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Nutrition Support Team Can Reduce Nutritional Product Expense: An Implementation in a Neurology Intensive Care Unit

Zeynep Parlak Özer[1], Tuba Ustaoğlu[2]

[1]Department of Gastronomy and Culinary Arts, Hasan Kalyoncu University, Faculty of Fine Arts and Architecture, Gaziantep, Turkey
[2]Department of Nutrition and Dietetics, Sanko University, Faculty of Health Sciences, Gaziantep, Turkey

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ABSTRACT

Objective: "Quality and Accreditation for Qualified and Effective Health Services" of the Health Transformation Program of Turkey mandated the establishment of nutrition support team in hospitals in 2016.
Methods: Nutrition support team was set up for the Neurology Intensive Care Unit of Gaziantep 25 Aralık State Hospital at the end of 2016 to manage the complex nutritional needs of the patients. Pre-nutrition support teams' nutritional requirements were defined by the patients' doctors, whereas after 2016 nutritional therapy and interventions were defined by doctors, dieticians, and nurses of nutrition support team.
Results: This study evaluates the effectiveness of nutrition support team on the hospital cost and improvement of the treatment. The parenteral nutrition products in energy decreased from 75.98% to 39.02% and the enteral products in total energy increased from 24.02% to 60.98% after nutrition support team. The total product expenses decreased from 80 029.53 ₺ to 75 550.00 ₺.
Conclusion: The Hospital Quality Standards require the establishment of the nutrition support team which helps to decrease nutrition product expenses and increase energy supply via enteral nutrition products instead of parenteral nutrition products.

Keywords: Nutritional product expense, enteral, parenteral nutrition, nutrition support team, hospital cost

INTRODUCTION

Nutrition support team (NST) is a multidisciplinary, inter multidisciplinary, transdisciplinary team consisting of doctors, dieticians, nurses, and pharmacists.[1] The main purpose of the NST is to advise the healthcare professionals responsible for the nutritional needs of patients.[2] Nutrition support team reports to the hospital management on cost savings and quality.[3]

Research studies are conducted to evaluate the effectiveness of the NST on the incidence of infection, mortality, and morbidity caused by diseases related to malnutrition, length of hospital stay, and nutritional deficiencies.[4,5] Furthermore, the effects of NST on the direct cost of the products and the cost of secondary complications caused by infections and metabolic complications are investigated.[6-8]

"Quality and Accreditation for Quality and Effective Health Services" is included in the Health Transformation Program in Turkey, and in this connection "Regulation on the Development and evaluation of Quality in Healthcare" was published in the official gazette 29399 dated 27.06.2015.[9] "Quality Standards in Health Hospital-Version 5" prepared by the Department of Quality and Accreditation in Health Care Services stipulates "making arrangements for the nutritional support needs of patients by establishing NST".[10]

The pre-NST patient's needs for enteral nutrition and parenteral nutrition and monitoring the therapeutic effects and side effects of nutrition therapy were physician-centered, whereas post-NST services are provided by multidisciplinary team members.[11]

The evaluation of the effectiveness of NST in Turkey is important for the development of new policies and practices.

The objective of the study is to compare the total enteral parenteral nutrition energies and the costs between the periods: 2 years before and 2 years after the establishment of NST in which the team actively worked in the Neurology Intensive Care Unit (ICU).

Corresponding author: Zeynep Parlak Özer, e-mail: zeynep.parlakozer@hku.edu.tr

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METHODS

The research was approved by the Gaziantep University Clinical Research Ethics Committee on May 27, 2020 (Decision number 2020/121).

This study was planned as a retrospective study. The change in the nutritional product usage and expense of the Neurology ICU of 25 Aralık State Hospital which accepts neurological diseases such as acute stroke and Parkinson, with a bed capacity of 10 patients, over the years (2015-2018) have been evaluated.

The nutritional requirements of the patients were defined by the doctors of the Neurology ICU before NST. After 2016, nutritional requirements were defined by multidisciplinary NST, whose members consist of a doctor, a dietician, and a nurse.

The monthly consumption and the cost data of the enteral and parenteral nutrition products were obtained for pre-NST and post-NST periods from the automation system in Excel format. The annual budget and the budget allocated for the purchase of medical drugs were obtained from the chief physician of the hospital.

Ready-to-use nutritional products were included in the enteral product cost as well as ready-to-use 3-chamber bag systems containing amino acid, glucose, and fat emulsions. The expense of manpower and disposable medical supplies were not taken into account.

Calculation of Product Energies, Protein, Product Expenses, Percentage of Expenditure in Hospital Budget and, in the Pharmaceutical Budget

The total energy contents of the products were calculated by multiplying the energy content in the packaging by the amount of product used.

Main Points

- This study is a single study examining the effect of nutrition support team on the hospital expences and the product use.
- The NST increased the total energy supplies to the patients and the energy supplied from the enteral nutrition product instead of the parenteral nutrition products.
- The NST reduced the total product cost and proportions of the product cost in drug budget and hospital budget.
- The necessity of the Hospital Quality Standards of NST helped to save costs in the hospital.

The total protein of enteral products was calculated by multiplying the protein content in the packaging by the amount of enteral nutrition product used.

The product cost is calculated separately for each item by multiplying the price of the product by the amount of product used.

$$\text{The percentage cost in the hospital budget}(\%) = \frac{\text{Total monthly product cost}}{\text{Hospital budget}} \times 100$$

$$\text{The percentage cost in the drug budget}(\%) = \frac{\text{Total monthly expenses}}{\text{The drug budget}} \times 100$$

RESULTS

The energy, protein content, and costs of the enteral and parental products before and after NST, the percentage of the expenses in the drug budget, and the percentage of the expenses in the hospital budget are given in Table 1.

Energy

The total energy provided by the enteral and parenteral products in pre-NST was 3 013 793 kcal. The enteral nutrition products and parental nutrition solutions provided 24.02% and 75.98%, respectively (Figure 1A).

In post-NST, 60.98% of 3 424 303 kcal energy was provided by enteral nutrition products; 39.02% was provided by parenteral nutrition products (Figure 1B).

Protein

Proteins obtained from enteral products before and after NST are 37 385.2 g and 97 972.3, respectively.

Product cost

The costs of the enteral and parenteral nutrition products before NST were 5461.00 ₺, and 74 267.00 ₺, respectively. The costs of the enteral and parenteral nutrition products after NST were 15 163 ₺, and; 60 387.75 ₺, respectively.

The total cost of the products decreased from 80 029.53 ₺, to 75 550.00 ₺,.

While the enteral product cost was 7.30% of the total product cost before the NST, post-NST it increased to 20.07%. The cost of parenteral nutrition products decreased from 92.7% of the total cost to 79.03% (Figure 1C).

Table 1. Enteral and Parenteral Nutrition Products Energy, Protein, Cost, Percentage of Products Cost in Drug Budget, and Percentage of Product Cost in Hospital Budget

	2015-2016			2017-2018		
	Enteral Nutrition Products	Parenteral Nutrition Products	Total	Enteral Nutrition Products	Parenteral Nutrition Products	Total
Energy (kcal)	724 143	2 289 650	3 013 793	2 089 783	1 337 520	3 424 303
Energy (%)	24.02	75.98		60.98	39.02	
Protein (g)	37 385.2			97 972.3		
Cost (₺)	5761.00	74 267.00	80 029.53	15 163	60 387.75	75 550.00
Cost (%)	7.30	92.7		20.07	79.03	
Percentage of product cost in drug budget (%)	0.16	2.02	2.18	0.06	1.54	1.61
Percentage of product cost in hospital budget (%)	0.007	0.091	0.09	0.008	0.06	0.036

Percentage of product cost in drug budget

Pre-NST costs of the enteral and parenteral nutrition products in the drug budget were 0.16% and 2.02%, respectively.

Post-NST costs of the enteral and parental nutrition products in the drug budget were 0.06% and 1.54%.

The total cost of the enteral and parenteral nutrition products in the pharmaceutical budget decreased from 2.18% to 1.61%.

Percentage of product costs in the hospital budget

The pre-NST costs of the enteral and parenteral nutrition products in the hospital budget were 0.007% and 0.09%, respectively.

The post-NST costs of the enteral and parenteral nutrition products in the hospital budget were calculated as 0.008% and 0.06%, respectively.

The total cost in the hospital budget decreased from 0.1% to 0.04%.

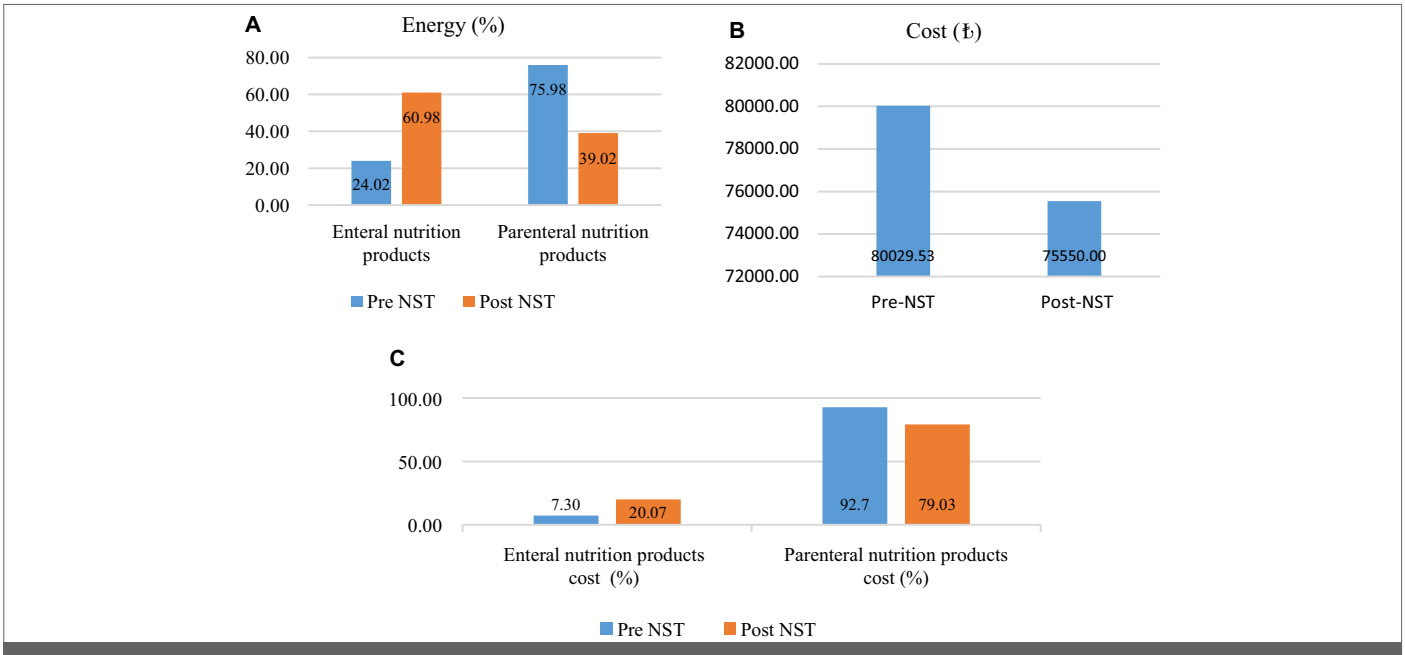

Figure 1. (A) Energy (%), (B) total cost w, and (C) enteral, parenteral nutrition products cost (%).

DISCUSSION

Malnutrition increases healthcare spending.[12] Prevention of diseases related to malnutrition also contributes to cost savings.[4] Nutrition support has positive effects on malnutrition, morbidity, mortality, length of hospital stay, and reduction of recovery time.[7]

The prevalence of malnutrition is 23.9% in hospitalized neurology patients and 52% in ICU.[13] In a study by Hafsteinsdóttir et al.[14], it was determined that 34% of the patients were at risk of malnutrition, 7% were malnourished, and 59% were well-nourished according to Mini Nutritional Assessment (MNA) on the first day of hospitalization in the Neurology ICU. However, 10 days after hospitalization, 57% of the patients were found to be at risk of malnutrition, 22% were undernourished, and 21% were well fed. It has been determined that the risk of malnutrition in the Neurology ICU increases with the length of hospital stay.[14]

In our study, it was determined that the intervention of NST increased the total energy and protein obtained from enteral nutrition solutions. It was found that the total energy obtained from the products also increased. It has been reported in the literature that NSTs provide more energy and protein.[15,16]

In addition to the increase in the total energies provided, the presence of NST has been found to shorten the time to start feeding and to achieve higher percentages of the energy and protein intakes.[11] Our study does not take into consideration the number of patients; we considered only retrospectively the total product use and cost. Since the volume and energy differences of the enteral and parenteral nutrition solutions used are taken into consideration, the energy provided for each product used was calculated and comparisons were made on this basis.

During the periods when the NST worked actively, the total energy provided was higher than the pre-NST.

Gönderen et al. reported that the use of parenteral nutrition of the nutritional support supplement decreased by 30%, the number of patients using enteral nutrition products increased by 42%, and this reduced the total nutritional cost.[17] Total Parenteral Nutrition (TPN) increases the cost of hospitalization.[18] Multidisciplinary decision-making on the use of parenteral nutrition products reduces hospital costs.[19] It has been reported that the nutritional support team reduced the use of inappropriate parenteral products from 16.5% to 8.9%. In a study examining retrospective nutrition records, it was reported that 14 of 176 people who received TPN within 12 months used inappropriate total parenteral nutrition for a total of 87 days, and if they received enteral nutrition solution support with the recommendation of the NST, the expense would be $2430. It has been found that stopping it prevents $45 186 additional hospital expenses.[20]

It has been determined that NST can prevent the use of inappropriate parenteral nutrition products.[21] In another study, the effect of the nutritional support team on the use and cost of the product was evaluated, and it was found that the use of parenteral nutrition products was reduced and the cost per patient decreased from £100 to £55.[6] In our study, direct product cost was studied, but in the light of the literature, it is known that in addition to the direct cost of parenteral nutrition, the complications associated with parenteral nutrition and developing complications also incur additional costs.[20]

The energy provided by the nutritional products after NST increased and the product cost decreased. This was due to the use of enteral nutrition products with lower cost isocaloric or hypercaloric options instead of ready-to-use parenteral nutrition bags. Since the enteral nutrition products are more affordable than the parenteral nutrition, reducing the use of high-priced parenteral nutrition solutions results in a reduction in NST medical expenses.[22] While more energy can be provided with the right product selection and rational use, product expense can be reduced.

The NST has the potential to positively impact enteral nutrition management in ICU, by continuing education and nutrition management protocols.[23]

Cost-effectiveness studies show that money can be saved, but nutritional intervention does more than saving money, such as improving disease-related malnutrition, improving quality of life, and preventing secondary complications.

Kennedy and Nightingale evaluated the tangible cost impact of the nutritional support team, use of the parenteral nutrition, and reduction of parenteral nutrition-associated sepsis resulting in a gain of £50.715. In this study, tangible costs, medical equipment, examinations, and medication costs are included.[3] In our study, only the cost of the products was calculated, and the equipment used was not added to the expense. In our study, since the energy components of nutritional support products are not standard, the number of products used was not compared, the energy provided with the products was compared and the direct effect of the NST on the product expense was investigated.

Cost-benefit analysis revealed a $4.20 benefit for every $1 invested in NST management.[23]

The duties of health professionals in the NST in hospitals may differ.[1] Following the hospitalization of a patient, the nutritional status is evaluated by the responsible nurse, and an electronic health record is created for the nutritional status evaluation. Nutrition support team interviews the patient after the review of the health record. Physician in the NST determines the route of nutrition of the patient with nutritional indicators. The dietitian determines the nutritional needs, makes the product selection, and consults the doctor about the dose of the product. The physician, dietitian, and nutrition nurse follow-up together on the complications related to nutrition. In addition to keeping electronic nutrition records of each patient, the nutrition nurse gives approval electronically for the product to be released from the hospital pharmacy after the request of the patient's doctor. The products released from the pharmacy are checked by the nurse. In cases of the wrong type and dose, the nurse rejects the delivery of the product from the pharmacy and can send a message to the relevant physician and pharmacy with the reason for the rejection. This ensures that the wrong product use, excess and unavailable product requests are prevented. It is reported in the literature that the use of electronic medical records can reduce nutritional costs.[8]

The NST evaluates the patient's nutritional status, calculates the patient's needs, determines the route of nutrition and product selection, and gives approval when the recommended product is released from the hospital pharmacy. The electronic nutrition management record and electronic nutrition administration record within the electronic medical record system used in the hospital are very important in terms of confirming the accuracy of the product delivery from the pharmacy and following the implementation of the recommendations of the NST.

The use of nutrition products in the neurology ICU, whose number of beds did not change for 4 years, was evaluated in the study. In the NST, the dietitian and nurse carry out the daily patient evaluation together with the responsible physician of the ICU. The pharmacist is not in the NST, but in the nutrition committee to purchase the hospital nutrition products. With the active work of the NST, the use of parenteral nutrition products decreased; it was found that the use of enteral nutrition products increased and the total energy given was increased. It has been shown that with the rational use of products, the cost can be reduced and the benefit increased.

It has been determined that while providing more energy, the product's expenses are decreased. This is due to the use of enteral nutrition solutions with lower unit prices instead of the use of parenteral products with a high unit price. On the other hand, it is considered that feeding by parenteral nutrition products consists only of macronutrients and needs to be supplemented by vitamins and minerals into products pocket, which leads to other tangible costs.

The total energy given before the NST is 3 013 793 kcal, and the energy given after the NST is 3 424 303. Total product costs before and after the NST are 80 029.54 ₺, and 75 550.00 ₺, respectively. It has been shown that with the rational use of products, the cost can be reduced and the benefit increased. The necessity of the Hospital Quality Standards of NST helped to save costs in the hospital. This study has limitations. One of them is that is single-center. There is a need for multi-center studies investigate the effect of nutritional support teams on hospital expences in Turkey. In addition, the other limitation is that the medical supplies, examinations, medications and, man power were not evaluated while examining the effect of the NST on hospital expence. It is recommended to consider the limitations for planning future studies.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Gaziantep University (Date: May 27, 2020, Number: 2020/121).

Informed Consent: Since patient data were not used in this study, written informed consent was not obtained.

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