ib).

A systematic review analyzing 13 randomized trials comparing use of the enteral route with the parenteral route in critically-ill patients found that patients with PN showed a higher number of infectious complica-

tions than the group with EN. Some studies included reported lower costs and a lower hyperglycemia rate when using the enteral route, though no difference was seen in mortality or in duration of mechanical ventilation²⁰ (Ia). Some authors²¹ have considered that the higher rate of infectious complications associated with PN could be related to less strict glycemia management protocols than those used currently. A recent review noted that some of the severe complications of PN referred to more than 2 decades ago. These do not occur today due to increased knowledge of PN in terms of calorie and protein needs, which has decreased provision of macronutrients, as well as improved control of glucose levels and improved management of central catheters²² (IV).

A meta-analysis on intention-to-treat studies⁵ (Ia) states that patients receiving EN initiated more than 48 hours after ICU admission had greater mortality than the group with PN, which led authors to recommend the use of PN if critically-ill patients were not able to receive EN in the first 24 hours, arguing that the complications associated with malnutrition for not starting nutrition early were greater than the complications from parenteral administration.

The access technique and protocol for maintenance of the IV catheter for PN or the feeding tube for the EN, as well as the different composition of nutrients for parenteral or enteral administration, and the method of delivery of both administration routes, are the origin of the different complications related specifically to the route of administration. In the incidence study of complications conducted by the Metabolism and Nutrition Working Group of the SEMICYUC in 2005, including over 800 patients with SNS, a different rate of complications was observed referring specifically to the route of administration^{23,24}.

What are the indications for postpyloric enteral nutrition?

The mechanical complications of EN are very common, particularly increased gastric residue due to sustained gastroparesis. This complication frequently leads to inadequate intake or even to discontinuation of the diet. The prevalence study of complications of SNS conducted by the Metabolism and Nutrition Working Group of the SEMICYUC in 2005 shows up to 25% of discontinuation of the diet at some time during treatment as a result of this complication²³. It has been shown using radioisotopes that patients with a nasojejunal tube have a lower rate of microaspirations than with a nasogastric tube²⁵ (Ib). However, when it was attempted to relate this finding to a lower rate of pneumonia from bronchial aspiration, no benefit was found²⁶ (Ib). In a meta-analysis²⁷ (Ia) of 11 randomized trials comparing the gastric and jejunal routes, no reduction was seen in the rate of pneumonia, both with simple jejunal tubes or double lumen

tubes for gastric decompression. To this should be added the difficulty in tube insertion, the frequent need for accessory techniques for placement and the higher rate of complications in their use. In specific conditions, such as severe acute pancreatitis, or in patients with elevated gastric output, their use may be considered for the purpose of reducing the use of PN in these patients²⁸.

What are the indications for complementary parenteral nutrition?

Several studies^{16,29} (IIa) have shown that in daily clinical practice it is difficult to reach the nutritional objectives during the first days of hospitalization due to discontinuations of the diet related to gastrointestinal intolerance³⁰ or other reasons (radiological examinations, endoscopic techniques, surgical procedures), with the result that nutritional intake in up to 60% of patients is less than that prescribed³¹. The low intake of EN is associated with increased complications³². Numerous authors recommend that at least 80% of needs should be covered, though the objective should be 100% of nutritional requirements^{33,34} (IV). However, some studies show surprising results, in the sense that critically-ill patients do not appear to benefit from the complete provision, suggesting that it is more appropriate to administer 33-66% of nutritional objectives³⁵ (IIb). There is agreement in all recommendations to prevent hypernutrition. Some groups of experts recommend combining complementary PN if after 72 hours from admission at least 60% of calorie and protein needs³⁴ (IV) has not been achieved.

In the patients who did not receive the planned intake of EN and whose requirements were completed with PN, a reduction in hospital stay has been noted, with no difference in the mortality rate³⁶ (Ib). In these cases, a daily assessment of the amount to be supplemented should be performed to prevent exceeding nutritional needs⁸ (IV). In patients with intact gastrointestinal tract, PN started at the same time with EN does not have benefits³⁷ (IV).

Recommendations

- Critically-ill patients who are not expected to receive a complete oral diet for at least 3 consecutive days should receive specialized nutritional support (C).
- In critically-ill patients, enteral nutrition started early decreases infectious complications and length of stay, and shows a trend towards reduction in mortality (A).
- In certain groups of critically-ill patients, earlier enteral administration (within 24 hours) significantly reduces mortality and incidence of pneumonia (A).
- An attempt should be made to cover the energy objective within the first 48-72 hours after onset of enteral support (C).

– Parenteral nutrition is associated with a higher rate of infectious complications than enteral nutrition, but no differences have been shown in mortality or days of mechanical ventilation (A).

– Delay in reaching the nutritional objectives with enteral nutrition may be associated with complications that outweigh its benefits over parenteral nutrition (B).

– Complementary parenteral nutrition should be started when 60% of nutritional requirements are not met at the fourth day of admission, or for at least 2 consecutive days during the hospital stay (C).

– Routine or standard use of the nasojejunal tube in critically-ill patients is not associated with increased efficacy in provision of enteral nutrition or a lower rate of infectious complications (A). In a situation of persistent increase in gastric output with a high risk of bronchial aspiration or severe pancreatitis, its use can be considered (C).

Conflicts of interest

The authors state that they have participated in activities financed by the pharmaceutical industry for marketing of nutritional products (clinical studies, educational programs and attendance at scientific events). No pharmaceutical industry has participated in the preparation, discussion, writing and establishing of evidence in any stage of these recommendations.

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