Top Clin Nutr
Vol. 39, No. 3, pp. 184–197

OPEN

ORIGINAL ARTICLE

Contribution to the Validation of the Portuguese Version of the "Barriers to Enterally Feeding Critically Ill Patients" Questionnaire and Its Application in a Hospital Context

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In Portugal, there is no validated questionnaire to assess barriers to enteral nutrition administration in critically ill patients. The aim of this study was to validate the "Barriers to Enterally Feeding Critically Ill Patients" questionnaire in a Portuguese context (BEFIP-PT). The BEFIP-PT, which assesses 16 potential barriers divided into 4 domains, was applied to a sample (n = 165) of physicians, nurses, and nutritionists working in the Portuguese intensive care units. The most detrimental barriers perceived by health care professionals were delayed motility agents, delayed small bowel access, and inadequate time dedicated to enteral nutrition education. **Key words:** *barriers to enteral nutrition*, *BEFIP questionnaire*, *enteral nutrition*, *validation study*

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Gratitude is expressed to all participants in this study.

The data presented in this study and the Portuguese version of BEFIP are available upon request from the corresponding author. The Portuguese version of the BEFIP can also be found on the Critical Care Nutrition Group Web page at: https://www.criticalcarenutrition.com/resources/barriers-questionnaire.

The authors declare no conflict of interest.

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DOI: 10.1097/TIN.0000000000000327

MANY CLINICAL nutrition guidelines focus on the importance of early initiation of enteral nutrition (EN) during critical illness (within the first 48 hours after intensive care unit [ICU] admission) in the absence of any contraindication to reduce mortality and the risk of malnutrition.[1,2] Early EN initiation during hospitalization is associated with several benefits for clinical outcomes in critically ill patients.[2,3]

In contrast, malnutrition acquired in a hospital environment, particularly in an ICU, can affect approximately 1 in every 3 inpatients and is an independent risk factor for increased inhospital mortality, length of stay, and costs.[4] Several circumstances can lead to malnutrition, including that ICU patients

may receive less enteral energy and protein than the prescribed dose (approximately 15%-90%) of goal.[5-7]

Implementation of clinical nutrition guidelines in the ICU is affected by numerous barriers, which may restrict or limit the provision of adequate nutrition support to critically ill patients.[8] Tools that identify the individual ICU barriers to EN delivery may facilitate the creation of EN protocols adapted to the unique features and characteristics of each institution.[9]

The Barriers to Enterally Feeding Critically Ill Patients survey (BEFIP) has been used to identify barriers to adequate EN support for critically ill patients. This questionnaire was developed by Cahill et al[10,11] with the aim of exploring the barriers perceived by health care professionals (HCPs) in ICUs. In 2016, this questionnaire was revised, and the latest version made it possible to analyze the magnitude and severity of 20 potential barriers.[12] In addition to its original version, the BEFIP has been successfully translated and validated for populations with other linguistic cultures when applied only to nurses.[13,14] To date, there is no validated instrument for characterizing potential barriers to EN administration in critically ill patients in Portugal.

The main aim of this study was to validate the Portuguese version of the BEFIP and characterize the perceptions of HCPs (physicians, nurses, and nutritionists) regarding barriers to the administration of EN to critically ill patients.

METHODS

Study design

This was a cross-sectional observational study in which the BEFIP was translated into Portuguese and, after a pretest, applied through an online platform to the final sample.

Study population

The pretest was applied to 5 physicians and 5 nurses, which corresponds to the minimum number recommended by Wild et al,[15] and only 3 nutritionists, given that the number of these professionals working in ICUs nationwide is small. The pretest inclusion criteria were as follows: (1) a physician, nurse, or nutritionist working in an ICU; (2) willingness to answer the questionnaire; (3) able to read Portuguese; and (4) a resident of Portuguese mainland or islands.

The final sample included physicians, nurses, and nutritionists working in Portuguese hospital ICUs. The criteria for inclusion in the final sample were the same as those for the pretest; however, the participants could not have previously participated in the pretest. The ICUs of 7 public sector hospitals from various health regions of the Portuguese mainland (4 from Lisbon and Tagus Valley, 1 from the Centre, and 1 from the North) and islands (1 from Terceira Island, Azores) agreed to collaborate among the 25 hospitals contacted.

Adjustment procedures of the Portuguese version of the BEFIP (BEFIP-PT)

First, the revised version of the BEFIP was translated and adapted from its original language (English) to Portuguese by the principal investigator.[16] It was linguistically verified by a second investigator, and the necessary semantic and grammatical adjustments were made.

The pretest, which consisted of the face-to-face administration of a mini survey to HCPs to assess their understanding of the translated version of the BEFIP-PT, was conducted between November and December 2020. The pretest assessed the acceptability, clarity, and comprehensibility of the questions, and the need to edit the survey.

After the translation and application of the pretest, some questions were adjusted to obtain a more harmonious and culturally adapted version of the BEFIP-PT (Figure).

The Portuguese BEFIP version (BEFIP-PT) was provided through a link that directed the respondents to an anonymous questionnaire using the online survey platform

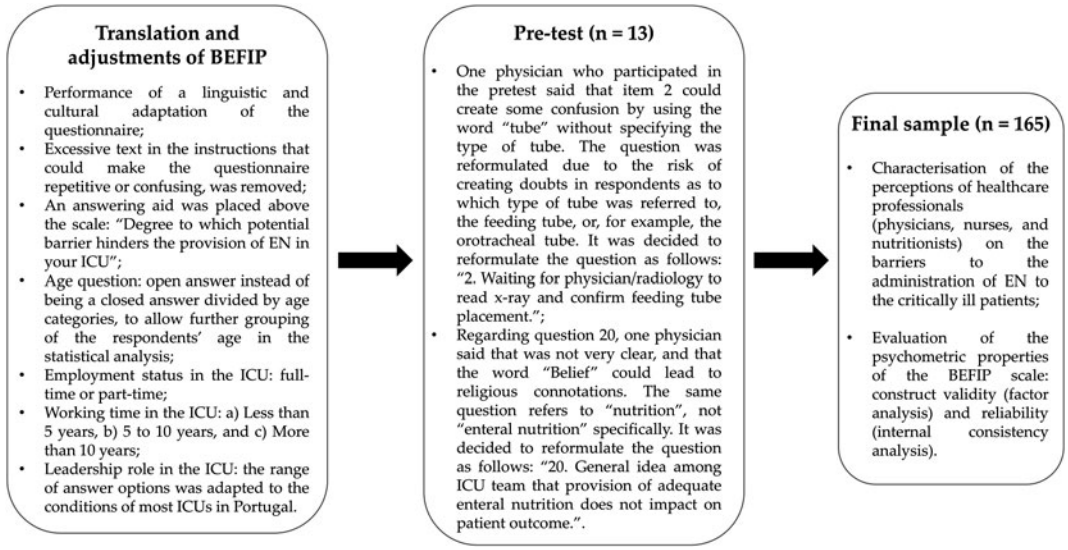

Figure. Workflow and adjustments made after the translation and pretest of the BEFIP. BEFIP indicates Barriers to Enterally Feeding Critically Ill Patients survey; EN, enteral nutrition; ICU, intensive care unit.

LimeSurvey.org (LimeSurvey, Hamburg, Germany), which hosted the data in Great Britain.[17] The link was sent through professional or personal emails of physicians, nurses, and nutritionists in each ICU by medical directors and/or head nurses in each unit between January and May 2021. A bimonthly email reminder was also sent requesting the participation of HCPs who had not yet responded to the questionnaire.

Assessment of the HCPs' perceptions about barriers to EN

The original BEFIP analyzed 20 potential barriers across 4 domains: (1) delivery of EN to the patient, (2) nutritionist support, (3) ICU resources, and (4) critical care provider attitudes and behaviors.[12] For each potential barrier, the respondent responded on a Likert-type scale with 7 response options, ranging from 0 for "Not at all" (the respondent does not perceive the item as a barrier) to 6 for "An extreme amount" (the respondent considers that the barrier severely affects the provision of EN in their ICU). As proposed by the authors of the BEFIP, to calculate each item's score, the value 0 is assigned to the ordinal scale from 0 to 3, and the values 1, 2, and 3 are assigned to answers on the ordinal scale of 4, 5, and 6, respectively. The sum of these values was then divided by 3 (the maximum possible value for each item) and multiplied by 100. After this conversion, the score for each domain can be calculated by averaging all items in the respective domain as well as the average of all items in the scale.[11,12]

Sociodemographic characteristics

Sociodemographic information was also collected (gender identity, age, profession, employment status, working time, and leadership role in the ICU).[12] The questionnaire also contained a section dedicated to additional comments regarding barriers that were not included in the questionnaire and/or possible improvements. This section was optional.

Ethical procedures

The validation of the BEFIP-PT was authorized by the authors of the original version via email. The study protocol was submitted to and approved by the Ethics Committee of Egas Moniz (process number: 901) and the

respective ethics committees for the health of public hospitals that agreed to collaborate.

Informed consent was incorporated into the online questionnaire and its completion could not be initiated without the consent of the respondents or the institution to which they belonged. The anonymity of the respondents was safeguarded by encryption and their IP address was not collected by the online platform.

Statistical analysis

All data obtained were analyzed using IBM SPSS Statistics for Macintosh, Version 27.0 (IBM Corp, Armonk, New York). Sociodemographic data and questionnaire items were analyzed using descriptive statistics. Given the ordinal nature and nonnormal distribution (verified by the Kolmogorov-Smirnov test) of the variables under study, the Kruskal-Wallis test was used to compare the perceptions of barriers between the 3 professional groups. Multiple comparisons between groups that had a statistically significant ($P < .05$) Kruskal-Wallis test result were performed using Fisher least significant difference test.[18]

Construct validity was assessed using factor analysis (FA) based on the principal component extraction method with varimax (orthogonal) rotation in a correlation matrix.[19] Howard[20] proposed that to perform an FA, the sample size should be at least 5 times greater than the number of items in the scale. The BEFIP scale has 20 items which, multiplied by 5, shows that data from at least 100 cases are needed to satisfy this condition.[20] The final sample comprised 165 patients. Before interpreting the FA, 2 assumptions were verified: Bartlett's sphericity test ($P < .05$) and the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO).[21] An eigenvalue greater than 1 rule was used to determine the retention of factors that extracted at least 5% of the total variance.[22] For the cumulative extracted variance after rotation, the minimum criterion of 50% to 60% proposed by Marôco[23] was used. According to the guidelines of Matos and Rodrigues,[24] minimum commonalities of 0.5 are considered acceptable for a sample of 100 to 200 individuals. Factor loadings greater than 0.5 were accepted to retain the item in a single factor, also considering its framework and conceptual coherence.[11,25]

Internal reliability was evaluated using Cronbach α coefficient (CAC) for each domain and total scale. Hill and Hill[26] suggested that CAC should have a minimum of 0.7. If each item was eliminated, the item-total correlation matrix and CAC values were analyzed to assess the relevance of each item to the total scale. The item-total correlation was considered acceptable if the correlation coefficient was greater than 0.3.[27,28]

RESULTS

Composition and sociodemographic characteristics of the sample

Of the 522 HCPs contacted, 32% (n = 165) responses were obtained. Of the 165 HCPs who responded, 12 (7.3%) were nutritionists, 35 (21.2%) were physicians, and 118 (71.5%) were nurses. On average, the participants took 8 minutes and 6 seconds to complete the questionnaire.

Regarding the sociodemographic characteristics of the sample, there was a higher prevalence of female HCPs (70.9%), those between 31 and 40 years of age (50.3%), nurses (71.5%), those who worked full-time in the ICU (90.9%), and those who had worked for less than 5 years (46.7%). Most HCPs (91.5 %) did not hold leadership positions in the ICU. Those who maintained managerial positions were mainly head nurses (35.7%), charge nurses (28.6%), and medical directors (28.6%) (Table 1).

Perceptions of the HCPs about barriers to EN

Delivery of EN to the patient

In the domain "Delivery of Enteral Nutrition to the Patient," items 1 (Physician order delay), 4 (Delayed motility agents), 5 (Delayed small bowel access), 6 (EN not a priority), and 7 (EN not discussed on rounds) were

Table 1. Sociodemographic Characteristics of the Final Sample

Characteristic	%	n
Gender identity		
Male	29.1	48
Female	70.9	117
Total	100	165
Age, y		
≤30	18.2	30
31-40	50.3	83
>40	31.5	52
Total	100	165
Health care profession		
Nutritionist	7.3	12
Physician	21.2	35
Nurse	71.5	118
Total	100	165
Employment status in the ICU		
Full-time	90.9	150
Part-time	9.1	15
Total	100	165
Working time in the ICU, y		
<5	46.7	77
5-10	22.4	37
>10	30.9	51
Total	100	165
Leadership role in the ICU		
No	91.5	151
Yes	8.5	14
Total	100	165
Type of leadership role in the ICU		
Medical director	28.6	4
Responsible physician	0	0
Head nurse	35.7	5
Charge nurse	28.6	4
Other	7.1	1
Total	100	14

Abbreviation: ICU, intensive care unit.

most frequently identified as barriers by the respondents. This trend was most notable for items 4 (median = 4.0) and 5 (median = 4.0). Items 2 (radiograph wait) (median = 1.0) and 3 (Feeding tube displacement) (median = 2.0) had little effect on EN administration (Table 2). Items 2 and 3 were less frequently reported by most professionals, with the exception of physicians (item 2: 13.3 ± 28.7; item 3: 17.2 ± 31.1) (Table 3).

In contrast, item 4 (Delayed motility agents) had a high mean score (37.8 ± 37.3). According to the analysis of multiple comparisons between professional groups, item 4 presented a significant difference ($P = .006$) between nurses (median = 4.0), nutritionists (median = 3.0), and nurses and physicians (median = 3.0; $P < .001$) (Table 3). Nurses tended to perceive that item more frequently as a barrier. These professional groups may have a better perception of this barrier, as they need to wait for the prescription of motility agents by the physician to carry out this change in therapy and administer to patients. Item 5 (Delayed small bowel access) also tended to be considered as a barrier and had a high mean score (42.8 ± 36.4) but without distinction between professional groups ($P = .089$) (Table 3).

Regarding item 6 (EN not a priority), there was dissonance in the answers given by HCPs. Half considered the item as less (39.4%; n = 65) and the other half as more than "A moderate amount" (39.3%; n = 65) (Table 2). They tended to respond to the intermediate category of the BEFIP Likert-type scale (median = 3.0), except for nutritionists, who were most likely to consider this item a barrier with little impact on EN administration (median = 2.0; $P = .401$) (Table 3).

Nutritionist support

In the domain "Nutritionist Support," item 11 (Not enough time dedicated to EN education) tended to be identified by respondents as a barrier with the greatest impact on EN administration (median = 4.0). Items 9 (Nutritionist is not present on rounds) and 10 (No or not enough nutritionist coverage) were categorized as having less impact on EN administration, and item 8 (Wait for the nutritionist) was even less (median = 2.0) than the other items (9, 10, and 11) in this domain (Table 2).

According to multiple comparisons between professional groups, item 8 (Wait for the nutritionist) presented a significantly

Table 2. Descriptive Statistics of BEFIP Response Scale

Domain/Item	Median	IQR	Mode	Response Frequency (%)							
				Not at All	Very Little	A Little	A Moderate Amount	A Lot	A Great Deal	An Extreme Amount	Total
Delivery of enteral nutrition to the patient											
1. Delay in physicians ordering the initiation of EN.	3.0	2.5	4.0	9.7	12.1	15.2	18.2	20.0	13.3	11.5	100
2. Waiting for physician/radiology to read radiograph and confirm feeding tube placement.	1.0	3.0	0	41.8	18.2	13.3	6.1	6.7	8.5	5.5	100
3. Frequent displacement of feeding tube, requiring reinsertion.	2.0	3.0	1.0	14.5	33.9	12.1	12.7	7.9	12.7	6.1	100
4. Delays in initiating motility agents in patients not tolerating enteral nutrition (ie, high residual gastric volumes).	4.0	2.0	5.0	4.8	6.1	12.7	17.0	21.2	22.4	15.8	100
5. Delays and difficulties in obtaining small bowel access in patients not tolerating enteral nutrition (ie, high-residual gastric volumes).	4.0	2.0	4.0	1.1	3.0	3.0	24.2	26.1	24.8	17.6	100
6. In resuscitated, hemodynamically stable patients, other aspects of patient care still take priority over nutrition.	3.0	2.0	4.0	10.3	10.3	18.8	21.2	24.8	10.9	3.6	100
7. Nutritional therapy not routinely discussed on patient care rounds.	3.0	3.0	5.0	11.5	9.1	16.4	18.8	17.6	19.4	7.3	100
Nutritionist support											
8. Waiting for the nutritionist to assess the patient.	2.0	4.0	0	26.1	13.3	11.5	17.6	8.5	7.9	15.2	100
9. Nutritionist not routinely present on weekday patient rounds.	3.0	4.0	0	20.0	5.5	9.7	18.8	14.5	13.3	18.2	100

(*continues*)

Table 2. Descriptive Statistics of BEFIP Response Scale (*Continued*)

Domain/Item	Median	IQR	Mode	Response Frequency (%)							
				Not at All	Very Little	A Little	A Moderate Amount	A Lot	A Great Deal	An Extreme Amount	Total
10. No or not enough nutritionist coverage during evenings, weekends, and holidays.	3.0	4.0	0	18.2	7.9	13.9	15.8	17.6	10.3	16.4	100
11. Not enough time dedicated to education and training on how optimally to feed patients.	4.0	2.0	3.0	4.2	4.2	7.9	22.4	21.8	21.8	17.6	100
ICU resources											
12. Enteral formula not available on the unit.	3.0	4.0	0	21.2	10.9	17.0	9.1	14.5	13.9	13.3	100
13. No or not enough feeding pumps on the unit.	1.0	5.0	0	40.6	9.7	6.7	7.3	10.3	12.7	12.7	100
Critical care provider attitudes and behavior											
14. Non-ICU physicians (ie, surgeons, gastroenterologists) requesting that patients not be fed enterally.	3.0	2.0	4.0	11.5	12.1	16.4	17.6	23.6	10.9	7.9	100
15. Nurses failing to progress feeds as per the feeding protocol.	3.0	3.0	0	22.4	15.2	9.7	13.3	15.2	16.4	7.9	100
16. Feeds being withheld due to diarrhea.	3.0	3.0	3.0	9.1	7.3	11.5	23.6	21.2	18.2	9.1	100
17. Fear of adverse events due to aggressive feeding of patients.	2.0	3.0	2.0	15.2	13.3	24.8	18.2	17.6	9.1	1.8	100
18. Feeding being withheld too far in advance of procedures or operating room visits.	3.0	2.0	3.0	8.5	14.5	18.8	24.8	18.8	8.5	6.1	100
19. Lack of familiarity with current guidelines for nutrition in the ICU.	3.0	3.0	3.0	13.9	9.7	13.3	20.6	17.0	14.5	10.9	100
20. General idea among ICU team that provision of adequate enteral nutrition does not impact on patient outcome.	3.0	4.0	0	21.8	11.5	10.9	13.3	12.7	14.5	15.2	100

Abbreviations: EN, enteral nutrition; ICU, intensive care unit; IQR, interquartile range.

Table 3. Comparison of Perceptions of Barriers to EN per Health Care Professional Group

	Nutritionists (n = 12)		Physicians (n = 35)		Nurses (n = 118)		
Item	**Median**	**IQR**	**Median**	**IQR**	**Median**	**IQR**	***P***
1	3.5	5.5	3.0	3.0	3.0	3.0	.280
2	1.5	4.75	0	2.0	1.0	3.0	.189
3	2.0	3.0	1.0	2.0	2.0	3.0	.772
4	3.0	2.5	3.0	3.0	4.0	2.0	<.001[a]
5	4.0	2.0	4.0	2.0	4.0	2.0	.089
6	2.0	2.75	3.0	2.0	3.0	2.0	.401
7	3.0	4.75	3.0	3.0	3.0	2.25	.917
8	1.0	1.75	1.0	3.0	3.0	4.0	.003[a]
9	2.5	3.75	3.0	6.0	3.5	3.0	.168
10	3.0	1.0	3.0	4.0	3.0	4.0	.663
11	3.0	3.75	4.0	3.0	4.0	2.0	.101
12	1.5	4.75	2.0	3.0	3.0	4.0	.125
13	1.0	4.75	1.0	4.0	2.0	5.0	.892
14	4.0	3.0	2.0	3.0	3.0	2.0	.237
15	3.5	3.0	3.0	5.0	3.0	3.25	.889
16	3.0	3.25	4.0	1.0	3.5	3.0	.474
17	3.0	1.0	2.0	2.0	2.0	3.0	.740
18	2.5	2.0	3.0	2.0	3.0	2.25	.776
19	2.5	3.5	3.0	2.0	3.0	3.0	.898
20	3.0	3.25	3.0	3.0	3.0	4.0	.991

Abbreviation: IQR, interquartile range.

[a]Results from the Kruskal-Wallis's test were statistically significant, with a *P* value of less than .05 and a confidence interval of 95%. Results from LSD Fisher tests on differences between professional groups: item 4, nutritionists versus physicians ($P = .676$); nutritionists versus nurses ($P = .006$); and physicians versus nurses ($P < .001$). item 8, nutritionists versus physicians ($P = .901$); nutritionists versus nurses ($P = .037$); and physicians versus nurses ($P = .002$).

different distribution ($P = .037$) between nurses (median = 3.0) and nutritionists, nurses, and physicians ($P = .002$). Nurses tended to perceive this barrier more frequently, whereas physicians (median = 1.0) and nutritionists (median = 1.0) considered item 8 (Wait for the nutritionist) to have little impact on the administration of EN in their ICU (Table 3). Physicians may find that waiting for a nutritionist to assess the patient has little impact on EN administration because there may be no nutritionist fully or partially allocated to the ICU, as mentioned by a physician in the additional comments section of the questionnaire. Alternatively, as mentioned by a nutritionist in the additional comments, some medical teams may still be reluctant to assign responsibility to the nutritionist for providing EN support.

Item 11 (Not enough time dedicated to EN education) had a high mean score (39.3 ± 37.8), tending to be categorized as "A lot" of a harmful barrier (median = 4.0), essentially by physicians and nurses (Table 3). This is an aspect mentioned in the statements of some physicians (1), nurses (2), and nutritionists (2) as an extremely relevant point, as the continuous training of members of the multidisciplinary team on matters of nutrition, specifically EN, is not regularly provided. This is an extremely relevant barrier and a gap reported by professionals and identified as a need.

ICU resources

Items 12 (Enteral formula not available) and 13 (No or not enough feeding pumps) of the "ICU Resources" domain were

Table 4. Results From Factor Analysis (N = 165)

Domain/Item	Factor 1	Factor 2	Factor 3	Factor 4	h^{2a}
Delivery of enteral nutrition to the patient					
1	0.496	**0.614**	0.171	−0.084	0.659
2	0.138	**0.804**	0.019	0.073	0.671
3	0.009	**0.668**	0.134	0.439	0.657
4	0.211	**0.615**	0.144	0.423	0.622
5	0.243	**0.637**	0.154	0.218	0.536
Nutritionist support					
8	0.062	0.328	**0.664**	0.206	0.595
9	0.105	0.089	**0.849**	0.008	0.740
10	0.004	0.063	**0.860**	−0.065	0.748
11	0.213	−0.003	**0.677**	0.334	0.614
ICU resources					
12	0.298	0.225	0.206	**0.725**	0.707
13	0.235	0.254	0.012	**0.801**	0.762
Critical care provider attitudes and behavior					
16	**0.740**	0.006	0.050	0.155	0.575
17	**0.679**	0.270	0.118	0.253	0.611
18	**0.796**	0.268	−0.032	−0.020	0.708
19	**0.647**	0.159	0.258	0.324	0.616
20	**0.677**	0.158	0.129	0.469	0.720
Initial eigenvalues	6.089	2.015	1.396	1.041	...
Explained variance after rotation, %	38.058	12.594	8.725	6.507	...
Cumulative explained variance after rotation, %	38.058	50.652	59.377	65.884	...
Eliminated items					
6. In resuscitated, hemodynamically stable patients, other aspects of patient care still take priority over nutrition.					
7. Nutritional therapy not routinely discussed on patient care rounds.					
14. Non-ICU physicians (ie, surgeons, gastroenterologists) requesting that patients not be fed enterally.					
15. Nurses failing to progress feeds as per the feeding protocol.					

Abbreviation: ICU, intensive care unit.
[a]h^2 = communality.
Bolded text = items retained in the factor.

considered more frequently by HCPs as "Not at all" harmful (Table 4). Item 13 (No or not enough feeding pumps) tended to have a lower median value (median = 1.0), reflecting a reduced effect of EN administration (Table 2). However, regarding item 12 (Enteral formula not available), analysis revealed differences between the professional groups because nurses (median = 3.0) perceived this barrier more frequently than physicians (median = 2.0) and nutritionists (median = 1.5) (P = .125) (Table 3) since nurses might have closer contact with the stock management of EN products and more likely to deal with possible failures in the supply system.

Critical care provider attitudes and behavior

In the last domain "Critical Care Provider Attitudes and Behavior," median values tended to be generally intermediate for all items in this domain, except for item 17 (Fear of adverse events), which HCPs tended to categorize as "A little" harmful (median and

mode = 2.0) for the administration of EN (Table 2).

Item 14 (Requests that patients not be fed enterally) was perceived as not very harmful by physicians (median = 2.0) and as more harmful by nurses (median = 3.0) and apparently even as a barrier with a greater impact on EN administration by nutritionists (median = 4.0). Therefore, there seemed to be disagreement among the 3 professional groups, although the difference was not statistically significant ($P = .237$) (Table 3).

In contrast, physicians (median = 4.0) and nurses (median = 3.5) tended to perceive item 16 (Feeds being withheld because of diarrhea) as a more harmful barrier than nutritionists (median = 3.0) (Table 3). An explanation for this difference ($P = .474$) may be that nutritionists are a professional group that may not always be present in the unit and merely provide support, which can sometimes lead to decisions about EN, such as its suspension, being left to physicians and/or nurses. Another reason for this difference is that nurses can more easily perceive this barrier since they carry out hygienic care and check whether patients have diarrhea.

Item 17 (Fear of EN adverse events) had a lower mean score (13.8 ± 24.4), although it was perceived as more harmful by nutritionists (median = 3.0) than by physicians and nurses (both median = 2.0) (Table 3).

Construct validity

An initial factorial model was obtained in which the validity of the FA was verified using Bartlett's sphericity test ($P < .001$). Sample adequacy was also verified by the KMO test and was considered good (0.862). Regarding the commonalities of the initial factorial model, a value ($h^2 = 0.375$) was found for item 14 (Requests that patients not be fed enterally), which was lower than the acceptable minimum (0.5), which led to repeated FA after deleting this item.[24]

In a new FA, items 6 (EN not a priority) and 7 (EN not discussed on rounds) were also phased out because they were loaded in an independent factor and did not correlate with items 1 to 5 belonging to the domain "Delivery of Enteral Nutrition to the Patient." Item 6 (EN not a priority) seems ambiguous and does not specify that other aspects of patient care may be a higher priority than nutrition, which may lead to different interpretations by respondents and different reasons for answers, depending on the understanding of each professional. Chapple et al[29] have shown, several aspects of care can compete with nutrition in the ICU. Regarding item 7 (EN not discussed on rounds), this can also be included in the domain referring to "Critical Care Provider Attitudes and Behavior" or "Nutritionist Support," in addition to the domain "Delivery of Enteral Nutrition to the Patient," as it had values of factor loadings close to 0.5, in 3 factors. Because of the insufficient number of nutritionists employed by Portuguese ICUs, and depending on the culture of the institutions, EN therapy may not be discussed or discussed only by the physicians and nurses.

In another FA, item 15 (Nurses do not follow the EN protocol) was also eliminated because it loaded an independent factor that had not been theoretically proposed, belonging to the dimension "ICU Resources." Perhaps this item does not correlate with the rest of the items in the domain "Critical Care Provider Attitudes and Behavior," as some ICUs may not yet have a well-defined EN protocol established, as noted by a professional in the additional comments section of the questionnaire.

Items 1 (Physician order delay), 3 (Feeding tube displacement), 4 (Delayed motility agents), and 20 (General idea that EN does not impact patient outcome) loaded more than 0.4 in more than 1 factor (Table 4). These items were retained in the factors with the highest factor loadings considering their conceptual framework.[11]

In the final factorial model, a total cumulative variance of 65.9% fulfilled the criteria proposed by Marôco.[23] The validity of the FA was confirmed using Bartlett's sphericity test ($P < .001$) and the KMO (0.834: good). All commonality values in this model were greater than 0.5, demonstrating that the 4

retained factors were appropriate for describing the latent correlational structure between items in the BEFIP-PT (Table 4).

Reliability

Table 5 shows that all dimensions of the BEFIP-PT have high internal consistency values ("Delivery of Enteral Nutrition to the Patient": CAC = 0.81 [good]; "Nutritionist Support": CAC = 0.80 [good]; "ICU Resources": CAC = 0.77 [acceptable]; and "Critical Care Provider Attitudes and Behavior": CAC = 0.84 [good]). The internal consistency value of the total scale can be considered excellent (CAC = 0.90). It was not necessary to eliminate any item by CAC analysis if the item was eliminated from the final factorial model (4 dimensions and 16 items), as the CAC of each dimension does not improve with the removal of each item.[30] The values of the item-total correlation coefficients are all above 0.3, ranging between 0.535 and 0.724. No item in the final factorial model has weak internal consistency values.

DISCUSSION

In the current study, the median results demonstrate that HCPs generally report barriers with greater impact on EN administration in contrast with the North American revised BEFIP survey of nurses.[12] It appears that the distribution of responses provided by American nurses is more skewed to the left of the BEFIP Likert-type scale, so they are considered less important barriers to the respondents.[12] Physicians and nutritionists were introduced to the analysis as they are the main decision makers in the prescription and administration of EN. Perceptions varied

Table 5. Mean Scores and Internal Reliability of the Final Factorial Model (N = 165)

Domain/Item	Mean Score ± SD	Item-Total Correlation	Cronbach α	Cronbach α if the Item Is Eliminated
Delivery of enteral nutrition to the patient	27.6 ± 24.6	...	0.808	...
1	27.1 ± 35.2	0.543		0.778
2	13.3 ± 28.7	0.587		0.765
3	17.2 ± 31.1	0.599		0.760
4	37.8 ± 37.3	0.637		0.748
5	42.8 ± 36.4	0.595		0.768
Nutritionist support	30.9 ± 30.7	...	0.800	...
8	23.2 ± 37.8	0.565		0.773
9	31.9 ± 39.5	0.710		0.695
10	29.1 ± 38.1	0.650		0.728
11	39.3 ± 37.8	0.540		0.784
ICU resources	26.1 ± 33.0	...	0.774	...
12	27.5 ± 37.0	0.631		NA
13	24.7 ± 36.8	0.631		NA
Critical care provider attitudes and behavior	23.1 ± 23.3	...	0.841	...
16	28.3 ± 34.1	0.535		0.831
17	13.8 ± 24.4	0.690		0.796
18	18.0 ± 29.6	0.612		0.815
19	26.3 ± 35.3	0.664		0.800
20	29.1 ± 38.3	0.724		0.784
Total scale	26.9 ± 20.1	...	0.903	...

Abbreviations: ICU, intensive care unit; NA, not applicable.

among different groups of HCPs for most items in all domains.

In a validation study of the first version of the BEFIP scale, respondents assessed each barrier in the context of its conceptual importance and not the magnitude and severity of the barrier in the administration of EN in the ICU; this was also applied to physicians and nutritionists.[11] However, the authors did not discriminate between the results of the professional groups.[11] Mirhosiny et al[31] used the first version of the BEFIP scale to compare perceptions of the importance of barriers between physicians and nurses, excluding nutritionists. Therefore, the present study is innovative in comparing perceptions of barriers to EN among the 3 professional groups.

In the validation of the Chinese version of the BEFIP, the authors used the same BEFIP scale and found that the most harmful barrier to EN administration perceived by Chinese nurses was also the limited time dedicated to teaching and training on optimal nutrition for patients.[14] On the other hand, the sample of nurses in the present study tends to consider that "waiting for the physician/radiologist to read the radiograph and confirm the placement of the feeding tube" has less impact on EN administration. This seems more harmful in the Chinese context than in the Portuguese context. This may mean that in some ICUs in Portuguese hospitals, HCPs do not use radiographs in their routine care to check the placement of feeding tubes, as mentioned by some professionals. It would be interesting to proceed with the protocol of these procedures according to the best evidence-based practice available to optimize the administration of EN and to avoid risks and complications for the patient arising from the possible misplacement and/or displacement of the feeding tube.[32]

Health care professionals working in the ICUs of the Portuguese hospitals under study tended to consider items 4 (Delayed motility agents), 5 (Delayed small bowel access), and 11 (Not enough time dedicated to EN education) as the most harmful barriers to EN administration. This may indicate that Portuguese nurses perceive a longer wait for physicians to prescribe motility agents to patients with delayed gastric emptying. Gastric intolerance is common among critically ill patients and EN therapy should advance cautiously.[33,34] According to a meta-analysis by Peng et al,[35] the use of prokinetics appears to improve gastric intolerance and reduce the length of ICU and hospital stays. However, the authors found no evidence of a reduction in the occurrence of adverse events or all-cause mortality.[35] Lewis et al[36] found that taking prokinetics did not significantly increase the rate of diarrhea. As recommended by Warren and Martindale,[37] patients with GI intolerance should be included in the EN protocol. The same authors also pointed out that the preparation and implementation of EN protocols should involve physicians, nurses, and nutritionists to obtain better results. Furthermore, in a meta-analysis using the Cochrane method by Alkhawaja et al,[38] the authors inferred that placement of the feeding tube postpylorically compared with placement in the stomach resulted in a sustained reduction in the risk of pneumonia. However, no evidence supports the fear of an increased rate of complications during the insertion and/or maintenance of the feeding tube in the small intestine using endoscopic techniques.[38] Soguel et al[39] found that teaching and continuous training provided by a nutritionist dedicated to the ICU, combined with the implementation of an optimized EN protocol, could improve the energy intake of critically ill patients by approximately 32%. Bonomo et al[40] observed an increase in the volume of EN provided to critically ill patients through the creation of protocols and training of HCPs through the teaching, demonstration, active involvement, and dissemination of educational materials.

This study has several limitations. Despite the sample size used in this study satisfying Howard's criterion with an adequate ratio of

8:1 for performing an FA, there was a low response rate (32%), which is lower than that reported in previous studies.[11,20] However, given that the online questionnaire was administered in ICUs during the peak of the COVID-19 pandemic in Portugal, the sample size obtained could be considered reasonable (n = 165). The proportion of nutritionists and physicians who responded to the questionnaire was approximately 10 and 3 times smaller than the number of nurses in the sample, respectively. Their disproportionality may not have allowed us to find statistically significant results in comparisons between groups. Finally, it was not possible to compare the results of this BEFIP scale with those of the previous scale because, according to the authors, this initial scale received negative feedback from experts and had to be rectified.[12] Therefore, we decided to use the revised version of BEFIP.

CONCLUSIONS

The use of diverse HCPs in a BEFIP-PT survey identifies ICU barriers to EN provision more comprehensively and may facilitate the creation of EN protocols adapted to the unique features and characteristics of each institution. Although the evidence supports the validity of the BEFIP-PT, its reliability, and reproducibility in future studies, it was not possible to apply other validation techniques, such as temporal stability by test-retest reliability. In future studies on this topic, it is recommended to use larger samples to verify the existence of differences between HCPs' perceptions of the barriers to EN provision in public and private sector hospitals and to include qualitative data collection techniques (eg, interviews and/or focus groups) to more deeply explore those items that have less interprofessional consensus.

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