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ORIGINAL ARTICLE

TRANSLATION AND VALIDATION OF A SCALE TO ASSESS THE PHYSICAL EXAMINATION SKILLS OF BRAZILIAN NURSES

HIGHLIGHTS

1. Making a scale available for research into Brazilian nursing.
2. Use of statistical tests to ensure consistency and accuracy of the scale.
3. Situational diagnosis of the physical examination practices of Brazilian nurses.

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ABSTRACT

Objective: To translate, adapt, and validate, for the Brazilian context, a scale for assessing physical examination skills and to measure the frequency of Brazilian nurses performing these skills. **Method**: A methodological study conducted between September 2021 and August 2022 in Vitória, Espírito Santo. A scale was translated and cross-culturally adapted according to Fortes CPDD and Araújo AP. The instrument was evaluated by judges, with content validity, and applied to nurses. Descriptive and inferential statistics were used to analyze the data. **Results**: The scale was translated, adapted, and validated, achieving semantic and conceptual equivalence (content validity index: 0.99 for clarity and 0.98 for relevance). When applied, 80% of the skills were performed frequently. **Conclusion**: After translation, adaptation, and validation, the instrument became viable for application in research related to Brazilian nursing, which can contribute to improving the care provided.

KEYWORDS: Physical Examination; Nursing Process; Translating; Nursing Assessment; Clinical Reasoning.

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INTRODUCTION

The physical examination is the first stage of the Nursing Process (NP), known as data collection, and serves as a subsidy for clinical reasoning and the other stages of the NP: diagnosis, planning, implementation, and evaluation[1-3]. Its application in Brazil by nurses is mostly based on the theory of Wanda de Aguiar Horta, who, in the 1970s, developed a nursing process model focused on basic human needs[2-3].

Although international institutions such as the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) and the American Nurses Association (ANA) encourage nurses to carry out a quality physical examination, there are weaknesses in carrying out the physical examination in clinical practice[4]. Although these professionals learn the skills during their training, most of them are not used in their professional routine[3-9]. An Italian study[4] found that one-third of the physical examination skills studied were not applied.

As for the Brazilian scenario, although nursing schools provide for the teaching of physical examination in their curricula, there are not enough records to elucidate how often Brazilian nurses perform physical examination skills. It is therefore essential to have an instrument capable of measuring physical examination skills in Brazilian clinical practice.

Given this, the scale in an Italian study[4] has 30 items that assess physical examination skills. It has already been internationally validated and applied in Italy[4], as well as in other countries such as Ethiopia[8] and Japan[5]. However, the scale is in English, so it needs to be translated and cross-culturally adapted for the Brazilian context and language.

This study aimed to translate, adapt, and validate a scale for assessing physical examination skills in the Brazilian context and to measure the frequency with which Brazilian nurses perform these skills.

METHOD

This is a methodological study, carried out between September 2021 and August 2022 in the city of Vitória, Espírito Santo, Brazil.

To translate and adapt the scale, we used as a theoretical reference the study by Fortes CPDD, Araújo AP de QC, who developed a Cross-Cultural Adaptation process model - CCA[10]. An e-mail was sent inviting people to join the CCA team from the contact network of the researchers who conceived the study, and all invitations were accepted.

The CCA team thus comprised a translator with fluency in the original and target languages (T1); two PhD nurses (T2 and T3) with over 15 years of experience in health care and teaching theoretical/practical subjects in Nursing; a back-translator (R), who was an English language teacher with dual citizenship, Brazilian and Canadian; the reviewers (R1 and R2), two nurses and master's students with more than 10 years of practice in health care; and the reviewer (R3) was the main author who knows the research in detail and has experience in the area of physical examination and nursing, as recommended by the theoretical framework[10].

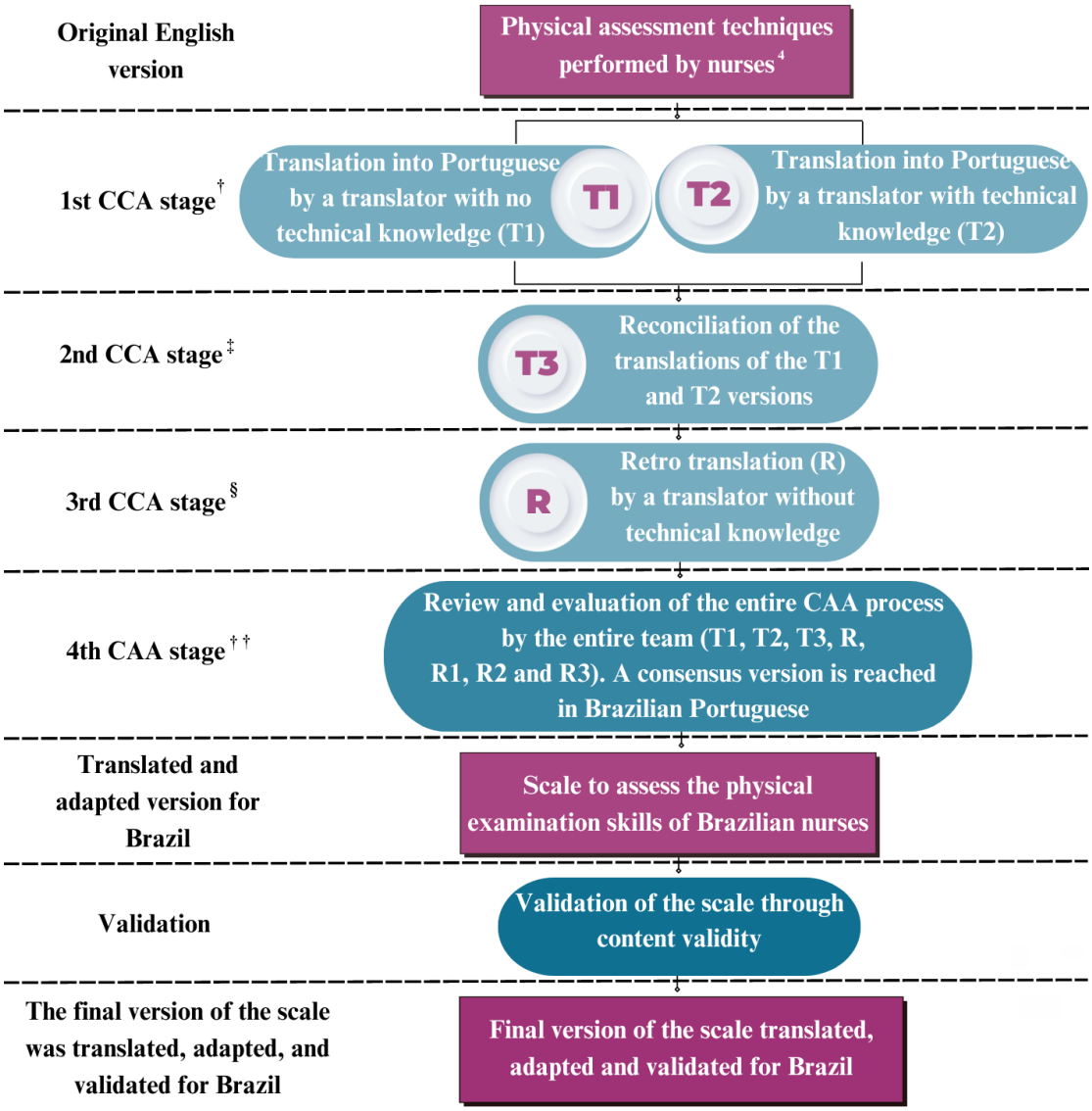
After agreeing to be part of the CCA team, a new e-mail was sent with the instructions for the process, as well as the articles on theoretical references[4,10]. The only exception was the back translator, who only received the instructions and the CCA reference [10]. The CCA process took place remotely between September 2021 and January 2022. The results obtained through T1, T2, T3, and R were documented separately in Microsoft Word® 2016 by R3. The checklist recommended by the CCA reference[10] was used throughout the translation and adaptation process.

After the four CCA stages, the instrument was tested by the ATC team nurses for semantic equivalence, as recommended by the reference10. Content validation of the scale then began. The "snowball" technique was used to compose the team of judges, inviting 11 nurses who had been providing direct care to hospitalized adult patients for at least two years.

Each item in the instrument was assessed for clarity and relevance and scored on a three-point Likert scale (1 - adequate; 2 - needs adaptation; 3 - inadequate). The content validity index (CVI) was then calculated to estimate the degree of agreement between the judges. According to the literature[11], when six or more judges are involved, the items evaluated must have a CVI greater than or equal to 0.79; therefore, items with a CVI of less than 0.79 were readjusted according to the suggestions.

Figure 1 illustrates the methodological process of translation, adaptation, and validation of the physical examination skills assessment scale, explaining the participation of the CCA team.

Figure 1 - Process of translation, adaptation, and validation of the physical examination skills assessment scale. Vitória, ES, Brazil, 2022.



†1st ACC stage: translation by two independent translators. ‡2nd CCA stage: reconciliation of translations by a translator fluent in the languages involved. §3rd CCA stage: back-translation of the T3 version into English. Objective: to transform the T3 version into the original scale and see if there has been any loss of meaning. ††4th CCA stage: a review comparing the original version with the adapted one. This analyzed whether the version back translated by R had semantic and conceptual equivalence with the original.

Source: The authors (2022).

After validation, the scale was designed as a questionnaire to be applied in a hospital. This process took place via an electronic form on the Google Forms® platform. The collection of information guaranteed the confidentiality and anonymity of the participants. The platform was configured to avoid duplicates.

To compose the sample of nurses participating in the application of the scale, the inclusion criteria considered nurses who provided direct care to hospitalized adult patients and who were employed at a public university hospital in Espírito Santo. The exclusion

criteria were nursing educators managers and nursing assistants on leave from their duties. The instrument was applied at the hospital between April and August 2022.

To apply the scale, the average frequency with which each skill was performed was measured, following the original study[4], using a six-point Likert scale: 0 = I don't know how to perform this technique; 1 = I know how to perform this technique, but it's not part of my clinical practice; 2 = I perform this technique rarely (a few times in my career); 3 = I perform this technique occasionally (a few times a year); 4 = I perform this technique frequently in my clinical practice (2 to 5 times every shift); 5 = I perform this technique regularly in my clinical practice (every time I work a shift).

An adapted instrument containing the 30 physical examination skills to be assessed and a Likert scale made up of the electronic form. Socio-demographic data was also included, such as gender, age, education, years of experience as a nurse, area of work, and number of jobs. To understand the influence of training, the questionnaire was conditioned to ask three more questions when the participants said they had a postgraduate degree. These asked whether the postgraduate course(s) were related to the patient's clinical practice, how many they had done, and when the most recent one was completed.

Furthermore, the sample was stratified into categories: (1) gender ('female', 'male' and 'prefer not to say'); (2) age ('20-30 years', '31-40 years', '41-50 years', '>50 years'); (3) education ('undergraduate only', 'postgraduate'); (4) years of experience ('<5 years', '5-10 years', '11-20 years', '21-30 years', '>30 years'); (5) sector of activity ('maternal and child unit', 'general inpatient unit', 'surgical interaction unit', 'intensive care unit', 'operating room', 'professional residency', 'nephrology', 'hemodynamics', 'gynecology and obstetrics', 'emergency room'); (6) number of jobs ('one', 'two', 'three' and 'other'); (7) number of postgraduate degrees ('one', 'two', 'three' and 'other'); (8) how many postgraduate courses were related to the patient's clinic ('none', 'one', 'two', 'three' and 'others'); (9) when the most recent postgraduate course was completed ('<5 years', '5-10 years', '11-20 years', '>20 years').

Descriptive statistics were used to describe the general characteristics of the sample and the frequency of each physical examination item. As the normality test showed non-parametric data, the median was calculated, and the Kruskal-Wallis test was used to assess potential differences between the groups. As category (3) compared only two groups, the Mann-Whitney U-test was used. The data was analyzed using IBM® SPSS Statistics software, version 2112. Values of $p < 0.05$ were considered significant.

The research project for this study was approved by the institution's Research Ethics Committee under No. 2.199.211/2017. The main author of the original scale[4] formally authorized the translation, cross-cultural adaptation, and validation of the adapted scale.

RESULTS

The translation phase resulted in two versions: "T1" and "T2". This stage aimed to ensure semantic equivalence, which is the examination of the transfer of meanings between languages, achieving a similar effect on respondents in different languages. For this reason, one of the translators had to have technical knowledge of the subject and the other did not[10].

Both versions were analyzed by T3 during translation reconciliation. Thus, it was possible to resolve the differences between the versions, which were due to T1 not having technical knowledge, so he had no experience with health synonyms, as recommended by the theoretical framework[10]. The differences can be seen in Chart 1.

Chart 1 - Divergences between T1 and T2. Vitória, ES, Brazil, 2022.

T1	T2
Palpate abdomen for tenderness and distension	Palpate the abdomen to assess abdominal distension and pain sensitivity
Observe the range of motion of the joints	Assessing joint movements
Palpate the extremity to check for tenderness	Palpation of the extremities to assess sensitivity
Assess hearing on a conversational basis	Assessment of hearing acuity during data collection
Inspect and assess support	Inspection and assessment of stool
Assess gait	Gait assessment
Inspect the spine	Inspection of the spine

Source: The authors (2022).

The reconciled version was sent to R for back-translation. During the review stage, it was noted that there was no loss of meaning when the adapted questionnaire (T3's version) was converted into the original during the back-translation stage.

As recommended by the theoretical framework[10], evaluator R did not know physical examinations and was unfamiliar with synonyms for technical terms in the health field. Thus, some divergences were exposed, such as the use of the term "check-up" instead of "inspect" in the original scale.

In addition, during the review, it was observed whether there was any conceptual equivalence, which means that the concepts of health and illness are similar in both cultures - the original and the one being studied[10]. This is because this equivalence has been studied since the preparation and design of the research, when the authors, immersed in the target culture, realized through experience that the concepts of health and illness are similar between the cultures mentioned. This finding of conceptual equivalence during preparation and review is recommended by the theoretical framework[10].

Content validation of the scale was carried out by 11 judges. All 30 items evaluated had CVIs above 0.80 in terms of relevance and clarity, and there were no suggestions for adjustments to the items. The total CVI of the instrument was 0.99 for clarity and 0.98 for relevance.

After carrying out the CCA and validation stages, the translated scale for assessing the physical examination skills of Brazilian nurses is shown in Chart 2.

Chart 2 - Scale translated into Brazilian Portuguese to assess nurses' physical examination skills. Vitória, ES, Brazil, 2022.

Code	Items (Skills)
E 01	Inspection of skin color
E 02	Assessment of breathing pattern
E 03	Assessment of mental state and level of consciousness
E 04	Inspection and palpation of extremities to assess edema
E 05	Palpation of extremities to assess temperature
E 06	Palpation and inspection of capillary filling
E 07	Palpation of peripheral arterial pulses to assess perfusion

E 08	Inspection of wounds/injuries
E 09	Auscultation of lung/respiratory sounds
E 010	Abdominal auscultation to assess hydro aerial sounds
E 011	Abdominal inspection
E 012	Auscultation of heart sounds
E 013	Inspection of skin integrity
E 014	Inspection of extremities for skin color and presence of hair
E 015	External eye inspection
E 016	Speech assessment
E 017	Palpation of the abdomen to assess abdominal distension and pain sensitivity
E 018	Assessment of joint movements
E 019	Inspection of the shape of the chest
E 020	Assessment of facial sensitivity and movements
E 021	Palpation of the extremities to assess sensitivity
E 022	Muscle strength assessment
E 023	Inspection of muscles and extremities for size and symmetry
E 024	Assessment of hearing acuity during data collection
E 025	Inspection and assessment of stool
E 026	Gait assessment
E 027	PERRLA* scale assessment
E 028	Assessment using the Glasgow Coma scale
E 029	Inspection of the oral cavity
E 030	Inspection of the spine

*Isochoric, rounded pupils, reactive to light and with preserved accommodation.
Source: Translation of international scale4 (2022).

The adapted instrument was then applied in the form of a questionnaire in the hospital. A total of 103 questionnaires were collected, of which 63 made up the final sample since the other 40 met some exclusion criteria. The sociodemographic and professional characteristics of the participating nurses can be seen in Table 1.

Table 1 - Sociodemographic and professional characteristics of the sample of nurses who applied the translated scale to assess the physical examination skills of Brazilian nurses. Vitória, ES, Brazil, 2022.

Variables	**n**	**%**
Gender		
Female	45	71.4
Male	17	27
Rather not say	01	1.6
Age in years		
20-30	03	4.8
31-40	42	66.7
41-50	14	22.2

50+	04	6.3
Education		
Undergraduate only	06	9.5
Postgraduate	57	90.5
Years of experience		
<5	06	9.5
5-10	20	31.7
11-20	29	46
21-30	08	12.7
>30	00	0
Sector of activity		
Maternal and Child Unit	08	12.7
General Inpatient Unit	17	27
Surgical Inpatient Unit	13	20.6
Intensive Care Unit	11	17.5
Surgical Center	04	6.3
Professional Residency	02	3.2
Nephrology	02	3.2
Hemodynamics	01	1.6
Gynecology and Obstetrics	01	1.6
Emergency Room	04	6.3
Number of jobs		
One	54	85.7
Two	09	14.3
Three	00	0
Other	00	0
Number of postgraduate degrees†		
One	12	21.1
Two	26	45.6
Three	19	33.3
Other	00	0
How many postgraduate courses are related to the patient's clinic†		
None	06	10.5
One	27	47.4
Two	22	38.6
Three	02	3.5
Other	00	0
When was the most recent postgraduate degree completed (in years)†		
<5	34	59.6
5-10	16	28.1
11-20	06	10.5
>20	01	1.8

†For these variables, consider n=57, since out of 63 participants, 57 answered that they had a postgraduate degree. Therefore, only these participants responded to the characteristics of the postgraduate course(s) they had completed.
Source: The authors (2022).

Based on the Likert scale measuring the frequency with which the skills were performed, it was observed that, of the 30 skills, 24 were performed 'frequently' or 'regularly' (median ≧ 4), as shown in Table 2.

Table 2 - Median (MD) with which each skill was performed by the participants; p-values of the significant differences for each item are highlighted in symbol form, according to the variables selected. Vitória, ES, Brazil, 2022.

Code	Skill	MD	Work Sector	Education
EO1	Inspection of skin color	5.00		
EO2	Assessment of breathing pattern	5.00		
EO3	Assessment of mental state and level of consciousness	5.00		
EO4	Inspection and palpation of extremities to assess edema	5.00		
EO5	Palpation of extremities to assess temperature	4.00		
EO6	Palpation and inspection of capillary filling	4.00		‡
EO7	Palpation of peripheral arterial pulses to assess perfusion	4.00		‡
EO8	Inspection of wounds/injuries	5.00		
EO9	Auscultation of lung/respiratory sounds	4.00	†	
EO10	Abdominal auscultation to assess hydro aerial sounds	4.00	†	
EO11	Abdominal inspection	5.00		
EO12	Auscultation of heart sounds	4.00	†	
EO13	Inspection of skin integrity	5.00		‡
EO14	Inspection of extremities for skin color and presence of hair	4.00		
EO15	External eye inspection	4.00		‡
EO16	Speech assessment	5.00		
EO17	Palpation of the abdomen to assess abdominal distension and pain sensitivity	4.00		‡
EO18	Assessment of joint movements	3.00		‡
EO19	Inspection of the shape of the chest	4.00		‡
EO20	Assessment of facial sensitivity and movements	4.00		‡
EO21	Palpation of the extremities to assess sensitivity	4.00		‡
EO22	Muscle strength assessment	4.00		
EO23	Inspection of muscles and extremities for size and symmetry	3.00		‡
EO24	Assessment of hearing acuity during data collection	4.00		‡
EO25	Inspection and assessment of stool	3.00		
EO26	Gait assessment	4.00		
EO27	PERRLA* scale assessment	3.00		‡

EO28	Assessment using the Glasgow coma scale	5.00		
EO29	Inspection of the oral cavity	3.00	†	‡
EO30	Inspection of the spine	2.00		‡

*Isochoric, rounded pupils, reactive to light and with preserved accommodation.
†Kruskal-Wallis test with $p < 0.05$ for comparison of the frequency of physical examination between participants in the following sectors: general, surgical and intensive care vs. all other environments.
‡ Mann-Whitney U-test with $p < 0.05$ for comparison of the frequency of physical examination between those who had completed postgraduate studies vs. undergraduate studies only.
Source: The authors (2022).

It was found that female participants performed the "Abdominal inspection" skill more than males (the option of not reporting gender was considered constant; $p < 0.05$). In addition, those aged between 31 and 40 and 41 and 50 performed the "Gait assessment" skill more than those aged between 20 and 30 and over 50 ($p < 0.05$).

Nurses working in the maternal and child unit performed more physical examinations in conjunction with the general, surgical, and intensive care units, compared to the other sectors, in the skills of "Auscultation of lung/respiratory sounds", "Abdominal auscultation to assess hydro aerial noises", "Auscultation of heart sounds" and "Inspection of the oral cavity" ($p < 0.05$).

Participants working in the Emergency Department performed the skill "Inspection and evaluation of feces" with high frequency, together with the general hospitalization, intensive care, and nephrology units ($p < 0.05$). In addition, emergency room nurses frequently performed the skill "Gait assessment", together with nurses from the maternal-child, general hospitalization, and surgical units ($p < 0.05$).

Nurses who completed postgraduate studies related to clinical practice practiced the skill "Assessment of respiratory pattern" more than those who completed postgraduate studies not related to clinical practice ($p < 0.05$).

Participants who had completed their postgraduate studies in less than five years and between 11 and 20 years practiced the skill "Assessment of mental state and level of consciousness" more often than those who had completed it between five and 10 years and more than 20 years ($p < 0.05$).

No significant difference was found in terms of the number of postgraduate courses completed or years of experience.

DISCUSSION

The skills of inspection, palpation, percussion, and auscultation8 are inherent to the physical examination and are included in the 30 skills presented in the original[4] and adapted scales, to obtain clinical data that support quality nursing care.

The translation and adaptation of the instrument were based on the recommendations of the process reference CCA[10], based on the stages of translation, reconciliation of translations, back-translation, revision, and validation, systematically. To this end, a CCA team was set up to work on the entire translation and cross-cultural adaptation process, which is recommended not only by the framework used but also by other studies[13-14].

Conceptual and semantic equivalences were reproduced and assessed at various points during the CAA process. Conceptual equivalence was considered right from the preparation and planning of the research, as it is essential since without it the whole process is compromised[10]. Semantic equivalence was the focus of the translation, so it guided the entire operational method of this phase and was revisited in the review.

As for validation, the fact that all the items assessed had a CVI above 0.80 shows that the instrument has content validity[11], as well as being translated and adapted to the cultural reality[13-14]. It is therefore suitable for use in research involving physical examination and Brazilian nursing.

The original scale[4] has already been translated and adapted for Japan[5] and Ethiopia[8] and the publications resulting from this process have focused on presenting the data resulting from the application of the instrument. This study translated, adapted, validated, and applied an instrument in a public hospital in Espírito Santo, which made it possible to assess nurses' physical examination skills. It also made it possible to compare the data obtained with the Italian study4 and with a study very similar to this one, carried out in Japan[5].

The present study showed that 24 of the 30 skills were performed frequently, which represents 80% of the skills. In the Italian[4] and Japanese[5] studies, 20 of the 30 skills were performed 'frequently' or 'regularly', which represents around 67%. Therefore, this study had slightly higher frequencies of physical examination than those carried out abroad as well.

In general, the nurses taking part in this study carry out a physical examination that includes most of the skills, which may be related to the fact that they work in a hospital where nurses join through a public selection process, with salaries for nurses higher than the national average[15]. Thus, the frequency of physical examination techniques reflects the reality of a scenario that may not be replicated throughout Brazil.

The skills that were performed occasionally and rarely also showed low frequencies of performance in the Italian[4] and Japanese[5] studies. This may suggest that nurses do not understand the importance of performing these skills in clinical practice.

As for the low performance of the skill involving the PERRLA scale, it is worth noting that this scale is little taught in Brazil and its practical application is often replaced by the assessment of pupillary reactivity. It is possible to infer that unfamiliarity with this term may have had an impact on the frequency of responses. Thus, it may be more appropriate to use the term "pupillary reactivity assessment" in the final version of the scale for application in Brazil.

In both this study and the original one4, nurses with postgraduate qualifications performed more physical examinations. Therefore, it can be seen that professional qualification is a predictor of quality of care, as it provides greater knowledge about the area of study/work, greater critical thinking, and clinical reasoning[3,16-17].

Similar studies conducted abroad as well showed that intensive care unit nurses were more likely to perform the ideal physical examination[4-5]. However, these studies presented different clinical environments to those listed in Brazilian reality and in our study, which made it difficult to compare data. Our data shows that nurses in general, in surgical and intensive care units, perform more physical examinations than those working in other sectors. By performing a more thorough physical examination, it is possible to suggest that nurses in these environments participate more actively in decision-making and care processes.

Some skills were performed more frequently by nurses with only one job. This may be related to the fact that having only one job makes more free time available, in which the professional can invest in quality of life and updates, which results in productivity.

One limitation of the study is that it was not possible to determine a causal relationship, but only associations between selected variables and the frequency of physical examinations. Furthermore, information bias may have occurred, since it is possible that the nurses who agreed to take part were the most interested in the topic, which may mean that they carried out a complete physical examination, unlike those who did not respond. Finally, it is worth remembering that the nurses who took part have a different professional value to the Brazilian reality.

CONCLUSION

It was possible to translate, cross-culturally adapt, and validate the physical examination skills assessment scale. In this way, the adapted instrument became feasible for application in other research in Brazilian nursing, which could contribute to improving the care provided to patients. In addition, it was possible to measure the frequency of execution of physical examination skills by a sample of Brazilian nurses.

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Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - **Endlich JAM, Mozer CA do N, Santos LS dos, Furieri LB, Fioresi M.** Drafting the work or revising it critically for important intellectual content - **Endlich JAM, Mozer CA do N, Santos LS dos, Furieri LB, Fioresi M.** Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - **Endlich JAM, Mozer CA do N, Santos LS dos, Furieri LB, Fioresi M**. All authors approved the final version of the text.

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