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Improvement and validation of the content of instruments to evaluate quality of hospital diets

Aprimoramento e validação de conteúdo de instrumentos para avaliar a qualidade de dietas hospitalares

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This article comes from a Professional Master's dissertation in Clinical Research of the Instituto Nacional de Infectologia Evandro Chagas. Title: "Elaboration, improvement and validation of the content of instruments to evaluate acceptance and quality of hospital diets"; Author: Marlete Pereira da Silva; Guidance: Lucilélia Granhen Tavares Colares and Patrícia Dias de Brito. Year: 2017

Abstract

Introduction: The assessment of the quality of hospital diets can contribute to better acceptance of the patients. **Objective:** The study aimed to improve and validate the content of instruments for assessing the quality of hospital diets. **Methods:** Study developed at a hospital in Rio de Janeiro to improve the form used for inspection of the supply of meals. To include all dimensions of quality, the form was divided into two instruments, for evaluation of sensory quality (ESQ) and hygienic and sanitary quality (EHQ), and its content was submitted to validation through a panel of experts using the Delphi technique adapted. Once approved, the instruments were applied to 12 menus of the two large meals to assess conformities. The study was approved by the institution's Ethics and Research Committee. **Results:** For both ESQ and EHQ, the items related to "presentation/design", "semantic clarity", "easy to understand" and "easy to fill in" obtained agreement in the first round. A second round was necessary to readjust the "capacity to assess hygienic and sanitary quality" in both instruments. After obtaining 91.7% of agreement for ESQ and 90.1% for EHQ, the instruments were considered validated. The mean rest index was 22%; large meals obtained higher percentages of waste (32.4%) than small meals (10.6% -21.5%). For the menus of the large meals that presented "non-conformities" for weight, texture, appearance, flavor and temperature, corrective measures were requested. **Conclusion:** The non-conformities observed in large meals may explain the high leftover index, compared to small meals. It is expected that the routine application of the instruments may contribute to a better dietary assessment of hospitalized patients and reduce the risk of malnutrition. After adaptations, other food and nutrition units can use these instruments to assess the dimensions of the quality of the provided meals.

Keywords: Dietary services. Quality management. Hospitals, public. Diet. Validation study.

Resumo

Introdução: A avaliação da qualidade das refeições hospitalares pode contribuir para a melhor aceitação pelo paciente. **Objetivo:** Aprimorar e validar o conteúdo de instrumentos para avaliar a qualidade das dietas hospitalares. **Método:** Estudo realizado em unidade hospitalar do Rio de Janeiro para aprimoramento de formulário próprio para fiscalização do fornecimento de refeições. Para atender a todas as dimensões da qualidade, o formulário foi desdobrado em dois instrumentos, para avaliação da qualidade sensorial (AQS) e da qualidade higiênico-sanitária (AQH), e seu conteúdo foi submetido à validação através de painel de especialistas e da técnica

Delphi adaptada. Após aprovado, foi aplicado em 12 cardápios das grandes refeições para avaliação das conformidades. O estudo foi aprovado pelo Comitê de Ética da instituição. **Resultados:** Tanto para AQS como para AQH, os itens relacionados a “apresentação/design”, “clareza semântica”, “facilidade de entendimento” e “facilidade de preenchimento” obtiveram concordância na primeira rodada. Uma segunda rodada foi necessária para readequação da “capacidade de avaliação” nos dois instrumentos. Após obtenção de no mínimo 91,7% de concordância para AQS e o mínimo de 90,1% para AQH, os instrumentos foram considerados validados. A média do índice de restos foi de 22%; as grandes refeições obtiveram percentuais maiores (32,4%) que as pequenas refeições (10,6%-21,5%). Para os cardápios das grandes refeições que apresentaram “não conformidade” para peso, textura, aparência, sabor e temperatura, foram solicitadas medidas de correção. **Conclusão:** As inconformidades observadas nas grandes refeições podem explicar o maior índice de restos, comparado às pequenas refeições. Espera-se que a aplicação rotineira dos instrumentos contribua para a melhor avaliação dietética dos pacientes hospitalizados e minimize o risco de desnutrição. Após adaptações, outras unidades de alimentação e nutrição podem fazer uso desses instrumentos para avaliar as dimensões da qualidade das refeições fornecidas.

Palavras-chave: Serviços de dietética. Gestão da qualidade. Hospitais públicos. Dieta. Estudo de validação.

INTRODUCTION

Hospital food is part of the care for the recovery and conservation of health, with a view to meeting the individual's nutritional needs and contributing to his clinical improvement.^{1,2} Thus, the quality of the meal offered to patients is a critical point in hospital care and stems from the interaction between meal production and nutritional assistance,^{3,4} demonstrating the essential integration between nutritionists in the clinical and meal production areas.^{1,4,5}

It is fundamental and necessary for the patient to eat properly, considering that food and nutrition are sources of pleasure and integral parts of the maintenance and reconstruction of the hospitalized patient's identity.⁶ Among the reasons for the low acceptance of the hospital meal, we can mention the dissatisfaction with the way the preparations are offered, with the service of the staff and the hospital environment itself, far from the family.^{7,8}

One of the ways to assess the quality of a food service is to use a set of indicators or tools that are collected and analyzed with a view to constant improvement.⁹ The assessment of the dimensions of the quality of the meals offered to hospitalized patients must be carried out systematically, and it should include several dimensions of quality: nutritional, sensory and hygienic-sanitary.¹⁰

When the production of meals cannot be performed in the hospital food unit, due to a limitation in the physical structure that comprises all stages of the meal production process (receiving, storage, pre-preparation, preparation, cooking, filling, distribution), outsourcing service for supplying and transporting food is an alternative. The communication process between hirer and engaged is fundamental to the success of this relationship.¹¹ Monitoring and inspection of the supply of meals through standardized operational procedures (SOPs) and forms of daily inspection of hospital diets completed at the time of reception of meals are essential to guarantee not only the adequacy of the diets, but also the fulfillment of the contract between the parties, expanding the dimensions of quality.⁹

Given the above, this study aimed to improve and validate the content of instruments for assessing the quality of hospital diets provided by an outsourced company in a public hospital in Rio de Janeiro.

METHODS

This is a validation study of instrument content, developed at a reference hospital unit for the treatment of infectious diseases in Rio de Janeiro, conducted from October 2015 to April 2017. The following steps were followed: a) reformulation of the daily evaluation form for meals provided by the outsourced company, b) content validation of instruments through a panel of experts; c) application of instruments; and d) attainment of the leftover index.

Reformulation of the daily evaluation form for meals provided by the outsourced company

The daily inspection form of the hospital diet outsourcing contract used by the Nutrition Service (SENUT) consisted of six assessment items covering the following aspects: delivery time, packaging conditions on delivery, temperature of arrival, menu (same as planned) and sensory evaluation, all classified as C (conforming) or NC (not conforming). This form was improved based on research and analysis of the tools available in the scientific literature to assess the dimensions of quality in meal production.¹²

In order to include a greater number of attributes of the food and nutritional, sensory and hygienic and sanitary dimensions, the form was divided into two instruments, entitled: "ESQ – Evaluation of the sensory quality of the meals received" and "EHQ - Evaluation of the hygienic and sanitary quality on reception and distribution of meals". The following attributes were met: a) food and nutritional dimension – presentation of meals, adequate portion and weight, and respect for the menu; b) sensory dimension – texture, appearance, odor and taste of meals; c) hygienic and sanitary dimension –

packaging conditions, physical contamination, temperature of meals and time elapsed between preparation and consumption. The instruments were developed with the help of a graphic designer, so that they were easily understood.

Validation of the content of the instruments through an expert panel

The Delphi technique adapted to validate the content of the improved instruments was used. Content validity portrays the instrument's ability to gauge the concept intended to be measured. This technique has been widely used, especially in the health area, for the preparation or validation of the content of instruments.^{13,14}

This method seeks to obtain the consensus of a group of experts on a certain subject, in a systematic way, through an interactive questionnaire and feedback of responses, with the procedure being repeated until it reaches a satisfactory level of agreement, in a practical and anonymous way.^{13,14} The adaptation of the original Delphi technique consists of limiting the number of rounds for expert analysis. Two to four cycles have been proposed for the search for consensus, that is, the "consensus" represents the level achieved in the last determined step, at a cut-off point previously defined by the researcher.^{14,15}

The experts were chosen by trial sample, as they are linked to teaching and research institutions and quality services in the area of food and nutrition. The number of specialists to make up the panel is not determined in the Delphi technique, but varies according to the subject to be studied and the researcher's understanding.^{13,14,16} Sixteen nutritionists from hospital units and Nutrition professors from universities, both from the municipality of Rio de Janeiro, were invited to join the panel of experts.

The experts received a form to evaluate each instrument, based on the following requirements: form of presentation (*Is the design of the instrument adequate?*); semantic clarity (*Does the instrument have semantic clarity?*); ease of understanding (*Is the instrument easy to understand?*) and easy to fill in (*Is the instrument easy to fill in?*); and usefulness of the instrument (*The items are sufficient to assess a) sensory quality; b) the hygienic and sanitary quality of the meals?*).¹⁷ Each of the requirements was classified according to the Likert scale of five points: 1 - strongly disagree; 2 - disagree; 3 - neither agree nor disagree; 4 - agree; 5 - totally agree.¹⁸ The form also provided an open field for each item, for possible observations / suggestions from experts.

There is no defined percentage for checking the agreement in the panel, which is reserved for the researcher and must be decided before data analysis. According to some authors, the acceptable levels are between 50 and 80%.^{14,19} In this study, the content of 70% agreement among specialists obtained from the sum of gradients 4 and 5 of the Likert scale was considered as adequate to be maintained in the instruments.²⁰

Obtaining the rest index

Food remains were quantified from a convenience sample of 50 adult patients, hospitalized between October 2016 and April 2017, by weighing the food residues left in the packages for 24 hours. All preparations for the day were weighed and measured in the SENUT pantry. Lunch and dinner were weighed in individual thermal packages on a digital scale S 400, with a capacity of 10 kg and precision of 1 g (Filizola®). The liquid preparations were measured in a graduated beaker, with a capacity of 500 ml and precision of 50 ml and in a syringe of 50 ml and precision of 1 ml. Before delivering the meals to the patients, the preparations were weighed and measured, subtracting the weight of the packages and noted on a specific form. At the end of meals, the waitresses collected the packages for new weighing and measurement.

The rest index (RI) of the large meals served to the patient during the 24 hours of the evaluation was determined using the following equation:²¹

$$RI = \frac{\text{weight of the rejected meal}}{\text{weight of the distributed meal}} \times 100 \text{Eq1}$$

Application of instruments

The improved instruments for assessing the sensory (ESQ) and hygienic and sanitary (EHQ) quality of the meals received were applied once a week, for three months, by two techniques in Nutrition, after training by the researchers. The two large meals provided by the outsourced company were evaluated.

Instructions for applying the instruments were: a) checking the filling time and possible physical contamination; b) checking the temperature of all preparations of the bland, pasty, semi-liquid and liquid diets; c) measuring the sensory characteristics: appearance, taste, texture and odor; d) weighing the preparations of all consistencies of diets and measuring the volume, in the case of semi-liquid and liquid preparations; e) performing corrective action, in case of non-compliance, such as: temperature below 60°C, meals placed in the oven to be heated until reaching at least that temperature; f) writing down all the steps in the assessment instruments of the meals received.

Analysis plan

All the information collected was passed on to an Excel® spreadsheet, version 2013. The degree of agreement obtained in the panel was described as frequency. The evaluation of the sensory quality and the hygienic and sanitary quality of large meals was described in the form of compliance frequency.

Ethical aspects

This study was approved by the institution's Ethics and Research Committee on April 20, 2016 (CAEE 5395.1916.3.0000.5262; Opinion no 1.508.881). The nutritionists who made up the panel of experts were duly informed about the study objectives and methodology, and signed the free and informed consent form (ICF). Confidentiality regarding the identification of participants and the confidentiality of data were guaranteed, as established by Resolution No. 466/2012.

RESULTS AND DISCUSSION

Patients admitted to this hospital receive six meals a day. Small meals (breakfast, breakfast, snack and supper) are prepared and packaged in the SENUT cup. Large meals (lunch and dinner) are prepared, portioned in individual packages and transported, from the industrial kitchen of the outsourced company to the hospital, in isothermal boxes.

Reformulation of the daily evaluation form for meals provided by the outsourced company

The daily inspection form of the hospital diet outsourcing contract used previously was modified to include the necessary attributes for the proper assessment of the quality of the meals received. Thus, it was deployed in two instruments: ESQ and EHQ.

The term "sensory quality of food" can be conceptualized as a set of characteristics perceived by the five senses when tasting a food; or as the set of perceptions that may result in the evaluation of food, since sensory perception is related to physiological and psychological factors.²² Thus, the EHQ instrument was divided by preparations, and the

following were included as sensory attributes: presentation (or appearance), texture and flavor, in addition to the assessment of the adequacy of the weight of each preparation.

In the EHQ instrument, the assessment of packaging conformity, and arrival and distribution temperatures was also divided by preparations.

Validation of the content of the instruments through an expert panel

Twelve experts contributed to the content validation of the instruments; 75% worked in the area of Clinical Nutrition and 25% in the area of Collective Nutrition. All had at least five years of professional experience.

The degree of agreement for the ESQ instrument in the first round ranged from 41.8% to 100%. The following evaluated items obtained 100% agreement: "presentation / design", "semantic clarity", "easy to understand" and "easy to fill in". The item "ability to assess sensory quality" received 58.4% agreement, was reformulated and sent to the second round. After obtaining 91.7% of agreement, the ESQ instrument was considered validated (figure 1).

Figure 1: Instrument ESQ to assess the sensory quality of meals provided by the outsourced company

Date: ___/___/___ Menu num: _____ Consistency: ()Bland ()Pasty ()Semiliquid ()Liquid Nutritionist/TN: _____

| LUNCH () OR DINNER () | | | | | | | | | |
|-------------------------|---|---|---|---|---|--|--|---|---|
| Preparations | Beans 100 g | Rice 120 g | Pasta 120 g | Protein Dish 100g | Garnish 100g | Dessert 90g | Fruit Unid | Semiliquid 300 ml | Liquid 300 ml |
| WEIGHT (gram) | Conforming | Conforming | Conforming | Conforming | Conforming | Conforming | Conforming | Conforming | Conforming |
| | ()Yes ()No | ()Yes ()No | ()Yes ()No | ()Yes ()No | ()Yes ()No | ()Yes ()No | ()Yes ()No | ()Yes ()No | ()Yes ()No |
| TEXTURE | ()Adequate ()Hard ()Thin ()other _____ | ()Adequate ()Hard ()very soft ()other _____ | ()Adequate ()Hard ()very soft ()other _____ | ()Adequate ()Hard ()very soft ()other _____ | ()Adequate ()Hard ()Thin ()other _____ | Adequate ()YES ()NO _____ _____ | Adequate ()YES ()NO _____ _____ | ()Adequate ()Thin ()other _____ _____ | ()Adequate ()Thin ()Other _____ _____ |
| | APPEARANCE | Defined ()Yes ()No | Defined ()Yes ()No | Defined ()Yes ()No | Defined ()Yes ()No | Defined ()Yes ()No | Adequate ()Yes ()NO _____ | Adequate ()Yes ()NO _____ | Defined ()Yes ()No |
| TASTE | () Seasoned *()V ()L () Salty () Unsalted () Other _____ | () Seasoned *()V ()L () Salty () Unsalted () Other _____ | () Seasoned *()V ()L () Salty () Unsalted () Other _____ | () Seasoned *()V ()L () Salty () Unsalted () Other _____ | () Seasoned *()V ()L () Salty () Unsalted () Other _____ | Adequate ()Yes ()NO _____ _____ | Adequate ()Yes ()NO _____ _____ | () Seasoned *()V ()L () Salty () Unsalted () Other _____ | () Seasoned *()V ()L () Salty () Unsalted () Other _____ |
| | ODOR | Characteristic ()Yes ()No | Characteristic ()Yes ()No | Characteristic ()Yes ()No | Characteristic ()Yes ()No | Characteristic ()Yes ()No | Characteristic ()Yes ()No | Characteristic ()Yes ()No | Characteristic ()Yes ()No |

*Consider the letters V – Very seasoned, and L – Little seasoned

Menu implemented as planned: Yes () No () Justification:

Regarding the EHQ instrument, the degree of agreement ranged from 50% to 91.7%. Like the ESQ, there was also agreement on the items “presentation / design” (91.7%), “semantic clarity” (91.7%), “easy to understand” (91.7%) and “easy to fill in” (83.4%). However, the item related to “capacity to assess hygienic-sanitary quality” obtained only 50.1% agreement. The observations and suggestions were all accepted. The quality of the food covers multiple aspects – microbiological, nutritional and sensory. For this to be a source of health, it is necessary to control from the acquisition of the raw material to the finished product.²³

There are several processes to reach the final product, and these initial steps are carried out in the outsourced company. To ensure the hygienic and sanitary quality of food, the food and nutrition unit (FNU) can use procedures and tools such as: Good Manufacturing Practices (GMP), which include actions that must be followed by food services, in order to guarantee sanitary quality and food conformity; the SOPs, which objectively determine the sequential instructions for the execution of routine specific actions in the handling of food; and registration forms.²⁴

After adjustment, the EHQ was submitted to the second round of evaluation by the experts. Although it was not necessary to evaluate the first three items, the experts evaluated the instrument as a whole, increasing the consensus among them (97.1%, 100%, 100%, 100%, 90.1%) (figure 2).

Figure 2: Instrument EHQ to assess the hygienic-sanitary quality of meals provided by the outsourced company

Label with filling time: Yes () No() Label with departure time: Yes () No() Time: Arrival _____ Distribution _____

Date: ____/____/____

Nutritionist/ TN: _____

Conditions of the packages and assessment of physical contamination at the arrival of meals

Mark with X regarding the conformities of packages containing preparations.

| LUNCH () OR DINNER () | | | | | | | | | | |
|-------------------------|--------------------|--|-------------------------------|--|--------------------|--|--------------------|--|--------------------|--|
| CONDITIONS OF PACKAGE | Beans | | Rice/garnish/ Protein dish | | Dessert | | Semiliquid soup | | Liquefied soup | |
| | () Conforming | | () Conforming | | () Conforming | | () Conforming | | () Conforming | |
| | () Not conforming | () Wrinkled () Dirty* () Violated () With food waste () Other _____ _____ | () Not conforming | () Wrinkled () Dirty* () Violated () With food waste () Other _____ _____ | () Not conforming | () Wrinkled () Dirty* () Violated () With food waste () Other _____ _____ | () Not conforming | () Wrinkled () Dirty* () Violated () With food waste () Other _____ _____ | () Not conforming | () Wrinkled () Dirty* () Violated () With food waste () Other _____ _____ |
| PHYSICAL CONTAMINATION | () Yes () No | | () Yes () No | | () Yes () No | | () Yes () No | | () Yes () No | |

*With food waste

Figure 2: Instrument EHQ to assess the hygienic-sanitary quality of meals provided by the outsourced company(Continues)

TEMPERATURE CONTROL

Record the arrival and distribution temperatures of the preparations and mark with a X the adequacy.
 Consider arrival and distribution temperatures equal or above 60°C

| Preparations | LUNCH () OR DINNER () | | | | | | |
|-----------------|-------------------------|----------|----|-------------------|--------------|----------|----|
| | ARRIVAL | | | | DISTRIBUTION | | |
| | T°C | Adequate | | Corrective Action | T°C | Adequate | |
| | | YES | NO | | | YES | NO |
| Beans | | | | | | | |
| Rice / Pasta | | | | | | | |
| Protein dish | | | | | | | |
| Garnish | | | | | | | |
| Semiliquid soup | | | | | | | |
| Liquefied soup | | | | | | | |

The use of the adapted Delphi technique was appropriate, as the experts responded within the period established by the researchers, and the process occurred within the number of rounds reported in the literature.^{14,15} It can be said that the training and experience of the specialists contributed to the improvement of the instruments developed.^{13,16} The Delphi technique proved to be a reliable method, important in the construction and validation of content.^{19,25}

Obtaining the rest index

The weighing of the meals of 50 patients for 24 hours showed an average RI of 22%, and the collation was the meal with the lowest index (10.6%), followed by snack (14.7%), breakfast (20,4%) and supper (21.5%). Large meals had the same RI value (32.4%). According to the study by Ribas, Pinto & Rodrigues,²⁶ small meals were also the ones with the lowest RI.

During the weighing process, there was a lack of standardization in the portioning of lunch and dinner preparations, which is probably one of the factors that most contributed to its high RI. Although similar RI values for large meals have been found by other authors,^{10,27} this index is higher than that established for hospitalized patients – 20%.^{28,29}

Application of instruments

In the next stage, the sensorial quality and the hygienic and sanitary quality of 12 menus of the two large meals provided by the outsourced company were evaluated for three months.

To assess the hygienic and sanitary conditions of the meals received, the condition of the packages was checked, and the temperature of the preparations was measured. According to RDC no. 216/2004,³⁰ food prepared after being subjected to cooking must be kept at a temperature above 60° C for a maximum of six hours, so as to avoid microbial proliferation. Hence the importance not only of gauging the arrival temperature of the preparations, but also the filling time, departure and arrival time and distribution of meals.

Regarding the variable “weight”, all the menus evaluated were “NC”, as they presented a higher weight than that provided for in the public notice. In addition to nutritional issues, as this is a limiting factor for the proper calculation of the ingested diet, food waste must also be considered (table 1).

Table 1. Percentage of adequacy of the sensory attributes for the preparations of 12 menus served for lunch and dinner, Rio de Janeiro-RJ, 2017

| Preparations | % of adequacy of sensory attributes | | | | | | | |
|-----------------|-------------------------------------|--------|------------|--------|-------|--------|-------|--------|
| | Texture | | Appearance | | Taste | | Odor | |
| | Lunch | Dinner | Lunch | Dinner | Lunch | Dinner | Lunch | Dinner |
| Beans | 100 | 66,7 | 100 | 66,7 | 100 | 58,3 | 100 | 100 |
| Rice | 100 | 100 | 100 | 100 | 50 | 66,7 | 100 | 100 |
| Pasta | 100 | ----- | 100 | ----- | 100 | ----- | 100 | ----- |
| Protein dish | 83,3 | 75 | 100 | 100 | 75 | 75 | 100 | 100 |
| Garnish | 100 | 100 | 100 | 100 | 100 | 75 | 100 | 100 |
| Dessert | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Fruit | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Semiliquid soup | 91,7 | 91,7 | 100 | 100 | 16,7 | 33,3 | 100 | 100 |
| Liquefied soup | 100 | 91,7 | 100 | 100 | 25 | 41,7 | 100 | 100 |

Several factors can influence food waste, such as inadequate planning, food preference, portioning of preparations, lack of staff training and preparation of the day's menu.²⁷ In addition to waste, portioning above the established can be an interfering factor in non-acceptance of the diet^{4,7} and, therefore, one of the probable reasons for the high RI found in large meals.²⁹ In the case of hospital meals, it is important that the portioning of the notice is respected, since the calculation of energy and nutrients offered is based on these quantities. If non-compliance occurs routinely, patients with specific clinical situations, in which diet control is essential for their improvement (protein restriction for patients with chronic renal failure and carbohydrate control for diabetics), will have their safety threatened by an operational failure.³¹

All preparations showed a characteristic odor. Odor and aroma are complex elements to evaluate, since they occur independently: in the first, the perception is carried out through the inspiration of the volatile components of the food before placing it in the mouth, while in the aroma, the perception of the components volatile occurs within the mouth.³²

The texture of the food was suitable for almost all foods. Only 16.7% of the protein dish was inadequate, being assessed as "hard", which can make chewing difficult, especially in the elderly and patients with weakness. Similar results are found in the literature.⁶

In the item "appearance", 20.8% presented non-compliance (semi-liquid soup and beans). Beans had a layer of raw garlic, which compromised not only the appearance, but also the flavor of the preparation. It is important to ensure that the sauté technique is correctly performed, avoiding large, raw and not homogenized pieces of garlic or onion in the preparation. In relation to liquefied soups, the inadequacy was related to the color: it is very pale, perhaps because it was prepared with foods of the same color, or because it has similar combinations that always result in a yellow color. This shows the importance of planning menus that include foods of different colors, also in semi-liquid and liquid consistencies.⁶

The inadequacies of the "flavor" attribute of the diets were related to the insufficient amount of salt or seasoning in the preparations. Unfortunately, the idea remains, on the part of those who plan or execute the menu, that the diet offered to patients should be light, with little salt and little seasoning, with no appreciation of sensory aspects.³³ Usually, absence or small amount of salt and lack of seasoning are reasons for dissatisfaction on the part of patients, including those who need to receive a low-sodium diet.^{6,10}

It is necessary to modify the view that hospital food is "boring", with connotations of "prohibited" or "allowed". Nutritional assistance must combine the different dimensions of food quality: nutritional, hygienic and sanitary, sensory and symbolic.^{6,33}

Regarding the execution of the 12 menus analyzed, only two were not implemented as planned, as there was a substitution of desserts. It is important to take into account the nutritional dimension at the time of substitution, as they should occur, as far as possible, between similar preparations – that is, avoid substituting a fruit for a sweet, for example.

In this study, at the time of reception, 100% of the preparations evaluated had a temperature below 60°C, both at lunch and at dinner, requiring corrective action as recommended by RDC 216/2004²⁴ and as stated in the unit's SOP. Therefore, meals were reheated to a minimum temperature of 80°C. This result shows the need for better control in the production stages, since the preparations are possibly not being packaged properly or maybe they are being prepared within an unsecured hygienic and sanitary time span.

According to other studies, inadequate temperature is related to the low acceptance of the diet being offered.^{26,29,34} In their study, Sousa, Glória & Cardoso¹⁰ mention the possible interference of temperature in the acceptance of the diet. We believe that, in this study, temperature did not interfere with the acceptance of meals and, therefore, it would not explain the high LI, as the meals were reheated before being delivered to patients.

This study has limitations. In order to validate an instrument, variables called "psychometric properties" must be used to ensure its quality, highlighting the reliability and validity, through previously elaborated steps.³⁵ The instruments

elaborated in this study had only their content validated by a panel of experts, and additional studies are needed to validate their construct.

CONCLUSION

The improvement and content validation of the instruments allowed us to reinforce the importance of having more instruments validated for carrying out research in the area of Dietetics, especially for use in clinical practice.

The application of the ESQ and EHQ instruments allowed a more complete assessment of the nutritional, sensory and hygienic-sanitary dimensions of the quality of the hospital diet. It is noteworthy that the portioning of the preparations that made up the large meals was above that established in the contract, a fact that directly affects the calculation of the patients' dietary intake, as it can also contribute to the reduction of acceptance.

Other non-conformities were observed in terms of appearance and temperature when receiving meals, especially the taste, a major factor in acceptance. Thus, it is important to study ways to make the meal more attractive and reduce the taboo in relation to the hospital diet.

Complementarily, the daily assessment of meals provided through the instruments will help ensure compliance with the quality dimensions of the meals served. These routines may reduce the prevalence of hospital malnutrition, as they allow a faster intervention and provide the recovery or maintenance of the patient's nutritional status.

The improvement of the instruments came from a specific need of the Nutrition Service of the studied hospital, but this does not preclude, from adaptations, its use in other institutions.

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Silva MP: conception of the study, data collection, analysis of data, writing the manuscript, final revision of the manuscript; Brito PD: conception of the study, analysis of data, writing the manuscript, final revision of the manuscript; Silva FM: instruments design, data collection, final revision of the manuscript. Almeida CF: data collection, final revision of the manuscript; Silva PS: analysis of data, final revision of the manuscript; Colares LT: conception of the study, analysis of data, writing the manuscript, final revision of the manuscript.

Conflict of Interest: The authors declare no conflict of interest.

Received: July 3, 2020

Accepted: September 26, 2020