


ORIGINAL ARTICLE

**CROSS-CULTURAL ADAPTATION OF THE INTEGRARE SCALE
INTO BRAZILIAN PORTUGUESE*****HIGHLIGHTS**

1. INTEGRARE proved to be an applicable scale for Brazilian Portuguese.
2. The contribution of transcultural adaptation broadens the scope of nursing.
3. INTEGRARE is based on standardized language.
4. INTEGRARE is a pressure injury risk prediction tool.

Isabella Duarte Vidor¹ Taline Bavaresco¹ Ana Carolina Fioravanti Eilert da Silva¹ Cássia Teixeira dos Santos² Ana María Porcel Gálvez³ Amália de Fátima Lucena¹ **ABSTRACT**

Objective: to carry out the cross-cultural adaptation and evaluation of the psychometric properties of the INTEGRARE Scale for Brazilian Portuguese. **Method:** methodological study with translation, synthesis, back-translation, and expert review stages. The psychometric properties were assessed for reliability, content validation and convergent construct validation with the Braden Scale. The pre-test was carried out with 30 patients and the validation with 120 adult patients admitted to the clinical and surgical units of a university hospital in southern Brazil. **Results:** the INTEGRARE Scale was easy to apply and understand, proving to be applicable in Brazil. In the analysis of the psychometric reliability properties, internal consistency was identified with questionable Cronbach's alpha ($\alpha=0.63$); however, in convergent validity there was a significant, positive, and strong correlation ($Rho=0.741$; $p<0.001$) in relation to Braden. **Conclusion:** the adaptation broadens the scope of nursing in the use of instruments that predict the risk of Pressure Injury.

KEYWORDS: Cross-cultural comparison; Translation; Pressure injury; Nursing care; Validation study.

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INTRODUCTION

Pressure injury (PI) is one of the main preventable adverse events in health services and is defined as localized damage to the skin and underlying soft tissues, usually on a bony prominence, after prolonged or intense pressure associated with shear¹. It is linked to an increased risk of infection, length of hospital stay, morbidity and mortality, as well as greater complexity and time spent on nursing care. It represents the third most expensive problem for health systems and is a challenge to overcome²⁻⁴.

Hospitalized patients have clinical conditions that often make them more susceptible to PI, such as immobility and bed rest, malnutrition, use of vasoactive and sedative medications, urinary and fecal incontinence, dehydration, and edema²⁻³. These conditions require proper nursing care management, which begins with assessing skin integrity and identifying patients' intrinsic and extrinsic risk factors for developing PI³⁻⁶.

In order to carry out a preventive assessment, nurses have predictive scales to help identify these risk factors, one of which is the Braden scale, which was developed in 1987⁷ and has been validated in Brazil⁸⁻¹⁰.

However, advances in knowledge and the use of standardized nursing language systems¹¹ have boosted both the qualification of records and the more precise identification of patients' risk factors. In addition, this progress has contributed to the development of scales such as INTEGRARE, which predicts the risk of PI and was developed by Spanish researchers¹².

The development of INTEGRARE was based on the original PI concept, according to the Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline¹, as well as the Nursing Outcomes Classification (NOC), a standardized language system that has results made up of clinical indicators assessed on a 5-point Likert scale, where 1 is the worst state and 5 the best state¹¹. The fact that the development of a predictor scale for PI risk is associated with sensitive nursing results represents an important advance, not only for documenting the stages of patient assessment, planning and evolution, but especially for decision-making in clinical practice.

The NOC outcome indicators on which the INTEGRARE Scale was based were: "*Integridad de la piel*" (*Integridade da Pele* / Skin Integrity 110113), "*Sensibilidad*" (*Sensação* / Sensation 110102); "*Perfusión Tissular*" (*Perfusão tecidual* / Tissue perfusion 110111); "*Alteración del Estado Nutricional*" (*Estado Nutricional Alterado* / Altered Nutritional Status 210607); "*Incontinencia Urinaria*" (*Incontinência Urinária* / Urinary Incontinence 050312) "*Cambia de Posición Solo*" (*Posicionar-se* / Positions Self 030012)¹¹⁻¹⁴. As a result, the original version of this scale consisted of six items, with scores ranging from 6 to 30 points¹²⁻¹³.

The applicability of the INTEGRARE Scale in Spain was validated in adult patients hospitalized in clinical and surgical units, and it was considered valid for assessing the PI risk. In terms of reliability, it showed high internal consistency ($\alpha=0.86$), which means high reliability, matching the scores obtained by other NOC-based tools¹¹⁻¹⁵. However, it is important that its use can be expanded to other realities, since it is the only PI risk assessment scale that uses NOC results and indicators, capable of measuring results with standardized language and recognized worldwide¹²⁻¹⁶.

In this way and considering the magnitude of PI in nursing and the importance of using instruments to predict its risks, as well as the fact that developing these involves a complex process that requires skills and abilities in different areas, it is important to carry out cross-cultural adaptation and validation studies in different health contexts¹⁷⁻¹⁸.

From this perspective, the INTEGRARE Scale presents itself as an alternative to the needs of Brazilian nursing, due to its importance in the professional and social context, since it is similar in its composition to the Braden scale, which is part of the care reality of Brazilian nurses. Thus, the aim of this study is to carry out the cross-cultural adaptation and evaluation of the psychometric properties of the INTEGRARE Scale into Brazilian Portuguese.

METHOD

Methodological study of cross-cultural adaptation with evaluation of the psychometric properties of the INTEGRARE Scale. For the adaptation, the internationally recommended steps were followed, maximizing the semantic, idiomatic, experiential, and conceptual achievement between the original Scale and the adapted one¹⁹.

This study was carried out in six stages. In the initial translation stage, two translations (T1 and T2) of the INTEGRARE Scale from its original Spanish version into Brazilian Portuguese were carried out independently, by a nurse with experience in clinical practice and a Spanish teacher with no knowledge of the health sector, both of whom were native to Brazil and proficient in Spanish. The two translations (T1 and T2) were identical, so there was no need to synthesize them.

In the back-translation phase, the T1-T2 version was back-translated into the original language, Spanish, by two other bilingual translators whose native language is Spanish. The first translator is a nurse from Spain, proficient in Portuguese and with experience in clinical practice and research; the second translator is from Argentina, has been a Spanish teacher since 2003 and has lived in Brazil since 2000. During this process, it was checked that the translated version reflected the same content as the original version. The back-translations (RT1 and RT2) took place independently, without access to the original scale.

After the back-translation, an online meeting was held via the Zoom application between the two translators and the researchers to review discrepancies and vocabulary, as well as to check for inconsistencies or conceptual errors, in order to reach a consensus between the versions. Afterwards, the back-translation synthesis was carried out and all versions of the scale were approved by the main author of the INTEGRARE Scale. The versions of the translations (T1-T2) and back-translations (RT1-RT2) were evaluated by the expert committee in order to check for semantic, idiomatic, experiential and conceptual equivalence and to obtain content validation of the scale.

A sample of 30 patients was included in the pre-test phase of the pre-final version, considering the ideal recommendation of using between 10 and 20 subjects per item of the instrument to be validated¹⁹⁻²⁰, in order to assess the necessary psychometric properties. This stage was carried out simultaneously and independently by two researchers in April 2021. After the pre-test was completed, a review meeting was held and the documentation for the new translated and adapted version of the INTEGRARE Scale was sent to the author, who approved the whole process.

For the cross-culturally adapted validation stage, 120 patients from nine adult clinical-surgical inpatient units of a large public university hospital in southern Brazil were included, based on the original INTEGRARE Scale¹²⁻¹³ study between May and June 2021.

The first 50 patients were assessed in pairs by two researchers, simultaneously and independently, and inter-observer reliability (equivalence) was analyzed. The rest were collected individually and consecutively.

The inclusion criteria for both the pre-test and the validation stage were patients of both sexes, aged 18 or over, who had been hospitalized for no more than 24 hours. Exclusion criteria were patients with serious clinical or cognitive alterations at the time of the assessment, and those without a responsible companion present to consent to taking part in the study. Patients hospitalized with a suspected or positive diagnosis of SARS-CoV-19 were also excluded.

The data collected was stored in a database built in Microsoft Office Excel version 2016, with double typing, carried out independently by the main researcher and a trained research assistant. The two researchers checked the two databases. Afterwards, the data collected was transferred to the SPSS program version 22.0. Absolute and relative frequencies were calculated for the descriptive evaluation of the categorical variables; and for the quantitative variables, mean, standard deviation, median and interquartile range were calculated, referring to clinical and sociodemographic characterization.

Confirmatory factor analysis (CFA) was used to confirm the factor structure's adequacy. Bartlett's test of sphericity was carried out to calculate the factorability of the data with $p < 0.05$. For the CFA, $\chi^2(gf)$ was used and the fit indices Root Mean Square Error of Approximation (RMSEA) with values below 0.08, Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) with values above 0.90 were considered adequate²¹.

The total score internal consistency of the INTEGRARE Scale was assessed by the Cronbach's alpha coefficient, in which Cronbach's alpha values of less than 0.6 are considered poor or not adequate, between 0.6 and 0.7 are questionable, and equal to or greater than 0.7 are acceptable²². Inter-observer reliability was assessed using the intraclass correlation coefficient (ICC) with a two-way mixed effect model with interaction for absolute agreement between mean measurements. ICC values above 0.75 were considered excellent reliability²³.

Spearman's correlation coefficient (ρ) was used to assess convergent construct validity, where a ρ greater than 0.5 indicates a strong correlation, a ρ between 0.3 and 0.5 indicates a moderate correlation, and a ρ less than 0.3 indicates a weak correlation²⁴. As a hypothesis for this study, the INTEGRARE Scale total score should have a significant, strong, and positive correlation with the Braden total score ($p < 0.05$; $\rho > 0.5$). For all analyses, a $p < 0.05$ was considered statistically significant. The JASP program version 0.14.1 was used for the CFA. The other analyses (internal consistency, inter-observer reliability and convergent validity) were carried out using the SPSS program version 22.0.

The study was approved by the Institutional Research Ethics Committee under protocol 4.038.729.

RESULTS

The translation, back-translation, back-translation synthesis, and expert committee evaluation stages were part of the cross-cultural adaptation of INTEGRARE. In the back-translation Synthesis stage, the item *Integridade da Pele* (Skin Integrity) was translated as "*Integridade Tissular*" (Tissue Integrity) in the RT1 version, differing from the RT2 version, which was "*Integridad de la Piel*" (Skin Integrity). There was a consensus between the back-

translators and the researchers to keep “*Integridad de la Piel*” as it was better understood and because this item was also described in the original version of the scale. There was also disagreement on the third item, which was translated as “*Perfusión Tissular*” (Tissular Perfusion) in RT1 and “*Perfusión de Tejidos*” (Tissue Perfusion) in RT2. The consensus decided to keep “*Perfusión Tissular*”, due to the grammatical origin of the word and because it believes that the term “tissular” is more appropriate and easier to understand, as well as considering that it is described like this in the original version.

Chart 1 shows the original version (Spanish), the translations (T1-T2), the back-translations (RT1-RT2) and the summary of back-translations (SRT).

Chart 1 - INTEGRARE Scale in the original version, translations, back-translations, and synthesis of back-translations. Porto Alegre, RS, Brazil, 2023

INTEGRARE Scale				
Original Version	Translation T1-T2 (spa-port)	RT1 back- translation (port-spa)	Back-translation RT2 (port-spa)	Synthesis Version - Back-translation SRT1-SRT2 (port-spa)
(110113) <i>Integridad de la piel</i>	<i>Integridade da pele</i>	<i>Integridad tisular</i>	<i>Integridad de la piel</i>	<i>Integridad de la piel</i>
(110102) <i>Sensibilidad</i>	<i>Sensibilidade</i>	<i>Sensibilidad</i>	<i>Sensibilidad</i>	<i>Sensibilidad</i>
(110111) <i>Perfusión tisular</i>	<i>Perfusão tissular</i>	<i>Perfusión tisular</i>	<i>Perfusión de tejidos</i>	<i>Perfusión tisular</i>
(050312) <i>Incontinencia urinaria</i>	<i>Incontinência urinária</i>	<i>Incontinencia urinaria</i>	<i>Incontinencia urinaria</i>	<i>Incontinencia urinaria</i>
(210607) <i>Alteración del estado nutricional</i>	<i>Alteração do estado nutricional</i>	<i>Alteración del estado nutricional</i>	<i>Alteración del estado nutricional</i>	<i>Alteración del estado nutricional</i>
(030012) <i>Cambia de posición solo</i>	<i>Muda de posição sozinho</i>	<i>Cambia de posición solo</i>	<i>Cambia de posición solo</i>	<i>Cambia de posición solo</i>

Source: The authors (2023)

Of the 120 patients taking part in the INTEGRARE Scale validation stage, 61 (50.8%) were female, 105 (87.5%) were white and the mean age was 57.6 years. Seventy-one (59.2%) were married or with a partner; 58 (31.7%) had incomplete primary education. The most common comorbidity was systemic arterial hypertension in 63 (52.5%) patients and the main reason for hospitalization was surgery in 69 (57.5%) cases (Table 1).

Table 1 - Sociodemographic and clinical characterization of patients in the validation phase of the INTEGRARE Scale adapted to the Portuguese language (n=120). Porto Alegre, RS, Brazil, 2023

Characteristic	n	%
Gender		
Female	61	50.83
Male	59	49.17
Age (years old) †	57.66 ± 17.36	
Race		
White	105	87.5
Afro-descendant	10	8.33
Brown	5	4.17
Body Mass Index (kg/m²) †	27.42 ± 6.37	
Marital status		
Married or with a partner	71	59.17
Single	23	19.17
Widowed	15	12.50
Separated	11	9.16
Education		
Incomplete Elementary School	58	48.34
Incomplete High School	31	25.83
Incomplete Higher Education	28	23.33
Illiterate	3	2.50
Religion		
Catholic	84	70.00
Others	36	30.00
Occupation		
Employee	56	46.67
Retired	40	33.33
Unemployed	5	4.17
Other/not specified	19	15.83
Comorbidities ‡		
Systemic Arterial Hypertension	63	52.50
Cardiovascular disease	41	34.17
Obesity	26	21.67
Diabetes Mellitus	20	16.67
Others	9	7.50
Reason for hospital admission		
Surgical	69	57.50
Clinical	27	22.50
Clinical-surgical	23	19.17

Note: † Mean±SD; ‡ Each individual could have more than one comorbidity

Source: The authors (2023)

The evaluation of each item on the INTEGRARE Scale showed that the majority of patients had a score of 5, i.e. no impairment of the indicator evaluated (Table 2).

Table 2 - Number and percentage of patients assessed in each of the scores and respective items of the INTEGRARE Scale. Porto Alegre, RS, Brazil, 2023

Item	1 Severely compromised	2 Very compromised	3 Moderately compromised	4 Slightly compromised	5 Not compromised
<i>Integridade da Pele</i>	2 (1.7)	0	4 (3.3)	11 (9.2)	103 (85.8)
<i>Sensibilidade</i>	1 (0.8)	0	2 (1.7)	23 (19.2)	94 (78.3)
<i>Perfusão Tissular</i>	0	2 (1.7)	6 (5.0)	16 (13.3)	97 (80.8)
<i>Incontinência Urinária</i>	5 (4.2)	1 (0.8)	4 (3.3)	11 (9.2)	99 (82.5)
<i>Alteração do Estado Nutricional</i>	1 (0.8)	5 (4.2)	9 (7.5)	19 (15.8)	86 (71.7)
<i>Muda de Posição Sozinho</i>	3 (2.5)	6 (5.0)	9 (7.5)	27 (22.5)	75 (62.5)

Source: The authors (2023)

Table 3 shows the mean score for each item on the INTEGRARE and Braden Scales assessed in the patients. It can be seen that on the INTEGRARE Scale most of the items scored between 4 and 5, i.e. the patients were between "slightly compromised" to "not compromised". The Braden Scale scores ranged from 2 to 4.

Table 3 - Mean score of each item and total score of the INTEGRARE versus Braden Scale (n=120). Porto Alegre, RS, Brazil, 2023

INTEGRARE		Braden †	
Item	Mean ± SD	Item	Mean ± SD
<i>Integridade da Pele</i>	4.78 ± 0.67	<i>Percepção Sensorial</i>	3.93 ± 0.28
<i>Sensibilidade</i>	4.74 ± 0.57	<i>Umidade</i>	3.78 ± 0.55
<i>Perfusão Tissular</i>	4.74 ± 0.59	<i>Atividade</i>	2.95 ± 0.86
<i>Incontinência Urinária</i>	4.65 ± 0.92	<i>Mobilidade</i>	3.39 ± 0.77
<i>Alteração do Estado Nutricional</i>	4.53 ± 0.86	<i>Nutrição</i>	2.87 ± 0.58
<i>Muda de Posição Sozinho</i>	4.38 ± 1.00	<i>Fricção e Cisalhamento</i>	2.87 ± 0.40
Total Score	27.83 ± 2.81	Total Score	19.78 ± 2.60

Note: † It should be noted that the maximum score for an item on the Braden Scale is 4, whereas on the INTEGRARE Scale it is 5
Source: Os autores (2023)

In relation to the PI risk, the total score presented by the patients was 27.83 ± 2.81 on the INTEGRARE Scale and 19.78 ± 2.60 on the Braden Scale, showing no risk of developing PI on both scales.

In relation to the assessment of convergent construct validity, the INTEGRARE total score had a significant, positive and strong correlation ($\rho=0.741$; $p<0.001$) with the Braden total score. The equivalence analysis (interobserver reliability) was carried out on the first 50 (41.67%) patients in the validation sample and was considered excellent (ICC=0.973; 95%CI

0.953 - 0.985). Bartlett's test of sphericity (137.9, $gl=15$, $p<0.0001$) suggested factorability of the INTEGRARE items.

The unidimensional solution of the six items accounted for 47.81% of the explained variance. After excluding item 2, all the items had adequate factor loadings and explained variance of 59.89%. Through the CFA, with the insertion of the six items, the fit indices showed adequate values for the INTEGRARE Scale's unidimensionality $\chi^2(gl) = 4.392(9)$, CFI = 1.000, TLI = 1.302, SRMR = 0.078 and RMSEA < 0.001 with 95% CI <0.001-0.050. In relation to internal consistency, all six items had a questionable Cronbach's alpha value ($\alpha=0.63$) (Table 4).

Table 4 - Factor loadings and Cronbach's alpha for the INTEGRARE Scale items. Porto Alegre, RS, Brazil, 2021-2023

Items	Factor loading for the 6 items	Cronbach's alpha if item is excluded
1. Integridade da Pele	0.26	0.61
2. Sensibilidade	0.26	0.63
3. Perfusão tissular	0.23	0.61
4. Incontinência Urinária	0.43	0.58
5. Alteração do estado nutrição	0.54	0.57
6. Muda de posição sozinho	0.99	0.45
Explained variance (%)	47.81	-
Alfa de Cronbach total	-	0.63

Source: The authors (2023)

DISCUSSION

This study's results indicate that the INTEGRARE Scale adapted and validated for Brazilian Portuguese showed good inter-observer reliability and internal consistency. It also showed a positive and strong convergent construct validity when compared to the Braden Scale, indicating that it is valid for predicting the PI risk. These results corroborate previous studies, which suggest its use in clinical practice, favoring the qualification of nursing care¹²⁻¹³.

Similarly to the original study of the INTEGRARE Scale, it was validated in patients admitted to clinical and surgical units, with surgical causes prevailing (57.50%) as the main reason for admission. This may explain why the scores on both scales (INTEGRARE and Braden) were high and the majority of patients were not at PI risk. In line with this idea, it can be seen that the patients most susceptible to PI are those hospitalized for clinical reasons, with cardiovascular and metabolic problems, sepsis and neoplasms⁶.

PI prediction scales most often include skin integrity and turgor, humidity, reduced mobility, sensitivity, and nutritional status, among others^{1,7-9-25-26}. In the INTEGRARE Scale, its six items include clinical indicators of NOC results, which in addition to assessing similar risk factors, facilitate the nurse's decision-making based on the degree of risk identified and the possibility of its prevention¹¹⁻¹⁶.

The application of INTEGRARE begins with the observation of the patient's skin, which is essential for the nurse to be able to recognize alterations that favor the PI risk, in order to act preventively²⁷. As for *Perfusão Tissular* (Tissular Perfusion), it represents the capillary oxygenation level in the skin, assessed by vascular filling time. In the case of hospitalized patients, this factor can represent a greater risk for PI development, as the blood takes longer to reach the extremities, reducing the supply of blood and nutrients to the tissues²⁶⁻²⁷.

In relation to *Sensibilidade* (Sensitivity), the INTEGRARE Scale and the Braden Sensory Perception subscale showed that patients were able to react to pain and had sensitivity in their extremities. Studies show that limitations such as sensory perception, together with impaired circulation and peripheral neuropathy are important conditions associated with the PI development^{1,25-26}.

In relation to the item *Incontinência Urinária* (Urinary Incontinence) on the INTEGRARE Scale and Moisture on the Braden Scale, which are similar items, it should be pointed out that, although it is important to assess the patient for moisture, the change in skin pH that can be caused by incontinence, and which makes it more fragile and susceptible to PI is rarely considered¹⁻²⁷⁻²⁸.

In relation to the item *Alteração do Estado Nutricional* (Altered Nutritional Status) on the INTEGRARE Scale and Nutrition on the Braden Scale, it is known that extreme alterations in nutritional status, such as malnutrition and obesity, reduce the skin's tolerance to pressure, especially in areas of bony prominences, which increases susceptibility to PI. For this reason, it is an important aspect of the patient's assessment from the moment they are admitted to hospital, with nutritional and multidisciplinary monitoring²⁶⁻²⁹.

In the item *Muda de Posição Sozinho* (Changes Position Alone) on the INTEGRARE Scale and Activity and Mobility on the Braden Scale, it is considered that the inability to move is one of the main risk factors for the development of PI and can be associated with other conditions such as pain, obesity, neurological deficit, musculoskeletal impairment and decreased muscle strength, as well as the presence of medical devices and sedative medications in the case of critically ill patients. In these cases, repositioning the patient is one of the main nursing interventions to combat PI²⁶, as corroborated by different studies²⁻⁵.

The convergent construct validity of the adapted version of the INTEGRARE Scale versus the Braden Scale showed that there is a significant, positive, and strong correlation ($\rho = 0.74$) between the two scales, corroborating the original study, where it was also high ($\rho = 0.79$), which means that both measure similar constructs for assessing the PI risk in clinical practice¹²⁻¹⁴.

It was observed that the factor loadings of the items *Integridade da Pele* (Skin Integrity 0.26), *Sensibilidade* (Sensitivity, 0.26) and *Perfusão Tissular* (Tissular Perfusion, 0.23) were low (<0.30), suggesting their exclusion. However, the literature shows that these items are important and recognized risk factors to be considered when predicting PI¹⁷. This is also corroborated in the NANDA International diagnostic classification system, which describes them as components of the nursing diagnosis pressure injury Risk³⁰.

In this study, the internal consistency of the adapted scale obtained a Cronbach's alpha coefficient of 0.63, which may indicate questionable reliability²⁴. Although this coefficient is one of the most widely used to measure psychometric properties, there is no exact consensus on its interpretation, with some studies considering values close to 0.60 to be satisfactory¹⁷. Another important point is that the number of items influences the Cronbach's alpha coefficient

value, so a smaller number of items in an instrument can reduce its coefficient, potentially jeopardizing internal consistency⁵, which may explain this finding in the current study.

When patients were assessed on their first day of hospitalization, both the INTEGRARE and Braden scales showed no PI risk, with scores of 27.83 (± 2.81) and 19.78 (2.60), respectively. However, women had a higher risk of developing PI on both scales (Braden - 59.4%; INTEGRARE -51.3%), which has also been found in other studies¹²⁻¹⁴.

This study's limitations may be related to temporality bias, which does not allow us to infer the causality of the results, since a single assessment of the patient was carried out on their first day of hospitalization.

CONCLUSION

This study carried out the cross-cultural adaptation and evaluation of the psychometric properties of the INTEGRARE Scale into Brazilian Portuguese. This adaptation broadens the scope of nursing in the use of PI risk predictor instruments and contributes positively to the quality of its clinical practice.

There is room for further research into the use of this scale in clinical practice, expanding its use to other patient profiles, as well as its application and follow-up in patients with longer hospital stays. It is also suggested that a conceptual definition be developed for the INTEGRARE Scale items, for a better patient understanding and assessment.

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