ANALYSIS OF PARENTERAL NUTRITION COSTS

ANÁLISE DE CUSTOS DE NUTRIÇÃO PARENTERAL

ANÁLISIS DE COSTOS DE NUTRICIÓN PARENTERAL

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ABSTRACT

Objective: to evaluate the cost involved in the preparation of parenteral nutrition in a university hospital when acquired from a third party company. **Method:** this is a quantitative, descriptive, exploratory study with retrospective data analysis. The data was obtained through the medical prescriptions and fiscal notes of the PNs. The average costs, in reais, of the prescription PNs practiced by the outsourced company were calculated for the comparison of costs, the estimated value of the hospital production compared to the UHS compensation amount, according to the Management System table of the UHS Procedure Table (SIGTAP). Results were presented in the form of tables. **Results:** 1818 prescriptions were analyzed, being 51.05% of adult prescriptions; 22.71% of Pediatrics and 26.24% of Neonatology. **Conclusion:** it is concluded that the amounts paid by the UHS are lower than those spent by the health services, regardless of the type of PN production. This study is considered important to assist hospital managers in decision-making. **Descriptors:** Costs and Cost Analysis; Cost Allocation; Organization and Administration; Hospital Costs; Parenteral Nutrition; Parenteral Nutrition Solutions.

RESUMO

Objetivo: avaliar o custo envolvido no preparo da nutrição parenteral em hospital universitário ao adquirido de uma empresa terceirizada. **Método:** trata-se de um estudo quantitativo, descritivo, exploratório com análise retrospectiva de dados. Obtiveram-se os dados por meio das prescrições médicas e notas fiscais das NP's. Calcularam-se, para a comparação de custos, os custos médios, em reais, das NP's por prescrição praticados pela empresa terceirizada, o valor estimado da produção no hospital comparado com o valor de ressarcimento pelo SUS, de acordo com a tabela Sistema de Gerenciamento da Tabela de Procedimento (SIGTAP) do SUS. Apresentaram-se os resultados em forma de tabelas. **Resultados:** analisaram-se 1818 prescrições, sendo 51,05% das prescrições de adultos; 22,71% de Pediatria e 26,24% de Neonatologia. **Conclusão:** conclui-se que os valores pagos pelo SUS são inferiores aos gastos pelos serviços de saúde, independentemente do tipo de produção da NP. Considera-se este estudo importante para auxiliar os gestores dos serviços hospitalares na tomada de decisões. **Descritores:** Custos e Análise de Custo; Alocação de Custos; Organização e Administração; Custos Hospitalares; Nutrição Parenteral; Soluções de Nutrição Parenteral.

RESUMEN

Objetivo: evaluar el costo involucrado en la preparación de la nutrición parenteral en un hospital universitario al adquirido de una empresa tercerizada. **Método:** se trata de un estudio cuantitativo, descriptivo, exploratorio con análisis retrospectivo de datos. Se obtuvieron los datos por medio de las prescripciones médicas y las notas fiscales de las NP's. Se calcularon, para la comparación de costos, los costos medianos, en reales, de las NP's por prescripción practicados por la empresa tercerizada, el valor estimado de la producción en el hospital comparado con el valor de resarcimiento por el SUS, de acuerdo con la tabla Sistema de Gestión de la Tabla de Procedimiento (SIGTAP) del SUS. Se presentaron los resultados en forma de tablas. **Resultados:** se analizaron 1818 prescripciones, siendo el 51,05% de las prescripciones de adultos; el 22,71% de Pediatria y el 26,24% de Neonatología. **Conclusión:** se concluye que los valores pagados por el SUS son inferiores a los gastos por los servicios de salud, independentemente del tipo de producción de la NP. Se considera este estudio importante para auxiliar a los gestores de los servicios hospitalarios en la toma de decisiones. **Descritores:** Costos y Análisis de Costo; Asignación de Costos; Organización y Administración; Costos de Hospital; Nutrición Parenteral; Soluciones para Nutrición Parenteral.

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INTRODUCTION

Parenteral nutrition (PN) is classified as a solution or emulsion composed of carbohydrates, amino acids, lipids, vitamins, electrolytes and minerals, and must be pyrogenic, sterile and packaged in glass or plastic containers.¹⁻²

It is known that there are two types of PN, total and partial, and total parenteral nutrition (TPN) means that all essential nutrients are supplied in adequate amounts for the maintenance of life and cell and tissue growth, including carbohydrates, lipids, amino acids, electrolytes, minerals, trace elements and vitamins. The administration is made through the insertion of a central venous catheter, which allows the administration of hyperosmolar solutions and which have the least possible inconvenience.²⁻³

Partial parenteral nutrition (PPN) is used to complement oral intake and part of the daily nutritional needs, and should be composed of solutions of low hyperosmolarity, including the nutritional intake for a given time.¹⁻⁴

PN is indicated to patients who should not or can not be fed orally or enterally, to patients with basic disease in food intake, digestion or absorption, malnutrition with loss of body mass greater than 20%, in hypermetabolic states such as large burns, septic patients, extensive polytrauma, and acute pancreatitis, high-throughput intestinal fistulas, based on intravenous feeding.¹⁻⁴

PN should be individualized and adapted to the needs of the individual. The formulations are thus differentiated, considering the age groups (newborns, pediatrics and adults) and the monitoring should be from the indication to the total suspension of PN3. It is noted, however, that the PN preparation process is complex and considered as a high-risk therapy that requires several precautions to ensure its safety.³⁻⁴

The National Multidisciplinary Team in Nutrition Therapy (EMTN) is regulated by the National Health Surveillance Agency (ANVISA), which must be composed of at least one professional in each area: physician, nurse, pharmacist and nutritionist, qualified and with specific training in nutritional therapy.⁵

It is informed that the PN must include the phases of indication, medical prescription, pharmaceutical evaluation and manipulation (quality control and transport), administration, clinical and laboratory control and final evaluation.⁵

It is necessary, since hospital units are places of complexity and high revenues, strict control of expenses in order to maintain patient care. It becomes important cost evaluation, assisting managers in managing these resources and generating data that can help in making decisions

in an appropriate way, as it corroborates the verification of the expected parameters and those that need modifications.⁶

Health expenditures can be related to input prices, payment terms, purchasing volume, complexity of the institution and types of treatments, among others, which are variable and must be well managed as they tend to raise costs.⁶⁻⁷

Cost is defined as the calculation of the materials and services to be produced, acquired or consumed by an organization, being the sum of the expenses with material, physical structure and equipment.⁵ Measurable elements are included in the costs, which can be classified as direct, indirect, fixed and variable.⁶⁻⁷

Direct costs are described as the expenses directly applied in the production of product or service; imply real and immediate financial withdrawal, such as costs of labor and materials; indirect costs are those related to various procedures or services and are not attributed to a single sector or exclusive product. It is made through apportionment and depends on a volumetric factor, being expenses related to water, electricity, cleaning and rent.⁶⁻⁷

It is explained that fixed costs are those related to the installed infrastructure, are constant and do not change even if the number of attendances increases, being examples of fixed costs those related to rent and wages;⁵ already the variable costs are related to the volume of production, which can increase or decrease according to the attendance, taking, as an example, the costs with materials, medicines and laundry.⁶⁻⁷

It is therefore essential to know the costs of the services, because through them, it is possible to identify points that need adjustment, containing expenses, eliminating waste, working efficiently and preserving the quality of care provided.⁶⁻⁸

OBJECTIVES

- To evaluate the cost involved in the preparation of parenteral nutrition in a university hospital when acquired from a third party company.
- To quantify the cost involved in preparing parenteral nutrition in a university hospital and that of a third-party company.
- To compare the costs involved in the preparation of parenteral nutrition in a university hospital when acquired from a third party company.

METHOD

This is a quantitative, descriptive, exploratory study, with retrospective data analysis, performed in the pharmacy sector of the Clinical Hospital of FMB Botucatu - Medical School - São Paulo, linked

to the secretary of the State of São Paulo for administrative purposes and the Faculty of Medicine of Botucatu for purposes of teaching, research and extension. It is detailed that the institution is a reference in High Complexity Care in parenteral nutrition, according to the ordinance n. 120, of April 14, 2009.⁹

It is reported that the Centers of Reference High Complexity in Parenteral Nutrition are the hospital units that have technical conditions, physical facilities, equipment and human resources adequate to provide comprehensive care and specialized in enteral and enteral / parenteral nutrition to patients at risk nutritionally or malnourished, including screening and nutritional assessment, follow-up, dispensing of nutritional formula and may still be responsible for handling / manufacturing.^{6,9}

The data was obtained through a retrospective exploratory analysis, through the medical prescriptions and fiscal notes of the PPNS, observing the following data: number of PN's / month, being characterized as adult, Pediatric or Neonatal, according to the volume used for industrialized PN.

For the quantification of costs with PN prepared at the institution, the Direct Costs with Human Resources (payroll) and Medicines and Supplies (sterilized medical-hospital material, disposable material, among others involved in the preparation of parenteral nutrition were identified).

For the calculation of the materials and inputs used, data and values were collected from the Pharmacy Sector currently practiced and those included in the table of the Chamber for Regulation of the Medicines Market (CRMM).

For comparison of costs, the average costs, in reais, of the PNs for the prescription practiced by the outsourced company, the estimated value of the production in the hospital, compared to the value of compensation by the UHS, according to the System table of Management of the Procedure Chart (SIGTAP) of the Unified Health System (UHS).

The data was tabulated and coded later, performing a descriptive analysis of the data from the frequency distribution table.

The study was approved by the Research Ethics Committee of Botucatu School of Medicine, State University of São Paulo "Júlio de Mesquita Filho" under number 2,259,544.

RESULTS

A retrospective data analysis of 1818 prescriptions, from the period between May and October 2016.

It is noted that, of the prescriptions of NP, 51.05% were adults; 22.71%, from the pediatrics unit (considering pediatric ICU and pediatric ward) and 26.24%, Neonatal unit prescriptions, as described in table 1.

Table 1. Number of parenterals prescribed according to age in a tertiary hospital in the state of São Paulo. Botucatu (SP), Brazil, 2018.

Number of prescribed parenterals								
	May	June	July	August	September	October	Total	
Adult	220	154	152	129	97	176	928	51.5%
Pediatric		25	152	91	65	80	413	22.71%
Neonatal	130	195	21	64	54	13	477	26.24%
Total	350	374	325	284	216	269	1818	100.00%

It was observed, regarding the cost analysis, that, of the PN for the adults, the cost was R\$175.92 for those handled in the institution and R\$155.82 from the outsourced service; for PNs from the Pediatrics unit, the cost was R\$112.50 for those handled at the institution and R\$410.11 for outsourced service, and the PN's for the Neonatal unit, the cost was R\$69.03 for the

handling at the institution and from R\$86.47 to outsourced service.

It is revealed that, for PNs for adults, there is a transfer of R\$60.00; in the Pediatrics of R\$45.00 and in the Neonatal of R\$30.00, as referenced in the SIGTAP table, and the costs of the adult, Pediatric and Neonatal PNs for institutional manipulation and outsourced services compared to the SIGTAP (UHS) table, are expressed in table 2.

Table 2. Comparison between the costs of the adult, pediatric and neonatal PN for institutional manipulation, outsourced service and SIGTAP (UHS) table. Botucatu (SP), Brazil, 2018.

Adult NP comparison table		
HC Manipulation	Outsourced	SIGTAP Table
R\$175.92	R\$155.82	R\$ 60.00
Pediatric PN comparison table		
HC Manipulation	Outsourced	SIGTAP Table
R\$112.50	R\$410.11	R\$45.00
Neonatal PN comparison table		
HC Manipulation	Outsourced	SIGTAP Table
R\$ 69.03	R\$ 86.47	R\$ 30.00
Average: R\$ 266.16	Average: R\$ 217.46	Average: R\$ 45.00

DISCUSSION

It was identified in the retrospective data analysis that evaluated 1818 prescriptions from the period between May and October 2016 that 51.05% of PNs were for adults. This is confirmed by a study conducted in Teresina, Piauí, where the authors found prescriptions of PN for adults at 52.40%.

It is known that PN should be indicated when there is a risk to the health of the patient and performed as early as possible, and its suspension occurs when there is stabilization of the GIT and/or when there is possibility of using enteral probe for feeding.⁵

The presence of EMTN is important in the evaluation stage of indication and follow-up of this patient, since it is possible, through its effective participation, to contain expenses associated with an incorrect prescription of PN.¹¹

For the description of PN costs acquired by the outsourced company, the costs presented in invoices were verified. The costs, whether direct or indirect, and fixed costs, applied to the values made available by the current Pharmacy Sector or those practiced according to the CRMM table, were evaluated for the costs involved in the own manufacture.

Table 2 shows the costs of handling the PN by the HC and the outsourced service, compared to the values in the SIGTAP table. It was possible to observe, through the analysis, that PN manipulation in the institution would be less onerous. Data was excluded from this study, such as loss and suspension of PN, factors that generate expenditure data, once, after prescription, there is reimbursement to the establishment that manipulated PN.

In the comparison of costs, it was observed a high value in pediatric parenteral nutrition practiced by the outsourced company. It is estimated that the high value was due to the request for a pediatric amino acid with taurine with increased volume, and the value practiced by the outsourced company, from May to August 2016, was based on the Neonatal nutrition value (the mean value correct ratio would be 0.185 / ml and 0.438 / ml was used), thus increasing the value.

It was found, in a study carried out in Teresina, Piauí, that the PN costs ranged from R\$82.00 to 235.00, and the values were higher when the therapies were supplemented with glycerophosphate and lipids.¹⁰ Data with products with larger values, counting the final PN values, was excluded from the study.

It was noted, in relation to the SIGTAP table, that the value reimbursed by the UHS, that the PN value for adults was R\$60.00 per bottle; for Pediatrics, R\$45.00 and for the Neonatal unit,

R\$30.00, and the amounts reimbursed by the UHS are lower than the costs incurred by the institution, regardless of the type of production.

In this way, it can be seen that the UH's, because they are places with high revenues, require constant cost analysis. Cost analysis is an essential tool in the performance of organizations, being necessary for planning objective decisions, reducing expenses and increasing revenues, or both. It is possible, with the cost analysis, to allocate and propose alternatives for the best execution of activities.¹¹

In a study carried out in Curitiba,¹² nutritional therapies, enteral and parenteral, accounted for an important part of the costs of treating hospitalized individuals, especially in cases of cancers and dementia syndromes, with the costs of nutritional therapy superior and greater in the group of users who died.

As a limitation of the study, factors such as time of use, pathologies and higher cost products were excluded, which are important variables, since they are complex procedures such as PN.

CONCLUSION

Through this study, the analysis of the prescriptions and the costs survey was possible, identifying that PN manipulation in the institution has a higher cost-benefit when compared to the manipulation by outsourced company, taking into account that the institution should have a team specialized in nutritional therapy and a school hospital enabled for activities in nutritional therapy.

It was found that the amounts paid by the UHS are lower than those spent by the health services, regardless of the type of PN production. It is understood that cost analysis is an important tool for decision makers in both UHS and private health care companies. It is possible to allocate, from this tool, the best form, the resources and to offer a quality service to the users.

It is concluded that such a study made the economic analysis of a procedure of high cost and high complexity possible, which generated data, to managers and professionals, about the service being offered, allowing the outcome of actions. It is also worth noting the importance of carrying out new studies in the area, since the literature on the subject is scarce.

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