

 Kahena Zarth¹

 Ester Zoche¹

 Thais Ortiz Hammes²

 Vera Lúcia Bosa^{2,3}

¹ Hospital de Clínicas de Porto Alegre, Programa de Residência Integrada e Multiprofissional em Saúde. Porto Alegre, RS, Brasil.

² Hospital de Clínicas de Porto Alegre, Serviço de Nutrição e Dietética. Porto Alegre, RS, Brasil.

³ Universidade Federal do Rio Grande do Sul, Programa de Pós-Graduação em Alimentação, Nutrição e Saúde. Porto Alegre, RS, Brasil.

Correspondence

Kahena Zarth
kahenazarth@gmail.com

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Offering ultra-processed foods in pediatric hospital diets for children over two years of age at a university hospital

Oferta de alimentos ultraprocessados nas dietas pediátricas hospitalares para crianças maiores de dois anos em um hospital universitário

Abstract

Introduction: The diet provided in hospital environments should promote good eating habits by offering healthy food. However, it is known that processed foods are served in hospital diets. **Objective:** To evaluate the presence and the frequency of ultra-processed foods in the pediatric diets of a university hospital. **Methods:** The sample consisted of 25 pediatric diets prescribed for children older than two years. Data collection occurred from January to August 2020. The menus were analyzed according to the level of food processing, following the NOVA classification. The data was analyzed in *Microsoft Excel*, and the results obtained were described by absolute and relative frequency. **Results:** Natural or minimally processed foods represent 54.3% (n=10,851). The culinary ingredients accounted for 28.9% (n=5,768); processed foods, 2.7% (n=551); and ultra-processed, 13.9% (n=2,789). A total of 29 ultra-processed foods were identified, of which the three most frequent were chocolate milk powder (23.5%, n=658), margarine (18.5%, n=518) and sliced bread (11%, n=308). The biggest offer occurs in breakfast (31%, n=854), in the afternoon snack (30%, n=844) and on supper (24%, n=661), representing 85% (n=2,359) of the total offer. **Conclusions:** The findings of this study include the presence of ultra-processed foods in virtually all hospital pediatric diets analyzed. However, natural or minimally processed foods represent more than half of the composition of the menus.

Keywords: Processed foods. Child nutrition. Pediatric obesity. Child health. Diet. Menu planning.

Resumo

Introdução: A dieta fornecida no ambiente hospitalar deve promover bons hábitos alimentares a partir da oferta de uma alimentação saudável. Entretanto, sabe-se que alimentos industrializados são servidos na alimentação hospitalar. **Objetivo:** Avaliar a presença e a frequência de oferta de alimentos ultraprocessados nas dietas pediátricas de um hospital universitário. **Métodos:** A amostra foi composta por 25 dietas pediátricas prescritas para crianças maiores de dois anos. A coleta de dados ocorreu de janeiro a agosto de 2020. Os cardápios foram analisados segundo o nível de processamento dos alimentos, conforme a classificação NOVA. Os dados foram analisados no programa *Microsoft Excel*, e os resultados obtidos foram descritos por frequência absoluta e relativa. **Resultados:** Alimentos *in natura* ou minimamente processados representam 54,3% (n=10.851). Os ingredientes culinários, 28,9% (n=5.768); os processados, 2,7% (n=551); e os ultraprocessados, 13,9% (n=2.789). Identificou-se um total de 29 alimentos ultraprocessados, dos quais os três mais

frequentes foram o achocolatado em pó (23,5%, n=658), a margarina (18,5%, n=518) e o pão de forma (11%, n=308). A maior oferta ocorre no café da manhã (31%, n=854), no lanche da tarde (30%, n=844) e na ceia (24%, n=661), representando 85% (n=2.359) da oferta total. **Conclusões:** Os achados deste estudo incluem a presença de ultraprocessados em praticamente todas as dietas pediátricas hospitalares analisadas. No entanto, alimentos *in natura* ou minimamente processados representam mais da metade da composição dos cardápios.

Palavras-chave: Alimentos Industrializados. Nutrição da Criança. Obesidade Pediátrica. Saúde da Criança. Dieta. Planejamento de Cardápio.

INTRODUCTION

Childhood is considered an essential phase in the formation of eating habits. The constant exposure to foods with a variety of colors, flavors and textures builds the basis of each individual's eating pattern. Despite the increased dissemination of information and public policies regarding healthy eating over recent years, it is known that most children are exposed to disordered eating patterns and too many processed products. On the other hand, there is a decrease in the supply of natural foods, fundamental for good development and growth, such as fruits and vegetables, in adequate variety and quantity.^{1,2}

It is known that a dietary pattern consisting mostly of processed foods poor in nutrients, especially when combined to other behaviors harmful to health, such as a sedentary lifestyle, in addition to environmental and biological factors, becomes a triggering element for the development of overweight and obesity. With this, chronic noncommunicable diseases (NCDs) such as diabetes, hypertension and hypercholesterolemia are present since childhood, expanding one of the biggest public health problems of today, which require efforts from various sectors, besides health care, to face this obstacle worldwide.^{3,4}

In this context, some public policy measures have been thought of, as in the case of the *Guia Alimentar para a População Brasileira* (Food Guide for the Brazilian Population), first released in 2006, and in its most recent version of 2014. This instrument advocates for and values healthy eating and the sharing of meals, in addition to having as its main guideline the consumption of natural or minimally processed foods as the basis of feeding. On the other hand, the consumption of processed and ultra-processed foods should be avoided in order to maintain a balanced and nutritious diet at any stage of life.^{5,6}

According to the NOVA classification, natural or minimally processed foods are foods in their natural form, extracted directly from plants or animals, such as fruits, vegetables, roots, milk, meat and eggs. Minimally processed foods, on the other hand, are natural foods that have undergone minimal processing, such as pasteurization or processes that don't add ingredients such as salt and sugar. The second group belongs to the processed culinary ingredients, i.e., items used in culinary preparations for the purpose of seasoning and cooking natural or minimally processed foods. Some examples are sugar, honey, oils and cooking salt. The third group is formed by processed foods, and include foods made from the addition of one or more ingredients, such as sugar and salt, oil, vinegar or other substances related to the second group, in order to increase the durability of the product or change its flavor, such as fish preserved in salt or oil, compote, breads and cheeses.⁷

The fourth group is of the ultra-processed foods (UPF), which are considered industrial formulations produced with five or more ingredients, such as oils, sugar and salt, as well as preservatives, stabilizers and antioxidants.⁷ Among the characteristics that make these items more appealing for consumption are convenience, low cost, hyperpalatability and aggressive advertising, which for a long time were thought with the objective of appealing to young children.⁸ The purchase and consumption of this type of food has increased dramatically in recent years in Brazilian families.⁹ Consequently, the expansion of production of ultra-processed foods, as well as a change in the individuals' lifestyle, has contributed to the increase in cases related to overweight and obesity in the population.¹⁰

Since the hospital is an environment focused on the promotion of health, the importance of using the in-hospital period to encourage healthier feeding habits is evident.¹¹ The food offered to patients during hospitalization should be in accordance with the main Brazilian guidelines, in addition to providing nutritional support appropriate to the clinical condition of each patient.¹² Therefore, addressing the presence of UPF in hospital diets is essential, due to the increased consumption of these foods, especially by children and adolescents, as well as the increase in cases of overweight and obesity in the child population.¹³⁻¹⁵ Moreover, studies that collect data in the use of this type of food in hospital diets are inexistent. In light of this, the present study aimed to assess the presence and frequency of supply of ultra-processed foods,

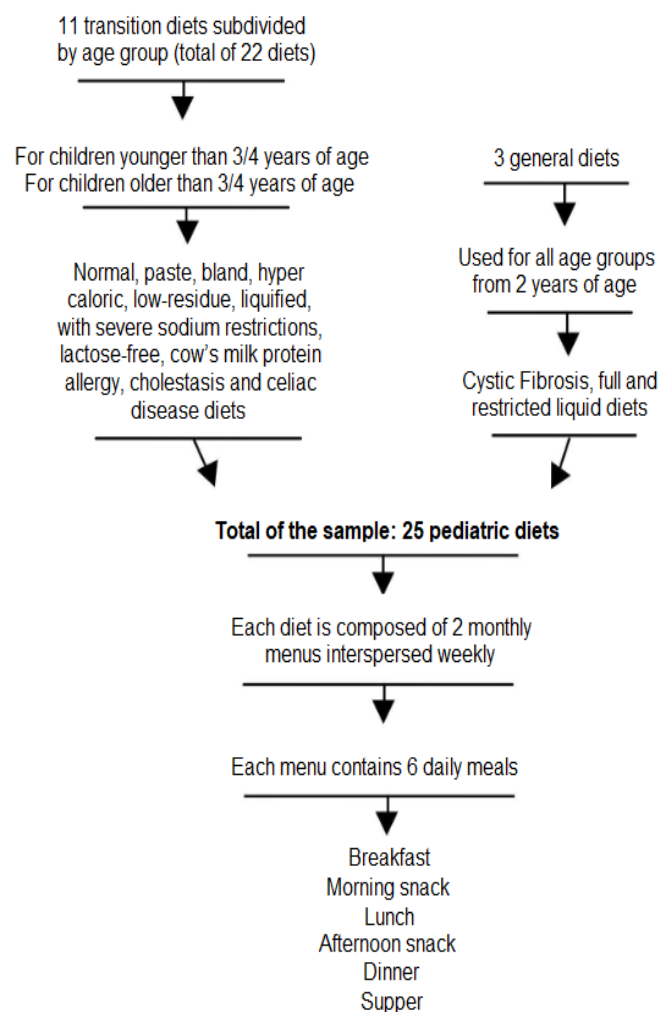
classifying the foods according to the processing levels, in the pediatric diet standards of a university hospital in Porto Alegre, Rio Grande do Sul.

METHODS

This is a quantitative observational study that was developed descriptively regarding the composition of pediatric diets offered at the Pediatric Inpatient Unit of a university hospital in the south of Brazil. The study was conducted during the Integrated and Multiprofessional Residency Program of Hospital de Clínicas de Porto Alegre, and data collection occurred from January to August 2020.

The sample consists of a total of 25 diets for children over two years of age. These are the normal, paste, bland, hypercaloric, liquefied, low-residue, cholestasis, cow's milk protein allergy, severe sodium restriction, lactose-free, celiac disease, cystic fibrosis, full liquid and restricted liquid diets. All dietary patterns are composed of two monthly menus, which are alternated weekly, for a total of 50 analyzed menus. Each menu consists of six daily meals: breakfast, morning snack, lunch, afternoon snack, dinner, and supper (Figure 1).

Figure 1. Flowchart of sample composition



Pediatric diets prescribed for patients older than two years old were part of the study. Enteral diets and diets for genetic diseases were excluded from the sample because they essentially have industrialized formulas in their composition.

All foods on the menus were analyzed, totaling 82 foods. To meet the proposal of quantifying the frequency of food offerings to pediatric patients during hospitalization, the foods were counted all the times they appear in the meals, regardless of how many times the food is repeated.

The data collection on the most prescribed diets in 12 months was conducted from 1,805 medical diet prescriptions in the period of July 2019 to July 2020.

The study was conducted in two stages. In the first one, data on the composition of the diets was collected through the computerized nutrition system present in the hospital (AGHuse). From technical sheets, all foods used in the menus and culinary preparations were identified. Each food was analyzed for its level of processing, based on the four groups of the NOVA classification. The culinary preparations were also analyzed according to the level of processing of the foods belonging to each one. The labels of the foods about which there was any doubt as to their level of processing were analyzed. In the second step, the data were exported to an *Excel* spreadsheet, in which a table containing the menus of the analyzed diets was made, identifying the foods present according to their level of processing. The data were analyzed using the pivot table function of *Microsoft Excel* and the results obtained were described by absolute and relative frequency.

The project was approved by the Ethics Committee of the institution, under the approval number 29678420400005327, and obtained authorization from the Nutrition and Dietetics Service to use the data from the AGHuse system.

RESULTS

In the present study, 25 pediatric hospital diets prescribed to children over two years old were analyzed, totalizing 50 menus.

Through the analysis, it was possible to identify that the diets are mostly composed of natural or minimally processed foods, representing on average 54.3% (n=10,851) of the monthly supply of food on the menus. Only four diets present less than 50% of their composition by natural or minimally processed foods, namely: the diets for cow's milk protein allergy for children under three years old, cholestasis for children under three years old, cystic fibrosis and full liquid. Culinary ingredients, such as salt, sugar and oil, accounted for an average of 28.9% (n=5,768) of the composition of the diets. The foods with the least presence in the diets are processed foods, such as canned foods, which represent on average 2.7% (n=551) of the frequency of supply. However, UPFs represent an average of 13.9% (n=2,789) of the food offerings in the diets and are present in considerably larger than average amounts, such as in the full liquid (25.9%, n=122) and severe sodium restriction for children under four years of age (23%, n=155) (Table 1).

Table 1. Frequency of the monthly offer of natural or minimally processed foods, culinary ingredients, processed and ultra-processed foods in menus of hospital pediatric diets. Porto Alegre-RS, 2020.

Diet	Total n	Group 1(%)	Group 2(%)	Group 3(%)	Group 4(%)
CMPA* for younger than 3 years	784	48.8	30.6	2.5	17.9
APLV* for older than 3 years	798	51.5	30.0	2.5	15.9
Bland for younger than 4 years	773	54.0	28.2	2.3	15.3
Bland for older than 4 years	833	54.2	27.0	2.1	16.5
Cholestasis for younger than 3 years	855	49.3	38.7	3.0	8.3
Cholestasis for older than 3 years	817	54.4	27.6	2.3	15.5
Celiac Disease for younger than 3 years	1062	55.9	32.6	3.2	8.0
Celiac Disease for older than 3 years	1115	59.2	29.7	3.2	7.7
Cystic Fibrosis	1058	48.3	27.5	4.8	19.1
Hypercaloric for younger than 4 years	868	54.1	24.6	2.4	18.7
Hypercaloric for older than 3 years	837	55.5	26.0	2.5	15.8
Full liquid	470	49.7	23.8	0.4	25.9
Restricted Liquid	336	58.3	41.6	0	0
Liquified for younger than 4 years	776	59.0	28.4	3.2	9.2
Liquified for older than 4 years	775	58.8	28.5	3.3	9.2
Normal for younger than 4 years	784	54.5	27.2	2.6	15.4
Normal for older than 4 years	836	55.5	26.0	2.5	15.9
Paste for younger than 4 years	787	53.4	27.7	3.3	15.5
Paste for older than 4 years	855	51.5	17.8	3.0	17.5
Low-residue for younger than 4 years	812	52.7	35.1	2.5	9.5
Low-residue for older than 4 years	743	50.9	34.5	2.3	12.1
Severe sodium restrictions for younger than 4 years	671	57.6	16.3	2.8	23.0
Severe sodium restrictions for older than 4 years	721	64.3	15.8	2.6	17.1
Lactose-free for younger than 4 years	791	53.9	34.5	2.5	8.9
Lactose-free for older than 4 years	802	54.4	32.9	2.8	9.7
Total	19,959	54.3	28.8	2.7	13.9

Key: Group 1: Natural or minimally processed foods, Group 2: Culinary ingredients, Group 3: Processed foods, Group 4: Ultra-processed foods * Cows milk protein allergy

Through the data collection on the most prescribed diets in 12 months, it was possible to identify that the normal diet was the most prescribed, representing more than half (68.2%, n=1,240) of the total diet prescriptions during this period. The other prescriptions together represent 31.8% (n=565) of the total. It is noteworthy that the supply of UPF in regular diets represents, on average, 15% (n=127) of the total food supply in the menus. However, this value is above the overall average of diets, which is of 13.9%.

Regarding the supply of UPF in diets, a total of 29 foods were identified, being the five most frequently offered foods the chocolate milk powder (23.5%, n=658), followed by margarine (18.5%, n=518), sliced bread (11%, n=308), French bread with food additive (6%, n=168) and sweet crackers (3.5%, n=98).

Regarding the distribution of the supply of UPF in the main and intermediate meals, it was noticed that the largest supply of these foods occurs for breakfast (31%, n=854), afternoon snack (30%, n=844) and supper (24%, n=661), representing 85% (n=2,359) of the total supply of ultra-processed food in the diets. Then, lunch, dinner and morning snacks had lower monthly offerings of UPF, with 8% (n=239), 6% (n=177) and 1% (n=14), respectively.

Even so, some foods are offered more than once a day, as in the case of chocolate milk powder, sliced bread and margarine, offered three times a day in most diets. Chocolate milk powder is offered in the preparation of chocolate milk and chocolate cake. Margarine, the second most offered ultra-processed food, in addition to being served with bread in the intermediate meals, is also found at lunch and dinner in some preparations such as potatoes with yogurt sauce, chicken escalope with sauce, lasagna, mashed potatoes and carrot soufflé.

Regarding the presence of ultra-processed foods in the culinary preparations, we highlight the use of potato flakes in the preparation of consommés, the use of concentrated juice in some desserts, such as sago with and without cream and juice pudding, the use of sliced bread in fish pies, industrialized ready-made gnocchi, and the use of industrialized pancakes in the preparation of lasagna (Table 2).

Table 2. Number of natural or minimally processed foods, culinary ingredients, processed and ultra-processed foods in culinary preparations with the presence of ultra-processed foods. Porto Alegre-RS, 2020.

Preparation (technical information)	Group 1	Group 2	Group 3	Group 4
Industrialized muffin * with margarine	3	3		2
Milk formula with chocolate powder				2
Bread * with jam	2	2		2
Bread * with margarine	2	2		2
Sandwich *	2	1	1	3
Milk with hypercaloric chocolate powder 1.0 kcal/ml	1			1
Milk with chocolate powder	1			1
Milk with hypercaloric chocolate powder	1			2
Hypercaloric natural orange juice	1	1		1
Banana with cream	2	1		1
Potatoes with yogurt sauce	6	2		1

Table 2. Number of natural or minimally processed foods, culinary ingredients, processed and ultra-processed foods in culinary preparations with the presence of ultra-processed foods. Porto Alegre-RS, 2020.(Continues).

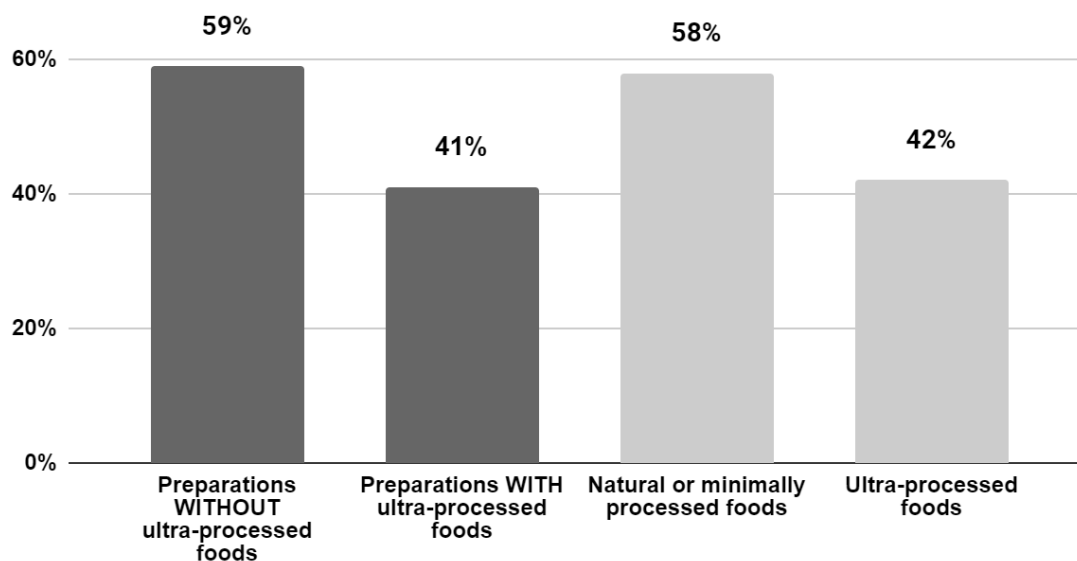
Preparation (technical information)	Group 1	Group 2	Group 3	Group 4
Rice dumplin	6	2		1
Diet, gluten-free and lactose-free chocolate cake	4	1		3
Diet, gluten-free and lactose-free corn cake	3	1	1	2
Vegetable consommé	3	2		1
Corn consommé	2	2	1	1
Lasagna Bolognese	7	2	2	2
Industrialized gnocchi	2	2		1
Gluten-free Lactose-free bread	5	3		1
Sweet cracker porridge	1			1
Meat pastry	1	2		1
Cheese pastry		1	1	1
Concentrated juice pudding	1	1		1
Pudding made with industrialized mix	1			1
Mashed potatoes	2	1		1
Sago with no cream	1	1		1
Sago with vanilla cream	4	1		2
Carrot soufflé	6	2		1
Fish pie	6	2		1

Key: Group 1: Natural or minimally processed foods, Group 2: Culinary ingredients, Group 3: Processed foods, Group 4: Ultra-processed foods

* *Industrialized foods bought ready for consumption.*

Regarding the analysis of the composition of the menus regarding the level of food processing, two distinct axes were analyzed: preparations with and without the presence of UPF and ready-to-eat ultra-processed processed foods in relation to natural or minimally processed foods. We identified that the preparations with the presence of ultra-processed foods constitute 41% (n=73) and the ready-to-eat UPF, 42% (n=27). In contrast, preparations free of ultra-processed products (59%, n=76) and natural or minimally processed foods (58%, n=24) represent most of the supply (Figure 2).

Figure 2. Analysis of the composition of preparations and foods offered in hospital pediatric diet menus.



DISCUSSION

The objective of the present study was to evaluate the presence and frequency of supply of UPF in hospital pediatric diets. Through the analysis of the results, it was possible to observe that most of the pediatric diets in the hospital under study are composed, predominantly, of natural or minimally processed foods, i.e., fresh and healthy foods and preparations. However, in general, UPFs are present in hospital pediatric diets, especially in intermediate meals such as breakfast, afternoon snack, and supper.

However, when talking about hospital pediatric diets, it is known that many patients have specific dietary needs, and providing the necessary nutritional support is a priority. For example, in the case of a diet for cow's milk protein allergy for children under three years of age, it is noted that, due to the impossibility of offering cow's milk, it is necessary to replace it with a hypoallergenic or allergenic formula, depending on the severity of the disease.¹⁶ Therefore, as formulas are ultra-processed foods, there is an increase in the supply of these and a decrease in the supply of natural foods. In the case of the full liquid diet, the variety of foods and preparations offered is smaller than in other diets due to its consistency restriction. Consequently, a greater frequency of ultra-processed products such as chocolate milk and jelly is offered. However, in the case of the diet for cystic fibrosis, the lower supply of natural or minimally processed foods compared to the general average supply seems to be explained by the need to offer a diet with higher caloric intake.¹⁷ In the hospital, some preparations and foods are included in the diet for cystic fibrosis, such as pastries, fried potatoes and *polenta*, strawberry-flavored yogurt, desserts with pudding mixes and sandwiches with sausages.

When comparing the supply of processed and ultra-processed foods, it is noted that the supply of ultra-processed foods is higher than that of processed foods in hospital pediatric diets. However, the increase in the production of UPF compared to processed foods has been favored by the evolution of the industry and technology. With the improvement of production techniques and the widespread use of chemical additives, it became possible to produce increasingly industrialized foods, with longer durability, hyper palatable, and low cost for the food industry.¹⁸⁻²⁰

Regarding the use of UPF in hospital pediatric diets, it is noted that, although the supply is lower compared to natural or minimally processed foods, there is a frequency of daily supply in virtually all diets. Foods such as chocolate milk powder, processed bread and margarine are present in intermediate meals and are offered more than once a day to children and

adolescents, thus favoring excessive consumption and reinforcing undesirable eating practices. It is known that the regular consumption of ultra-processed foods is associated with the development of overweight and obesity, as well as with NCDs.²¹

Due to the pioneering nature of this study and the consequent lack of other studies assessing the presence of UPF in hospital pediatric diets, it is necessary to compare the results with studies conducted outside the hospital environment, but with the same age group. One study assessed the participation of ultra-processed foods in the diets of public-school children aged 8-12 years old. It was identified that 25.2% of the average energy consumption came from UPF, and the most frequently consumed foods were industrialized pasta (instant noodles), sweet cookies, sausages, chocolate milk powder and soft drinks.²² With even more worrying results, the study carried out with children between 2-10 years old attending a Primary Health Care Unit found that 47% of the average energy consumption came from UPFs.²³ Another study, also conducted with children aged 2-9 years old attending a Primary Health Care Unit, found that the most frequently consumed UPF were sugary drinks with 70.4% and corn chips, instant noodles, and packaged cookies with 63.2%.²⁴ It is noteworthy that the hospital under study does not offer a number of PSA that appear to be some of the most commonly consumed by the public, such as filled cookies, soft drinks, snacks, instant noodles, etc. However, sugary drinks such as strawberry flavored yogurt, concentrated juice, and chocolate milk are offered in the hospital environment.

Furthermore, according to the results found in this study, some processed foods, such as ready-made pancake batter and gnocchi, are offered only a few times a month and facilitate the food production routine because of the large scale. An extremely positive point is the fact that no industrialized ready-made seasonings are used in the preparation of the meals.

In addition, margarine, according to the UPF group, the most frequently offered, is present in some of the culinary preparations for lunch and dinner, and it is served together with industrialized bread. Margarine is a product with considerable levels of trans fat, extremely harmful to health.²⁵ Its use in menus is questionable and can be reviewed in order to reduce the use and frequency of supply. Therefore, it is necessary to evaluate the quality of the food offered, as well as possibilities of healthier substitutions to compose the menus of hospital pediatric diets, especially in the intermediate meals, such as breakfast, afternoon snack and supper.

However, when talking about a public university hospital, it should be noted that some points are determining factors in the choice of the foods offered, such as cost and practicality. Margarine could be substituted by butter, but its harder consistency, and especially its higher cost, are some of the barriers. Similarly, chocolate milk could be easily substituted by coffee with milk, however, there is the issue of not being well accepted by hospitalized children due to pre-established eating habits that indicate a preference for chocolate milk, as presented in some studies.^{1,13,26}

It is noted that continuous actions of food and nutritional education linked to the conduct of menu modifications in the hospital environment are of extreme importance, since, by presenting the benefits of changing eating practices to patients and their families, the possibility of accepting healthier choices becomes more effective, both in the hospital environment, and later at home.

However, it is considered a limitation of this study the lack of other scientific articles with the same objective of evaluating the presence and frequency of supply of UPF in hospital pediatric diets, to be able to promote a broader discussion of the results.

CONCLUSION

The findings of this study include the presence of UPF in almost all diets analyzed, especially in the intermediate meals (breakfast, afternoon snack, and supper). However, natural or minimally processed foods represent more than half

of the menu composition. The presence of UPF in the main meals (lunch and dinner) is minimal, being more often used in desserts.

The data obtained suggest that, by analyzing the composition of menus of hospital pediatric diets through the levels of processing of the NOVA classification, it is possible to identify the points of improvement in the quality of the food offered and promote reflections on the possibilities of changes. Furthermore, we emphasize the pioneering nature of this study in the hospital environment, which is an important initial step for new studies on the theme that elucidate the presence and supply of ultra-processed foods in pediatric diets, also in other hospitals in Brazil.

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Contributors

Zarth K worked on study design conception, project writing, study material organization, data collection, data analysis, article writing; Hammes TO worked on study design conception, project writing, data collection, data analysis, article writing; Zoche E worked on study design conception, project writing, data analysis, article writing; Bosa VL worked on study design conception, project writing, data analysis, article writing.

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