Original Article

Assessment of medical residents' knowledge in a high-complexity hospital regarding their roles in nutritional therapy

Avaliação do conhecimento de médicos residentes em hospital de alta complexidade sobre suas atribuições em terapia nutricional

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ABSTRACT

Introduction: Hospitalized patients with impaired nutritional status have high risks of morbidity and mortality. In Brazil, in a hospital setting, diet prescription is the responsibility of physicians. However, medical nutritional education is rare, limited to general topics taught at the beginning of medical school. As such, this study aimed to evaluate the knowledge of medical residents regarding their responsibilities in nutritional therapy. **Methods:** A cross-sectional descriptive study, conducted through an online questionnaire, covering various aspects related to nutritional therapy. The sample was convenience-based, allowing the inclusion of all medical residents from the Clinical Hospital of the University of São Paulo Medical School. **Results:** The survey was conducted with 81 residents from 26 medical specialties. It was found that most do not perform nutritional screening (89%), do not estimate total energy expenditure (87%), nor protein requirements (84%). Regarding the initiation of nutritional therapy, more than 80% initiate it within 5 days when recommended, and 70% increase the diet volume every 24 hours until reaching the nutritional goal. Regarding decision-making on nutritional therapy, 53% of residents consider the dietitian the main responsible, although the frequency of contact with the dietitian is mostly rare. Additionally, 84% of participants have doubts or do not know what the multiprofessional nutritional therapy team is. The vast majority (97%) rated their knowledge of Nutrition as null to medium, despite recognizing its importance for patient outcomes. **Conclusion:** The study showed limited knowledge of nutritional therapy among medical residents.

Keywords:
Nutrition therapy. Internship and residency. Knowledge.

Unitermos:
Terapia nutricional. Internato e residência. Conhecimento.

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RESUMO

Introdução: Pacientes internados com estado nutricional debilitado apresentam altos riscos de morbimortalidade. No Brasil, em ambiente hospitalar, a prescrição da dieta é de responsabilidade dos médicos. Porém, a educação nutricional médica é rara, limitando-se a tópicos gerais ensinados no início da faculdade. Dessa forma, esse trabalho avaliou o conhecimento de médicos residentes sobre suas atribuições em terapia nutricional. **Método:** Esse foi um estudo descritivo transversal, realizado através de um questionário on-line, englobando diversos aspectos relacionados à terapia nutricional. A amostra ocorreu por conveniência, permitindo incluir todos os residentes médicos do Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo. **Resultados:** A pesquisa foi realizada com 81 residentes de 26 especialidades médicas. Verificou-se que a maioria não realiza triagem nutricional (89%), não estima o gasto energético total (87%) e nem a necessidade proteica (84%). Quanto ao início da terapia nutricional, mais de 80% iniciam-na em até 5 dias quando indicada e 70% progridem o volume de dieta a cada 24 horas até atingir a meta nutricional. Acerca da tomada de decisão sobre a terapia nutricional, 53% dos residentes consideram o nutricionista o principal responsável. Porém, a frequência de contato com o nutricionista é majoritariamente rara. Além disso, 84% dos participantes têm dúvidas ou não sabem o que é a equipe multiprofissional de terapia nutricional. A grande maioria (97%) avaliou-se com nível de conhecimento sobre Nutrição entre nulo e médio, apesar de reconhecerem sua importância para a evolução dos pacientes. **Conclusão:** O estudo evidenciou conhecimento limitado em terapia nutricional entre médicos residentes.

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INTRODUCTION

Nutrition therapy (NT) consists of a set of therapeutic procedures aimed to maintain or recover the patient's nutritional status[1]. Other authors emphasize the referral of NT, whether oral, enteral or parenteral, in order to treat and prevent nutritional deficiencies or imbalances[2]. Proper conduct of nutritional therapy must be understood as the patient´s dietitian follow-up appointments from the moment of their admission to the hospital[3].

The prevalence of energy-protein malnutrition (EPM) can occur in 19 to 80% of hospitalized patients and has been extensively documented in the literature over the last few decades. Hospitalized patients with impaired nutritional status face higher risks of developing greater rates of complications and mortality, representing higher costs for both institution and society[4].

Hospital malnutrition may result from the patient's own pathology, limited socioeconomic resources, but also due to the failure to recognize the individual's nutritional needs and the absence of a medical prescription for nutritional therapy[3].

In 1999, the Brazilian survey on hospital nutritional assessment (IBRANUTRI)[2] showed the relation, along with other factors, between malnutrition and medical awareness, in a cross-sectional study with 4,000 patients admitted to 25 Brazilian hospitals. The results suggested that doctors' lack of knowledge about nutritional needs was as significant a cause of hospital malnutrition as socioeconomic differences and other risk conditions, as well as the increase of malnutrition associated with long hospitalization periods, given that only 18.8% of patient records contained any reference to nutritional status.

In Brazil, as in most countries, diet prescriptions in hospitals are the responsibility of physicians. However, as outlined in the literature selected for the study, nutritional education for physicians is rare. Often, it is limited to general topics taught in the early years of medical school[3].

Within Resolution No. 3/2014[5], which establishes the national curriculum guidelines for medical undergraduate courses, there aren't articles nor topics related to nutritional therapy, whether in the definition of competencies, curriculum content, or pedagogical projects.

However, the Brazilian National Health Council, through Resolution No. 704/2022[6], approved the contributions regarding the new National Curriculum Guidelines for the Nutrition Undergraduate Course, establishing a minimum workload of 4,000 hours and at least 5 years of an academic term, providing practices and competencies in nutritional and dietetic assistance, offering greater support for proper and specific training related to dietary prescriptions.

According to Technical Note n° 82/2023 of the Federal Council of Nutritionists (CFN)[7], the roles of physicians and dietitians in hospital nutritional care are distinct and complementary. It is the physician's responsibility to indicate and prescribe nutritional therapy, define the route of administration—oral, enteral, or parenteral—and establish the general characteristics of the diet based on the diagnosis and the patient's clinical condition, as well as to document the patient's progress in the medical record. In turn, the dietitian is responsible for assessing nutritional status and developing the dietary prescription, an exclusive professional activity that involves determining the total energy value (TEV), macro- and micronutrient composition, consistency, meal distribution, and necessary adjustments according to the patient's clinical and nutritional needs.

Resolution No. 600/2018 from the Brazilian Federal Council of Nutritionists[8] defines the professional fields and responsibilities. Among them, the Clinical Nutrition area, in the subarea of nutritional and dietetic assistance in hospitals, establishes mandatory activities for dietitians, including[7]: "elaborate the nutrition diagnosis", "develop dietary prescription based on the guidelines of the nutrition diagnosis and considering drug/nutrient and nutrient/nutrient interactions", and "register the dietary prescription and nutritional progress in the patient/client/user records, according to protocols established by the Nutrition and Dietetics Unit".

According to the authors, the clinical dietitian is the professional capable of efficiently applying the nutrition care process, especially for hospitalized patients[3].

In a more specialized context, the multidisciplinary nutrition therapy team (MNTT), is characterized as a formal, mandatory body composed of at least one professional from each of the following categories: physician, dietitian, nurse, and pharmacist, all of whom are duly qualified and have specific training to perform activities related to nutrition therapy. The team may also include professionals from other disciplines, according to the needs of the service. Within this structure, each professional acts according to their specific competencies and skills, in an integrated and complementary manner, with the aim of ensuring the patient's recovery or maintenance of an adequate nutritional status, without overlap or encroachment upon exclusive professional scopes of practice[1,9].

In Brazilian clinical practice, it is possible to see that the exposed failures are also directly related to professionals from the categories described above who are not members of the MNTT and do not have specific training in this area.

Often, these professionals do not have knowledge about (or even are unaware of) the importance and direct association between good nutritional status and therapeutic

success, reduced complications, hospital infections, decreased morbidity and mortality, and reduced duration and cost of hospitalization[3].

Thus, the objective of this study was to specifically evaluate the knowledge of medical residents, who are responsible for diet prescriptions in hospital settings, about their roles in nutritional therapy. Additionally, the study aimed to analyze the relationship between medical residents, dietitians, and/or the MNTT as well as assess their self-perception regarding their expertise in nutritional therapy.

METHOD

This is a cross-sectional descriptive study, carried out through the application of a questionnaire (Attachment 1) developed by the authors, based on instruments used by the study from the following online literature[9-16], through Google Forms platform, in Portuguese, containing 21 multiple-choice questions which covered an array of topics related to nutritional therapy, such as benefits, indication, concepts, medical duties, responsibilities of the dietitian, among others.

The study sample was made up out of convenience, allowing to include all the 1.711 medical residents, throughout all the years of residency, from 104 specialties offered across the Clinical Hospital of the University of São Paulo Medical School (HCFMUSP). Those numbers were previously collected via email from the management of the Medical Residency Committee of the University of São Paulo Medical School (COREME-FMUSP). The participants were required to mandatorily express their agreement with the Free and Informed Consent Form by signing it. Exclusion criteria consisted of non-medical residents at HCFMUSP by the time of the survey, and those who did not fill the questionnaire and/or refused to join in.

The tool considered problems frequently encountered in clinical practice, and was based on the main guidelines of nutritional therapy developed by the Brazilian Society for Parenteral and Enteral Nutrition (BRASPEN)[17-20] and by the European Society for Clinical Nutrition and Metabolism (ESPEN)[9,21-23]. Questions about age, gender, specialty and current medical residency year were also investigated. Answers were collected anonymously.

The questionnaire link was shared on social media, with the support of the multidisciplinary team, through in-person approaches during working hours, via printed handouts shared out at the clinics and physician resting areas, posters/banners placed at strategic spots in the dining areas of the hospital, among other forms of sharing, aiming the widest possible reach. The period of response collection took place from September 2024 to January 2025.

The data storage and tabulation were carried out by Google Forms, on which its formulation and application were also carried out. The statistical method used to evaluate data consisted of a descriptive analysis, opting not to perform statistical tests beyond absolute and relative frequencies.

The project of the current study was analysed by the Ethics Committee for Research Project Analysis (CAPPesq) of the Hospital das Clínicas, University of São Paulo Medical School (HCFMUSP), in accordance with the ethical and legal requirements of Resolution No. 466/2012, dated December 12th, 2012, of the National Health Council.

RESULTS

A total of 81 forms were received during the study period. There was no need to exclude any of the participants.

The sample, formed by 81 residents from 26 medical specialties, had a predominantly female profile and an age range mostly between 26 and 30 years old. Data analysis (Table 1) showed wider participation from the second-year residents, especially in the fields of Emergency Medicine, Internal Medicine, Intensive Care Medicine and General Surgery.

Table 1 – Participant characteristics according to age, sex, specialty and current medical residency year at the Clinical Hospital of the University of São Paulo Medical School in 2024.

Age Range	n	%
21 to 25 years old	10	12.3
26 to 30 years old	56	69.1
30 to 35 years old	12	14.8
Over 36 years old	3	3.7
Sex		
Female	43	53.1
Male	38	46.9
Current medical residency specialty		
Emergency Medicine	16	19.7
Clinical Medicine	14	17.3
Intensive Care	7	8.6
General surgery	7	8.6
Neurology	4	4.9
Pediatrics	4	4.9
Endocrinology	4	4.9
Rheumatology	3	3.7
Nephrology	3	3.7

Continuation Table 1 – Participant characteristics according to age, sex, specialty and current medical residency year at the Clinical Hospital of the University of São Paulo Medical School in 2024.

Current medical residency specialty		
Hematology	2	2.5
Anesthesiology	2	2.5
Clinical Nutrition	1	1.2
Pediatrics Intensive Care	1	1.2
Physical Medicine and Rehabilitation	1	1.2
Geriatrics	1	1.2
Gastroenterology	1	1.2
Infectology/Medical Infectious Diseases	1	1.2
Ophthalmology	1	1.2
Dermatology	1	1.2
Neurosurgery	1	1.2
Plastic surgery	1	1.2
Immunology	1	1.2
Advanced surgery	1	1.2
Vascular surgery	1	1.2
Pain Medicine	1	1.2
Clinical Pathology	1	1.2
Current year of medical residency		
R1	21	25.9
R2	28	34.6
R3	21	25.9
R4	8	9.9
R5	1	1.2
>R5	2	2.5

n = sample size; R1 = first year; R2 = second year; R3 = third year; R4 = fourth year; R5 = fifth year.

Most physicians demonstrate lack of knowledge about nutritional screening and do not incorporate it into their clinical practice. The presented outcomes on table 2 indicate that only 11,1% perform nutritional screening, mainly using tools such as NUTRIC score, Nutritional Risk Screening (NRS-2002), and Mini Nutritional Assessment (MNA), respectively. Participants also generally do not estimate the total energy expenditure (TEE) from their patients. Among those who calculate it, the main formulas used are Harris-Benedict and simplified formulas, with values ranging from 20 to 35 kcal/kg of body weight. Mifflin and Toronto formulas were also mentioned. Regarding the need of proteins, only 16% calculate them, and the values reported are substantially heterogeneous, from 0,8 to 2,0 g/kg of body weight.

Table 2 – Nutritional screening and calculation practices at the Clinical Hospital of the University of São Paulo Medical School in 2024.

	n	%
Do you have any knowledge about nutritional screening?		
Yes, I am familiar with, and I use it	9	11.1
Yes, I am familiar with, but I don't use it	25	30.9
I am not familiar with nutritional screening	47	58
Do you generally estimate the total energy expenditure from most of your patients before prescribing a diet?		
Yes, I calculate it through simplified formulas	9	11.1
Yes, I calculate it through predictive equations	1	1.2
Yes, I calculate it through indirect calorimetry	1	1.2
Other method	0	-
I usually do not calculate it	70	86.7
Do you usually calculate the protein needs for most of your patients before prescribing the diet?		
Yes, I calculate it	12	14.8
I usually do not calculate it	68	84
Other	1	1.2

n = sample size.

The survey reveals that over 80% of residents initiate enteral nutritional therapy (ENT), when recommended, within 5 days, and more than 70% report progressing the diet volume every 24 hours until reaching the nutritional goal (Table 3). Only 2 residents affirmed starting ENT after more than 5 days, and 14% report not to routinely prescribe this type of diet in their specialty.

There is an expressive disparity in participants' knowledge regarding both trophic enteral nutrition and the differences between polymeric and oligomeric enteral diets. While 55% demonstrated understanding the trophic enteral nutrition concept, nearly 40% expressed uncertainty and 7% had no knowledge of it. This lack of knowledge widened when analyzing the distinction between polymeric and oligomeric diets, with only 18% of the participants mastering the subject, 26% denying any knowledge and the majority (55%) expressing uncertainty.

Regarding the hospital dietary standards, the characteristics and consistencies of foods from the institution menus where the resident works, 84% mentioned to know superficially, a small group (9%) reported to have a broad knowledge of them, and 7% admitted they had never seen this document.

Table 3 – Nutritional therapy initiation practices at the Clinical Hospital of the University of São Paulo Medical School in 2024.

	n	%
How long do you wait before starting enteral nutrition for your patients who are unable to eat orally, or with a very l ow oral calorie-protein intake?		
Up to 24 hours	23	28.4
Between 1 and 5 days	44	54.3
After more than 5 days	2	2.5
I usually do not prescribe enteral nutrition in my specialty	11	13.6
Other	1	1,2
In most cases, how often do you increase the diet volume?		
Every 24 hours until reaching the nutritional goal.	58	71.6
Every 48 hours until reaching the nutritional goal.	9	11.1
Every 72 hours until reaching the nutritional goal.	0	-
I usually do not increase the volume, I prescribe directly the volume I estimate required.	2	2.5
I usually do not prescribe enteral nutrition in my specialty.	10	12.3
Other	2	2.5

n = sample size.

Table 4 – Physician-dietitian relationship at the Clinical Hospital of the University of São Paulo Medical School in 2024.

	n	%
In most of the clinics you have worked, who was responsible for making the decisions regarding patients' nutritional therapy?		
Attending physician	33	40,7
Physician from another specialty	2	2,5
Dietitian	43	53,1
Nurse	0	0
Speech therapist	3	3,7
Do you know the dietitian who works at the clinic where you are currently assigned to?		
Yes, I know the dietitian and I have regular contact with them.	45	55,6
I know the dietitian, but I have never talked to them.	11	13,6
I do not know who is the dietitian of the clinic I am currently working at.	25	30,9
How many times a week do you generally discuss clinical cases with a dietitian in your daily routine?		
Every day	8	9,9
2 to 3 times a week	16	19,8
Once a week	16	19,8
Rarely	32	39,5
Never	8	9,9
Other	1	1,2

n = sample size.

The survey also investigated the decision-making process in nutritional therapy (Table 4), revealing that about half of the residents consider the dietitian to be the professional in charge of it. However, 41% assign this function to the physician responsible for the clinic, while a small group mention speech therapist (4%) or other physicians (2%). About the interaction with the dietitian, 56% of the residents reported knowing and keeping regular contact with them. However, 31% did not know the clinic's dietitian, 14%, despite knowing them, have never met up with them. The frequency of clinical case discussions between these two professionals is also variable: only 10% discuss it daily, 40% one to three times a week, 40% rarely, and 10% never discuss clinical cases.

The study has also revealed a considerable lack of knowledge about the MNTT among the participants. Only 16% demonstrated awareness of who the team members were and their respective functions, while 49% expressed doubts and 35% did not know what it was. This knowledge gap extends towards the differentiation between nutrologist physician (physician specialized in clinical nutrition) and dietitian, with 35% of the participants expressing questions and 5% denying knowing the difference. The majority (52%) of the participants has never requested a consultation with MNTT, mainly for not understanding its purpose (Table 5).

Although all the participants understand the importance of nutritional therapy for the patients' clinical evolution (Figure 1), the self-assessment of the knowledge about the subject revealed a significant gap (Figure 2). While 97% of the participants self-evaluated their level of knowledge from null to moderate (levels 0 to 3), only 3% considered themselves with an excellent level (level 5) of knowledge about the topic.

Table 5 – Multidisciplinary nutritional therapy team (MNTT) at the Clinical Hospital of the University of São Paulo Medical School in 2024.

	n	%
Do you know the difference between a nutrologist physician and a dietitian, regarding their roles?		
Yes, I know how to differentiate these professionals' roles	49	60.5
I have questions regarding their roles	28	34.6
I do not know the difference between these professionals' roles	4	4.9
Do you know what the MNTT is?		
Yes, I know what it is, which professionals are part of it and what their roles are	13	16
I have doubts about this concept	40	49.4
No, I don't know what MNTT is	28	34.6
Have you ever requested an interconsultation with MNTT for any patient?		
Yes, I have requested it on my own initiative	25	30.9
Yes, I have requested it but on another professional's initiative	9	11.1
I have never requested it for judging there was no need of it	4	4.9
I have never requested for not knowing what MNTT is	42	51.9
Other	1	1.2

n = sample size.

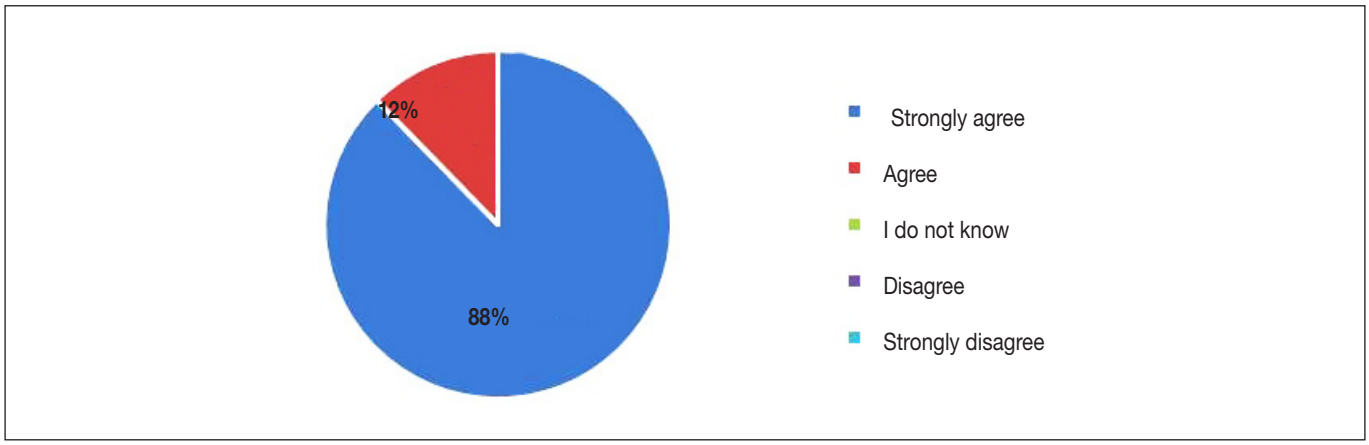

Figure 1 - *Responses of residents about the affirmation "Nutritional therapy influences the patients' clinical evolution" at the Clinical Hospital of the University of São Paulo Medical School in 2024.*

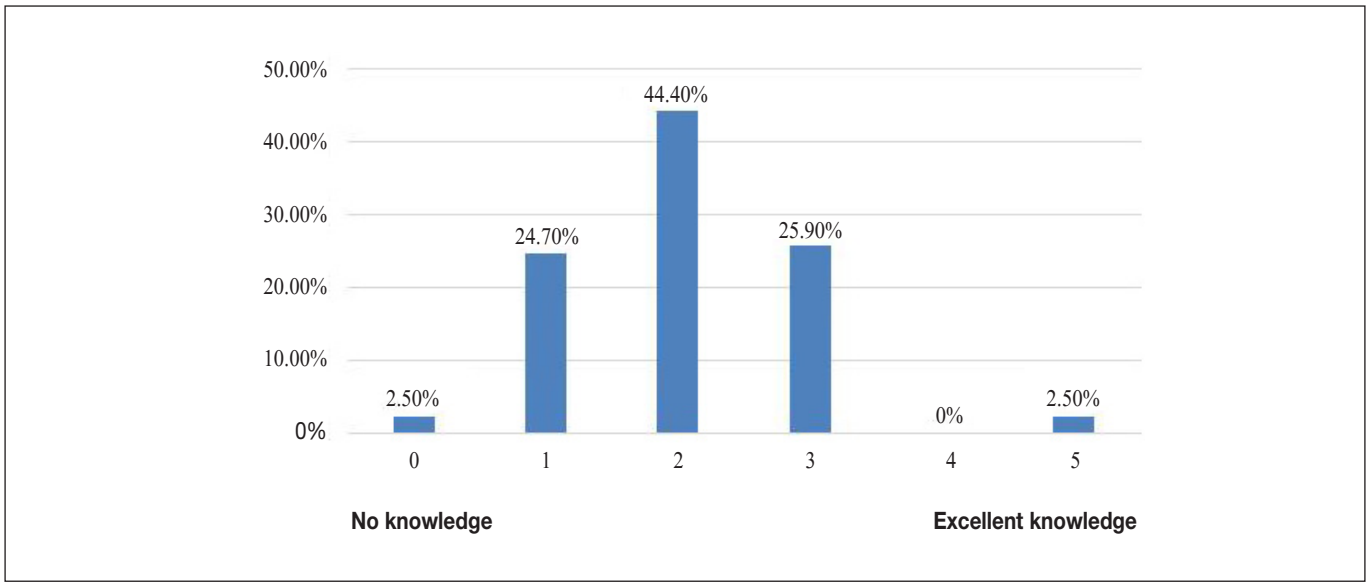

Figure 2 - *Self-assessed knowledge level in nutritional therapy*

DISCUSSION

The study sample, formed by 81 medical residents, presented a wider size when compared to the majority of studies reviewed in literature, which varied from 14 to 67 participants[11-15]. This can be explained by the low interest and engagement from the physicians in completing the questionnaire, despite the wide available population for these studies. However, the voluntary participation is necessary.

The variety of medical specialties represented on the sample was wider than the one encountered in previous studies, which had a bigger participation of residents in Medical Clinical and Intensive Care, although it has also included Gynecology/Obstetrics, Neurosurgery and Psychiatry[10,11]. The biggest prevalence of Clinical Medicine and Intensive Care can be explained for being more generalist areas and more focused on the patient, demanding, therefore, more frequent interaction with nutritional therapy.

Another divergence from literature concerns the participants' distribution according to each year of residence. While Cabral et al.[11] reported the participation of 73% of residents from the 1st year (R1s) and 27% of the residents from the subsequent years, this study, on the contrary, observed 26% of R1s and 74% of subsequent years.

Regarding nutritional screening, the research outcomes brought up a substantial discrepancy between clinical practice and the ESPEN[9]. While society emphasizes the importance of early identification of patients at risk of malnutrition through specific tools, such as the Malnutrition Universal Screening Tool (MUST) for hospitalized or adults or community-dwelling adults, the NRS-2002 exclusively for inpatients, and the MNA for elderly in various situations (inpatients, long-term care institutions or rehabilitation)[9], collecting data indicate that this practice is still very unknown, being adopted by only 11% of the participant physicians. Similarly, Mendes et al.[24] found only 36% of physicians used nutritional screen

According to the BRASPEN, the gold standard for assessing all patients' energy needs is indirect calorimetry[13]. However, only 1% of the participants reported using it, especially for being a high-cost and limited resource at most of the hospitals. Therefore, the guidelines[17-19] recommend the use of predictive equations, both for calories and proteins, tailored to each clinical condition, with significant variations among them. This is not corroborated by the few residents (11%) that reported using these methods, typically relying on generic values for all situations. BRASPEN recommends, for instance, that critically ill patients such as those who had a traumatic brain injury (TBI) or a stroke, initiate a moderate caloric and protein intake, progressing after the fourth day. When it comes to obese critical patients, the intake must be adjusted according to the ideal or actual body mass index (BMI), depending on the case[17]. For old individuals, it is indispensable to adjust the individual nutritional needs, according to the nutritional status, physical activity level and metabolic demand regarding disease[18]. Regarding kidney injury, the recommendations are highly variable, depending on factors such as the chronicity and severity of the disease, metabolic stress, and the presence of other diseases[19]. These guidelines reinforce the importance of adequate energy and protein planning, and the fact that 87% of residents do not estimate TEE highlights a relevant gap. Although the calculation of calories and macronutrients is part of the dietary prescription (an activity exclusively performed by dietitians), it is essential that physicians possess basic knowledge of nutritional requirements, as they are responsible for indicating nutritional therapy and frequently participate in these decisions in clinical practice[9].

When it comes to the beginning of nutritional therapy, this study, despite stipulating wider response options, observed that most of the participants corroborate the recommendation of BRASPEN, which proposes its initiation within 24 to 48 hours of admission[17]. Similarly, another study verified that 84% of the intensive care physicians consider it acceptable to wait up to 48 h before starting the enteral nutrition in septic ICU patients, 5% consider it acceptable to wait up to 72 h and 1%, up to 5 days[9].

The study results about MNTT reassure the perspectives from Paulo et al.[12] perspectives, which highlight a relevant unawareness among medical residents about the MNTT composition and functioning. In their research, 26% of the participants reported to acknowledge the team's existence, but did not know their members, while 23% mentioned occasional interactions. However, 40% reported not having any familiarity with the concept and responsibilities of MNTT[12]. Possible explanations may be related to the limited and slow dissemination of MNTTs in institutions, and the lack of emphasis on the importance and functioning of the team during the medical education[9].

Regarding the self-assessment of medical residents, it was possible to observe that the numbers meet the scientific literature, which evidences a significant perspective and an actual gap in their knowledge of nutritional therapy. Cunha et al.[10] highlighted that over one third of the professionals report serious difficulties at organizing a nutritional program for critically ill patients, whose self-assessment averaged score was 6 on a 0 through 10 scale. The same score prevalence was noted in the studies by Mendes et al.[24] and Cabral[11]. Additionally, Ferreira et al.[13] identified that

half of the participants did not feel prepared to work with parenteral nutrition. Gomes & Boin[14] observed a regular knowledge about nutritional therapy among the residents, with an average score of less than 50% on a basic questionnaire about clinical nutrition. Furthermore, Paulo et al.[12] emphasized that 94% of the physicians reported not having the proper knowledge about nutritional therapy in surgical patients, and less than 20% demonstrated being confident enough to change their patients' nutritional therapy. Confirming that outcome, his study presented a low performance with only 30% correct answers on a nutritional knowledge questionnaire[12].

Although there is a consensus among respondents on the importance of nutritional therapy in patients' clinical outcomes, as shown by previous studies[13,16], this seems to be undervalued in medical education, with a notable and significant indifference from the medical residents in deepening their understanding in this area. Research indicates that fewer than 60% of the residents demonstrate their willingness to enhance their learning in Nutrition[16], and only one-third deny that nutritional therapy is a low priority in their departments[17]. In contrast, Paulo et al.[12] observed that 83% of the physicians agree on the perspective that a training would be valuable for their career, once the majority of them (94%) feel not properly informed to assist their patients' nutritional management. Additionally, Cabral et al.[11] verified high interest among most of the residents about the hospital malnutrition; however, they presented limited self-awareness in how to deal with the issue.

The research outcomes meet the literature through its emphasis on the importance of the dietitian during the decision-making process of the nutritional therapy. Even though most of the results acknowledge the dietitian role, there is still a significant portion who still assign this responsibility to the physician. This disagreement is similar to what Gomes & Boin[14] presents in his studies, who observed diversified responsibilities between physicians and dietitians when it comes to nutritional assessment, optimization, and standard dietary planning. The frequency of discussions among these professionals also varies, highlighting the need of strengthening communication and interprofessional collaboration. This necessity is even more explicit when considering that, according to Paulo et al.[12], a significant portion of residents report having the responsibility of deciding their patients' nutritional therapy, which can harm the nutritional care quality. Abdollahi et al.[19] outcomes reinforce the importance of the dietitian's expertise in the area, indicating that these professionals have got a deeper and more reliable nutritional knowledge. As a consequence, it is essential for physicians to recognize the importance of collaboration with the dietitians in order to assure nutritional therapy enhancement and to improve patients' clinical results.

The research points out that, in many cases, providing appropriate nutritional therapy does not depend, exclusively, on clinical patients' conditions, but also on the medical team's expertise, just like its effective application[17]. Most failures in patient nutritional care have been associated with the lack of grounded and sufficient knowledge among the clinical team, and its resistance to new guidelines[20]. Among the multidisciplinary team, perceived barriers to implementing nutritional support are crossed by the unclear responsibilities, lack of instructions, knowledge and work overload[13,26].

This topic stands out due to the physician's responsibility for recommending and prescribing nutritional therapy, which requires a deep knowledge from them, once different nutritional therapy modalities involve high costs and risk of complications[26].

The low performance analyzed on questionnaires about clinical nutrition applied to physicians is possibly related to the insufficient amount of content about nutrition during medical school period. Studies involving medical residents confirmed this gap, as they have estimated very limited or no exposure[11] to this topic during their undergraduate training period.

The National Curricular Guidelines of Medical School[5], published in 2014, do not elaborate any mention regarding the patient's nutritional care, which means there is no regulation defining the adequate proportion of nutrition education required for medical undergraduates, reflecting the undervaluation of the topic in medical education.

The barriers described for the improvement of Nutrition teaching in medical schools include low clinical applicability, perspectives that nutritional care is not part of a physician's role, lack of disseminations about the existence of clinical nutrition faculties, teacher demotivation and curricular overload[26]. The growing number of emerging medical topics competing for attention and the excessive workload can also explain the low attendance of graduate or undergraduate physicians to upgrading courses about nutritional therapy.

These factors clearly demonstrate that hospital malnutrition is constantly trivialized and not acknowledged by the healthcare team members, as the dietitian role when it comes to the nutritional diagnosis, and individualized, adequate dietary planning in qualitative, quantitative, pathophysiological and well-accepted aspects. In other words, that means hospital nutrition is still seen as a support service and not as an essential care service. The early nutritional identification and intervention for patients at a nutritional risk are the most effective ways to minimize the harmful effects of protein-calorie

malnutrition. In this context, it is undeniable that physicians and dietitians have different professional regulations and academic training, even though they are both healthcare professionals. Therefore, it should be a dietitian's responsibility to perform tasks to which they are most qualified to perform due to their academic background[3].

Thus, the medical team's training proves to be essential. Creating new medical education models on this subject is urgent in order to improve nutritional care quality.

The main limitations of the presented study taken into consideration are the sample size, which required the resident's willingness to participate, the use of a non-validated questionnaire, despite the developed tool being quite effective in collecting data, and the risk of bias by completing the questionnaire with no supervision, which could allow participants to consult other professionals or online sources.

On the other hand, the advantages include the diversity of medical residency program specialties found through this research and their contribution to the Brazilian bibliography related to medical knowledge about nutritional therapy, as there are few published studies with this purpose.

Creating other strategies to widen the sample size, the performance of prospective studies aiming their applicability on Clinical Nutrition classes such as the intervention method, and the production of comparative studies with physicians and dietitians as sample groups seem to be essential to enrich the future's literature on this topic.

CONCLUSION

The study revealed a significant gap in knowledge and nutritional therapy practices among medical residents. Despite the recognized importance on the patients' clinical outcomes, most participants demonstrated limited knowledge about nutritional screening, energy and protein needs calculation and enteral nutritional therapy.

The lack of awareness about the MNTT and the limited collaboration with dietitians were also observed.

The research also highlighted the physicians' perception about their limitations in nutritional knowledge and their unsatisfying performance on tests regarding the topic, which stood out the need of improving nutritional therapy training during medical school.

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ATTACHMENT 1

QUESTIONNAIRE ON NUTRITIONAL THERAPY FOR RESIDENT DOCTORS

I. INITIAL DATA

1 Age:
- a. Between 21 and 25 years old
- b. Between 26 and 30 years old
- c. Between 30 and 35 years old
- d. Over 36 years old

2 Gender:
- a. Male
- b. Female

3. Current medical residency specialty:
_____

4. Current year of medical residency:
- a. R1
- b. R2
- c. R3
- d. R4
- e. R5
- f. > R5

II. SPECIFIC DATA

1. Do you have any knowledge of nutritional screening? If so, do you use this tool in your clinical practice?
- a. Yes, I know and I use it.
- b. Yes, I know, but I do not use it.
- c. I do not know about nutritional screening.
- d. Other. ___

2. If you perform nutritional screenings on your patients, which of these tools do you usually apply
- a. NRS-2002
- b. NUTRIC score
- c. MNA
- d. Other. Which? ____
- e. I don't perform nutritional screening.

3 Do you usually calculate the estimated total energy expenditure (TEE) for most of your patients before prescribing a diet? In that case, which method do you use?
- a. Yes, I calculate it using quick formulas. Which? ___
- b. Yes, I calculate it using predictive equations. Which? ___
- c. Yes, I calculate it using indirect calorimetry.
- d. Other methods. Which? ___
- e. I do not usually calculate it.

CONTINUATION ATTACHMENT 1

QUESTIONNAIRE ON NUTRITIONAL THERAPY FOR RESIDENT DOCTORS

4 Do you usually calculate the protein requirements for most of your patients before prescribing a diet?

a. Yes, I calculate it. I usually prescribe between __ and __ g PTN/kg/day.

b. I do not usually calculate it.

c. Other. ___

5. In general, how long do you usually wait before initiating enteral nutrition for patients who are unable to eat orally or have very low oral caloric-protein intake?

a. Up to a maximum of 24 hours.

b. Between 1 and 5 days.

c. After more than 5 days.

d. I do not usually prescribe enteral nutrition in my specialty.

e. Other. ___

6. In most cases, how long do you usually take to increase the diet volume?

a. Every 24 hours until the nutritional goal is reached.

b. Every 48 hours until the nutritional goal is reached.

c. Every 72 hours until the nutritional goal is reached.

d. I don't usually increase the volume: I prescribe directly the volume I calculate according to its need.

e. I do not usually prescribe enteral nutrition in my specialty.

f. Other. ___

7. Do you know what trophic enteral nutrition is?

a. Yes, I know the concept and its applicability.

b. I have doubts about this term.

c. No, I do not know what it is.

d. Other. ___

8. Do you know the difference between polymeric and oligomeric enteral diets?

a. Yes, I know the difference and the applicability.

b. I have doubts about these types of diets.

c. No, I do not know what they are.

d. Other. ___

9. Do you know the standard of hospital diets, the characteristics and consistencies of the foods that make up the menus of the institution where you work?

a. Yes, I have excellent knowledge.

b. I know superficially.

c. I have never seen the standard of hospital diets.

d. Other. ___

10 Nutritional therapy influences the clinical progress of the patient.

a. I strongly agree.

b. I agree.

c. I do not know.

d. I disagree.

e. I strongly disagree.

CONTINUATION ATTACHMENT 1

QUESTIONNAIRE ON NUTRITIONAL THERAPY FOR RESIDENT DOCTORS

11 In most clinics you have worked in, who made the decisions regarding the nutritional therapy of patients?

a. Doctor responsible for the clinic
b. Doctor from another specialty. Which? ___
c. Dietitian
d. Nurse
e. Speech-language pathologist or speech therapist
f. Other. Which? ___

12. Do you know the difference between the roles of a dietitian and a nutrologist physician, regarding their duties?

a. Yes, I can differentiate the duties of these professionals.
b. I have doubts about their roles.
c. I do not know the difference between their duties.
d. Other. ___

13. Do you know what a Multiprofessional Nutritional Therapy Team (MNTT) is?

a. Yes, I know what it is, the professionals who make it up, and their duties.
b. I have doubts about this concept.
c. No, I do not know what MNTT is.
d. Other. ___

14. Have you ever requested a consultation with the MNTT for any patient?

a. Yes, I have requested it, on my suggestion.
b. Yes, I have requested it, but it was suggested by another professional.
c. I have never requested it, as I didn't think it was necessary.
d. I have never requested it because I don't know what MNTT is.
e. Other. ___

15. Do you know the dietitian in the clinic where you are currently working?

a. Yes, I know the dietitian and I maintain contact with them.
b. I know the dietitian, but I have never spoken to them.
c. I do not know who the dietitian in the clinic I'm working at is.
d. Other. ___

16. How many times per week do you usually discuss clinical cases with a dietitian in your routine?

a. Every day.
b. 2 to 3 times a week.
c. Once a week.
d. Rarely.
e. Never.
f. Other. ___

17 How would you rate your knowledge in nutritional therapy based on your clinical practice? (0 = no knowledge and 5 = excellent knowledge).

a. 0
b. 1
c. 2
d. 3
e. 4
f. 5

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