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ORIGINAL ARTICLE

Should pediatric parenteral nutrition be individualized?☆

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KEYWORDS
Nutritional status;
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Abstract
Introduction: Parenteral nutrition (PN) formulations are commonly individualized, since their standardization appears inadequate for the pediatric population. This study aimed to evaluate the nutritional state and the reasons for PN individualization in pediatric patients using PN, hospitalized in a tertiary hospital in Campinas, São Paulo.
Methods: This longitudinal study comprised patients using PN followed by up to 67 days.
Nutritional status was classified according to the criteria established by the World Health Organization (WHO) (2006) and WHO (2007). The levels of the following elements in blood were analyzed: sodium, potassium, ionized calcium, chloride, magnesium, inorganic phosphorus, and triglycerides (TGL). Among the criteria for individualization, the following were considered undeniable: significant reduction in blood levels of potassium (<3mEq/L), sodium (<125mEq/L), magnesium (<1mEq/L), phosphorus (<1.5mEq/L), ionic calcium (<1mmol), and chloride (<90mEq/L), or any value above the references.
Results: Twelve pediatric patients aged 1 month to 15 years were studied (49 individualizations). Most patients were classified as malnourished. It was observed that 74/254 (29.2%) of examinations demanded individualized PN for indubitable reasons.
Conclusion: The nutritional state of patients was considered critical in most cases. Thus, the individualization performed in the beginning of PN for energy protein adequacy was indispensable. In addition, the individualized PN was indispensable in at least 29.2% of PN for correction of alterations found in biochemical parameters.

☆Study conducted at Universidade Estadual de Campinas, Campinas, SP, Brazil.
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PALAVRAS-CHAVE
Estado nutricional;
Criança;
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Deve-se individualizar a nutrição parenteral pediátrica?

Resumo

Introdução: As formulações da nutrição parenteral (NP) são comumente individualizadas, visto que a padronização destas parece inadequada para a população pediátrica. O objetivo do estudo foi avaliar o estado nutricional e os motivos para individualização da NP dos pacientes pediátricos em uso de NP internados em um hospital terciário de Campinas-SP.

Métodos: Estudo longitudinal conduzido com pacientes acompanhados por até 67 dias de uso de NP. Para a classificação do estado nutricional, foram utilizados os critérios propostos pela *World Health Organization* (WHO) (2006) e WHO (2007). As dosagens sanguíneas analisadas foram: sódio, potássio, cálcio iônico, cloreto, magnésio, fósforo inorgânico e triglicerídeo (TGL). Foram considerados motivos indubitáveis para individualização da NP quando esses elementos apresentavam redução expressiva dos níveis sanguíneos (potássio <3 mEq/L; sódio <125 mEq/L; magnésio <1 mEq/L; fósforo <1,5 mEq/L; cálcio iônico <1 mmol/L; cloreto <90 mEq/L) ou qualquer valor superior aos de referência.

Resultados: Foram estudados 12 pacientes (49 individualizações) com idade de 1 mês a 15 anos. A maioria dos pacientes foi classificada como desnutrida. Observou-se que 74/254 (29,2%) dos exames demandaram NP individualizada por motivos indubitáveis.

Conclusão: O estado nutricional dos pacientes foi considerado crítico, na maioria dos casos. Desta forma, a individualização realizada no início da NP para a adequação energética proteica foi essencial. Além disto, a NP individualizada foi indispensável em, no mínimo, 29,2% das NP, para correção das alterações encontradas nos exames bioquímicos.

Introduction

In 1968, Dudrick, Vars, and Rhoads[1] became famous for starting parenteral nutrition (PN) formulations.[2] In 1972, Solassol and Joyeux reported the successful use of the parenteral formula that would become known as 3-in-1, containing amino acids, a glucose and lipid emulsion, as well as electrolytes, vitamins, and trace elements.[3] PN is an effective nutritional strategy for survival, but it is associated with clinical complications such as infections, metabolic and minerals disorders, hypertriglyceridemia, and liver alterations.[4] According to the American Society for Parenteral & Enteral Nutrition (ASPEN),[5] PN is a complex therapy associated with adverse effects, and even death, when safety guidelines are not followed. Thus, for an appropriate and safe prescription, it is necessary to meet the needs of protein, energy, macronutrients, micronutrients, fluid homeostasis, and acid-base balance.

The PN formula can be standardized or individualized for adults. Regarding the pediatric population, the formulations are commonly individualized due to peculiarities related to growth and development and, consequently, different nutritional demands. However, there have been an increasing number of studies on standardized 3-in-1 PN (industrialized) for children. According to Colomb *et al*[6] and Rigo *et al*,[7] the advantages of using the standardized solution are: reduction in the risk of infection, decrease in prescription errors and complications caused by inadequate use of incompatible compounds, and easy handling reported by health professionals.

Considering that, in Brazil, the use of standardized PN is not a common practice in Pediatrics, and with regard to the abovementioned facts, the aim of the present study was to evaluate the nutritional status and the reasons for PN individualization in pediatric patients receiving PN in a tertiary hospital in Campinas-SP.

Method

This was a longitudinal study performed in 12 patients receiving PN, admitted to the pediatric ward and the pediatric intensive care unit (PICU) of a tertiary hospital in Campinas-SP. Patients were followed for up to 67 days of PN use.

The study inclusion criteria were: use of individualized PN, and signature of the informed consent by the parents/guardians. When the PN was discontinued, but the patient subsequently started receiving it again, this patient was included in the study only with regard to the first instance.

The weight and height of patients were measured according to the techniques proposed by the World Health Organization (WHO)[8] and Lohman, Roche, and Martorell.9 The instruments used were: stadiometer (to the nearest 0.1cm), electronic Filizola scale (Filizola® – São Paulo, Brazil) (capacity of 2.5kg to 150kg), and Toledo digital scale (Toledo® – São Paulo, Brazil) (capacity of 0.1kg to 15kg).