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# Translation, adaptation, and validation of the Sunderland Scale and the Cubbin & Jackson Revised Scale in Portuguese

*Tradução, adaptação e validação para o português da Escala de Sunderland e da Escala Revista de Cubbin & Jackson*

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## ABSTRACT

**Objective:** To translate into Portuguese and evaluate the measuring properties of the Sunderland Scale and the Cubbin & Jackson Revised Scale, which are instruments for evaluating the risk of developing pressure ulcers during intensive care.

**Methods:** This study included the process of translation and adaptation of the scales to the Portuguese language, as well as the validation of these tools. To assess the reliability, Cronbach alpha values of 0.702 to 0.708 were identified for the Sunderland Scale and the Cubbin & Jackson Revised Scale, respectively. The validation criteria (predictive) were performed comparatively with the Braden Scale (gold standard), and the main measurements evaluated were sensitivity, specificity, positive predictive value, negative predictive value, and area under the curve, which were calculated based on cutoff points.

**Results:** The Sunderland Scale exhibited 60% sensitivity, 86.7% specificity, 47.4% positive predictive value, 91.5% negative predictive value, and 0.86 for the area under the curve. The Cubbin & Jackson Revised Scale exhibited 73.3% sensitivity, 86.7% specificity, 52.4% positive predictive value, 94.2% negative predictive value, and 0.91 for the area under the curve. The Braden scale exhibited 100% sensitivity, 5.3% specificity, 17.4% positive predictive value, 100% negative predictive value, and 0.72 for the area under the curve.

**Conclusions:** Both tools demonstrated reliability and validity for this sample. The Cubbin & Jackson Revised Scale yielded better predictive values for the development of pressure ulcers during intensive care.

**Keywords:** Validation studies; Risk assessment; Pressure ulcer/prevention & control; Pressure ulcer/nursing; Intensive care

This study was conducted in the Intensive Care Unit of the Hospital Santo António dos Capuchos, Centro Hospitalar de Lisboa Central, E.P.E - Lisboa, Portugal.

**Conflicts of interest:** None.

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## INTRODUCTION

Pressure ulcers (PUs) are considered a health care problem because of their impact on the quality of life and the high cost of treatment due to expenses incurred from the medical workforce, materials, and hospitalization. In the current economic context, the efficient use of resources is imperative, and concerns about healthcare quality and, consequently, patient safety are a reality.

Therefore, it is crucial to prevent this phenomenon, beginning with the correct identification of patients at risk. Risk assessment is an inherent requirement for prevention. Several factors contribute to the development

of PU with variable severity levels, which render the medical assessment difficult and cause the use of several risk assessment scales.<sup>(1)</sup>

Employing assessment scales that are suitable for all types of patients is an interesting idea because these instruments may be widely used and understood, thus easily facilitating the establishment of relationships and comparisons. There are multiple risk factors within the context of intensive care; thus, the scale used for risk assessment should not be one that is used for most patients but should be adapted to the specificity of intensive care patients. The scale should present a greater breadth relative to the evaluation factors and be less general in terms of variability of the application fields, therefore yielding gains in precision, greater reliability, and greater ability to predict risk.<sup>(2,3)</sup>

Several risk assessment scales for the development of PUs have been introduced in health organizations.<sup>(4)</sup> Researchers conducting studies in intensive care units (ICUs) have concluded that the Cubbin & Jackson (C&J) scale is the one that should be used for the risk assessment of PU development in critical patients.<sup>(5-7)</sup>

The choice of this theme stems from the necessity of a tool (validated for Portuguese) for patients in intensive care, seeking thereby to improve health care and minimizing the harmful consequences and costs related to PUs. The goal of the present study was to translate, culturally adapt, and validate the Sunderland Pressure Sore Risk Calculator - Sunderland Scale<sup>(8)</sup> and the C&J<sup>(9)</sup> Revised Scale to Portuguese; to verify their measuring properties; and to compare them to the Braden Scale in terms of predictability, sensitivity, and specificity.

## METHODS

This study was approved by the Ethics Committee for Health of the Centro Hospitalar de Lisboa Central, E.P.E. Informed consent was obtained from the participants/families.

The present investigation was a predictive correlational study, conducted in a single intensive care unit (ICU) with eight polyvalent beds, which predominantly receives surgical and medical patients. The sample represented all users who were in the ICU

at the time of data collection using the scales and who consented to undergo the risk assessment for PU development.

The investigator completed the scale based on his observation of the patient during the medical care session, with no requirement for interventions that were not indicated or determined by the patient's clinical situation. Unstable patients were not assessed.

The definition of PUs from the Treatment and Prevention guidelines of the National Pressure Ulcer Advisor Panel/European Pressure Ulcer Advisor Panel (NPUAP/EPUAP) and the classification from the International Classification System of Pressure Ulcers were used.<sup>(10)</sup> The initial assessment occurred at admission or during the first 24 hours, being repeated every 24 hours, and assessment was concluded when a PU developed or when the patient either died in the ICU or was discharged. The maximum monitoring length was 3 weeks (21 days). Data were collected from January to May 2012.

The data were entered and analyzed using the Statistical Package for the Social Science (SPSS<sup>®</sup>) software, version 17, for descriptive analysis. Microsoft Excel<sup>®</sup> was used for contingency table construction; the program Analyse-it<sup>®</sup> (integrated into Microsoft Excel) was used for sensitivity, specificity, and predictive value calculations (with their respective confidence intervals) for constructing curves using the Receiver Operating Characteristic (ROC) and for verifying the area under the curve (AUC) (with determination of the scales' cutoff points for better performance).

### Translation and adaptation

Translation and cultural adaptation were performed based on recommendations that propose standardization that is comprised of the following steps: translation and synthesis, *back-translation* and synthesis, an expert committee, and a pretest.<sup>(11)</sup> Although directed at quality-of-life tools, the propositions of these authors have been used for cross-cultural adaptations of various tools.<sup>(12)</sup>

The translation was performed by two bilingual nurses whose native language is Portuguese (from Portugal), both with experience in intensive care and employed in the United Kingdom. A combined

analysis of the translated material was performed by the translators to reach a consensus on the translation outcome. The back-translation was conducted by a bilingual nurse whose native language is English and who was employed in the intensive care field in Portugal, and by a bilingual translator whose native language is also English. The translators presented two different translations, which yielded a final result after comparison. From the committee of experts, several alterations to both consensual translations were made, with terminology changes requiring the clarification of certain concepts, as expected.<sup>(11)</sup> After the adjustment recommended by the committee of experts the back-translation were sent to the authors of the original scale for comparison with the original scales. Next, a pretest was applied by a group of eight nurses, who were informed about the objectives of the protocol. The scale was applied to seven ICU patients after obtaining their informed consent.

After performing these steps, the final versions of both scales in Portuguese (Tables 1 and 2) were achieved.

**Table 1 - Sunderland Scale, Portuguese version**

		Pontuação
Condição médica	Requer admissão	4
	DM/Corticoterapia	3
	Falência renal/diálise	2
	Doença vascular	1
Peso	Normal	4
	Obesidade	3
	Caquexia	2
Pele	Edema/anasarca	1
	Intacta	4
	Eritema	3
Estado de consciência	Abrasão/escoriação	2
	Necrose/exsudativa	1
	Acordado e alerta	4
	Agitado/confuso	3
Temperatura corporal	Sedado/apático	2
	Coma/não responde	1
	36°C-37°C	4
	37°C-37,5°C	3
	>37,5°C	2
	<36°C	1

Continue...

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Nutrição	Dieta completa	4
	Nutrição entérica	3
	Nutrição parentérica	2
	Apenas soroterapia	1
Respiração	Respiração espontânea	4
	CPAP/pressão assistida	3
	Ventilação mecânica controlada	2
	VM controlada sem estímulo respiratório	1
Estado hemodinâmico	Estável sem suporte de inotrópicos	4
	Estável com suporte de inotrópicos	3
	Instável sem suporte de inotrópicos	2
	Instável com suporte de inotrópicos	1
	Não requer hemoderivados	4
	Requer concentrado eritrocitário	3
	Requer albumina	2
	Requer concentrado eritrocitário/albumina/plaquetas	1
Incontinência	Anúria/cateter vesical	4
	Urinária	3
	Fecal	2
	Urinária e fecal	1

DM - *diabetes mellitus*; CPAP - continuous positive airway pressure; VM - ventilação mecânica. Alto risco pontuação  $\leq 28$ ; baixo risco  $\geq 29$ .

**Table 2 - Cubbin & Jackson Revised Scale, Portuguese version**

		Pontuação
Idade	<40	4
	40-55	3
	55-70	2
	>70	1
Peso	Normal	4
	Obesidade	3
	Caquexia	2
Antecedentes pessoais	Qualquer dos itens acima + edema/anasarca	1
	Nenhum	4
	Moderados	3
	Graves	2
Pele	Muito graves	1
	Intacta	4
	Eritema (potencial perda de continuidade)	3
	Abrasão/escoriação (superficial)	2
Estado de consciência	Necrose/exsudativa (profundas)	1
	Acordado e alerta	4
	Agitado/inquieto/confuso	3
	Sedado/apático mas reativo	2
	Coma/não responde/sedado e curarizado	1

Continue...

## ... continuation

Mobilidade	Deambula com ajuda	4
	Muito limitada/levante para cadeirão	3
	Imóvel mas tolera posicionamentos	2
	Não tolera posicionamentos/totalmente dependente/decúbito ventral	1
Estado hemodinâmico	Estável sem suporte de inotrópicos	4
	Estável com suporte de inotrópicos	3
	Instável sem suporte de inotrópicos	2
	Instável com suporte de inotrópicos	1
Respiração	Espontânea	4
	CPAP/tubo em T	3
	Ventilação mecânica	2
	Exaustão respiratória	1
Necessidades de oxigênio	O <sub>2</sub> < 40% - estável à mobilização	4
	40% > O <sub>2</sub> < 60% - estável à mobilização	3
	40% > O <sub>2</sub> < 60% - gasimetria estável. Dessatura à mobilização	2
	≥ 60% O <sub>2</sub> - gasimetria instável. Dessatura em repouso	1
Nutrição	Dieta completa	4
	Dieta ligeira, dieta líquida, nutrição entérica	3
	Nutrição parentérica	2
	Apenas soroterapia	1
Incontinência	Continente/anúria/cateter vesical	4
	Urinária/sudorese profusa	3
	Fecal/diarreia ocasional	2
	Urinária e fecal/diarreia prolongada	1
Higiene	Independente	4
	Semi-dependente	3
	Muito dependente	2
	Completamente dependente	1
<b>Classificação dos antecedentes pessoais</b>		
Nenhum	Nenhum	4
Moderada	Alterações cutâneas que afetem áreas suscetíveis à pressão	3
Graves	Corticoides; artrite reumatoide; DM tipo 2; doenças auto-imunes; DPOC; doenças que limitem a mobilidade; insuficiência cardíaca congestiva	2
Muito graves	Doença vascular periférica; DM tipo 1; síndrome compartimental; pessoa caída no domicílio previamente à admissão	1

CPAP - continuous positive airway pressure. Alto risco pontuação ≤ 29; baixo risco ≥ 30. Reduz-se 1 ponto: paciente operado nas últimas 48 horas; se necessita de hemoderivados; se em hipotermia. DM - *diabetes mellitus*; DPOC - doença pulmonar obstrutiva crônica.

**Validation of the measuring tools**

To proceed with validation of the scales, their measurement properties were tested.

The first characteristic that a tool must possess is reliability, which is a property of measurement that is verified by stability and internal consistency. Stability refers to the degree of concordance between two measurements taken at two different times. Internal consistency is defined as the degree to which the items of a tool measure the same concept.<sup>(13)</sup> In the present study, the internal consistency of the observed tools was verified.

An instrument is valid when it measures what it is supposed to measure in a satisfactory manner.<sup>(14)</sup> Validity refers to the degree of precision with which the concept is represented by particular statements in the measuring tool.<sup>(13)</sup> There are several methods to verify the validity of a tool (face validity, content, criteria, and construct validity). In the present study, criteria validity and predictive validity were verified and compared with the Braden Scale.

Psychometric-property analysis of the scales was performed with consideration of the cutoff defined in the literature (Sunderland Scale=28, C&J Revised Scale=29, and Braden Scale=16). Contingency tables were created using the average scores of the patients who did not develop PU and the score on the day before PU onset, similar to the validation performed on a new scale that evaluated the risk of PU development.<sup>(15)</sup>

The calculated indicators were sensitivity, specificity, positive and negative predictive values, precision, efficiency, Matthews' correlation coefficient or coefficient  $\phi$  (phi), and AUCs obtained from the ROC curves.

**RESULTS**

The sample included 90 patients who were admitted to the ICU during the data collection period. The average age of the patients was 70 (69.9) years, with a minimum age of 18 years and a maximum age of 95 years. The sample consisted mainly of male patients (63.3%). The diagnoses leading to ICU admission were acute respiratory failure (35.6%), postoperative admission from elective (28.9%) or emergency (15.6%) surgery, and sepsis/septic shock (6%). The

most common admission diagnoses were postoperative, with 42 patients (46.7%), followed by medical services (17.8%), and emergency services (16.7%). The hematology and surgery services contributed to the sample with ten (11.1%) and eight (8.9%) patients, respectively. The average length of ICU stay was 6.14 days (standard deviation of 5.97 days, minimum of 1 day, and maximum of 36 days). Because surgery was the most common diagnosis, the following ICU discharge destination was observed: 49 (54.4%) patients were transferred to surgical services, 20 (22.2%) to medical services, 5 (5.6%) to hematology, and 14 (15.6%) eventually died.

Fifteen (16.7%) patients developed PUs out of 90 included in this study, and the categories with the highest number of PUs were II and III, with six PUs each. The predominant region was the sacrococcygeal region, with 10 (66.7%) PUs. Regarding the elapsed time prior to PU development, 73.3% of the ulcers developed within 72 hours after admission to the ICU (Table 3).

**Table 3** - Characteristics of the pressure ulcers

Variable	Results
Pressure ulcer	
No	75 (83.3)
Yes	15 (16.7)
Pressure ulcer category	
Category I	3 (20)
Category II	6 (40)
Category III	6 (40)
Category IV	-
Location of the pressure ulcer	
Sacrococcygeal	10 (66.7)
Calcaneus	3 (20)
Trochanter	1 (6.7)
Mental region or Chin	1 (6.7)
Number of hours prior to pressure ulcer detection	
1-48	2 (13.3)
49-72	2 (13.3)
73-144	6 (40)
≥145	5 (33.3)

Results expressed in numbers (%).

### Reliability analysis

The Cronbach alpha obtained for the Sunderland Scale was 0.702. The exclusion of three items (“Medical

condition,” “Incontinence,” and “Nutrition”) was observed to cause positive variations in Cronbach’s alpha. However, only “Nutrition” led to significant variation (Cronbach’s alpha = 0.75) due the sample’s size and homogeneity of the principle diagnosis (mainly surgical), for which nutrition begins at a later timepoint, all components of the scale were maintained because the total value was positive in terms of reliability (Table 4).

**Table 4** - Cronbach’s alpha; Sunderland Scale total statistics

	Average of the scale if the item was excluded	Variation of the scale if the item was excluded	Corrected total item correlation	Cronbach’s alpha if the item was excluded
Medical condition	28.56	20.939	0.203	0.711
Weight	28.55	20.251	0.314	0.689
Skin	28.15	21.231	0.281	0.692
Consciousness	28.52	17.471	0.589	0.632
Temperature	28.67	18.660	0.426	0.668
Nutrition	30.36	24.510	-0.133	0.750
Breathing	28.53	17.976	0.615	0.631
Inotropics	28.18	18.196	0.723	0.620
Blood products	28.03	19.551	0.488	0.659
Incontinence	27.89	22.998	0.153	0.706

The Cronbach alpha of the C&J Revised Scale was 0.708. In this scale, similar to the Sunderland Scale, exclusion of most of the components would not be beneficial in terms of the scale’s reliability; only exclusion of the “Nutrition” component would produce a significant positive variation. However, as per the justification used previously, all of the scale’s items were retained (Table 5).

### Validity analysis

When using the Sunderland Scale, it was verified that 78.8% of the patients were in the low risk category (Table 6). According to the Sunderland scale, with a cutoff described in the literature, this study sample had values of 60% sensitivity, 86.7% specificity, 82.2% precision, 47.4% positive predictive value, 91.5% negative predictive value, 4.5 positive likelihood ratio, 0.46 negative likelihood ratio, 0.43 phi coefficient, and 73.4% efficiency. Thus, 82.2% of the patients were

**Table 5** - Cronbach's alpha. Cubbin & Jackson Revised Scale total statistics

	Average of the scale if the item was excluded	Variation of the scale if the item was excluded	Corrected total item correlation	Cronbach's alpha if the item was excluded
Age	30.82	23.919	0.060	0.728
Weight	29.40	21.453	0.280	0.701
Personal history	30.06	23.729	0.119	0.717
Skin	28.91	22.596	0.248	0.702
State of consciousness	29.40	17.708	0.671	0.627
Mobility	30.61	21.311	0.439	0.676
Hemodynamic state	28.99	19.430	0.635	0.644
Breathing	29.32	19.035	0.628	0.642
Oxygen requirement	29.05	20.765	0.491	0.668
Nutrition	31.10	24.536	-0.012	0.737
Incontinence	28.74	24.406	0.062	0.719
Hygiene	31.05	21.789	0.516	0.673

correctly evaluated, regardless of whether the risk was high or low. The high-risk patients and those who developed PUs were correctly identified in 60% of the patients, and among those at low risk and who did not develop PU, 86.7% of the patients were correctly identified. The probability of a PU patient having been evaluated as high risk was 47.4%, and the probability of a non-PU patient having been evaluated as low risk was 91.5%. A phi coefficient greater than 0 indicated that the prediction was not random; if the value was less than 1, the prediction was not perfect. The ideal scale is that in which the balance between sensitivity and specificity is 100%, and the Sunderland Scale had a balance of 73.4%. Additionally, the positive likelihood ratio indicated that the patients assessed as high risk were 4.5 times more likely to develop PU.

Using the C&J Revised Scale, it was verified that 81.1% of the patients were in the low risk category (Table 6). For the present sample, this scale (with a cutoff described in the literature) presented a sensitivity of 73.3%, specificity of 86.7%, precision of 84.4%, positive predictive value of 53.4%, negative predictive value of 94.2%, positive likelihood ratio of

**Table 6** - Contingency table for the Sunderland Scale, Cubbin and Jackson Revised Scale, and Braden Scale

	Sunderland			Cubbin & Jackson			Braden		
	UP (+)	UP (-)	Total	UP (+)	UP (-)	Total	UP (+)	UP (-)	Total
Risk (+)	9	10	19	11	10	21	15	71	86
Risk (-)	6	65	71	4	65	69	0	4	4
Total	15	75	90	15	75	90	15	75	90

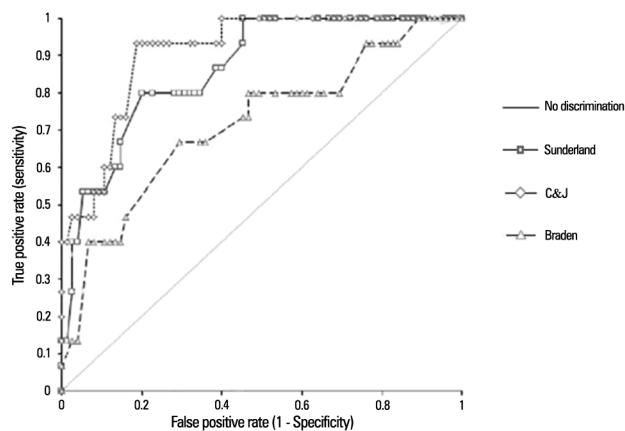
5.50, negative likelihood ratio of 0.31, phi coefficient of 0.53, and efficiency of 80%. Thus, 84.4% of the patients were correctly evaluated regardless of the risk involved. The high-risk patients who developed PU were correctly identified in 73.3% of the cases, and among those who were low risk and did not develop PU, 89.7% were correctly identified. The probability of a PU patient having been assessed as high risk was 52.4%, and the probability of a non-PU patient having been evaluated as low risk was 94.2%. A phi coefficient greater than 0 indicated that the prediction was not random; if the value was less than 1, the prediction was not perfect. The ideal scale is that in which the balance between sensitivity and specificity is 100%, and the C&J Revised Scale had a balance of 80%. The positive likelihood ratio indicated that the evaluated patients assessed as high risk were 5.5 times more likely to develop PUs.

The use of the Braden Scale allowed for verifying that 95.5% of the patients were high risk (Table 6). For the present sample, the Braden Scale (with a cutoff described in the literature) had a sensitivity of 100%, specificity of 5.3%, precision of 21.1%, positive predictive value of 17.4%, negative predictive value of 100%, positive likelihood ratio of 1.06, negative likelihood ratio of 0, phi coefficient of 0.02, and efficiency of 52.7%. Only 22.2% of the patients were correctly evaluated, independently of their high- or low-risk status. All of the high-risk patients who developed PU were correctly identified, but with low sensitivity. This poor sensitivity did not allow for correct differentiation between patients with values below 50%, which resulted in poor predictive capabilities.<sup>(16)</sup> The probability of a PU patient having been evaluated as high risk was only 17.4%,

but the probability of a non-PU patient having been assessed as low risk was 100%. A phi coefficient only slightly higher than 0 indicated an almost random prediction. The Braden Scale achieved a balance of 52.7% between the sensitivity and specificity. In addition, the positive likelihood ratio was verified as indicating that the patients assessed as high risk were 1.06 times more likely to develop PUs.

### Comparison of ROC curves

Using the data from the three scales, the following curves and ROC values were obtained: the AUC for the Sunderland Scale was 0.86%, with a 95% confidence interval (95% CI) of 0.77-0.95 ( $p < 0.0001$ ); the AUC for the C&J Revised Scale was 0.91%, with a 95% CI of 0.84-0.98 ( $p < 0.0001$ ); and the AUC for the Braden Scale was 0.72%, with a 95% CI of 0.56-0.87 ( $p < 0.0032$ ) (Figure 1).



**Figure 1** - ROC curves for the Sunderland Scale, Cubbin & Jackson Revised Scale, and Braden Scale.

The use of ROC curves facilitated studying the scale behavior, in terms of sensitivity and specificity, with different cutoff points (Table 7). The use of a cutoff point  $\geq 30$ , in either the Sunderland Scale or the C&J Revised Scale, allowed for improved performance. The Braden Scale with a cutoff point below that described in the Portuguese version also improved its predictive capabilities, but still kept below the value ranges for the two other scales.

Another concern raised in the literature is the assessment frequency. Table 8 shows that the best

**Table 7** - Predictive properties of the scales with different cutoff points

Scale	Sunderland	Cubbin & Jackson Revised	Braden
Cutoff (95%CI)	$\leq 30$	$\leq 30$	$\leq 12$
Sensitivity	80	93.3	66.7
Specificity	80	81.3	70.7
Efficiency	80	87	68.7
Positive predictive value	44.4	50	31.3
Negative predictive value	95.2	98.39	91.4
Precision	80	83.3	70%
Coefficient $\phi$	0.49	0.6	0.29
Likelihood ratio (+)	4.00	5.00	2.28
Likelihood ratio (-)	0.25	0.08	0.47

95%CI - 95% confidence interval. The results are expressed in numbers (%).

predictive values were obtained in the day preceding the occurrence of PUs. This result suggests that the assessment should be performed daily. In the C&J Revised Scale if surgery occurs 1 point should be deducted on the day of surgery.

### DISCUSSION

Regarding the PU phenomenon, the present data were in agreement with the literature as to the location, with the sacrococcygeal region being the most representative,<sup>(5,17,18)</sup> and with regard to the time elapsed until PU formation, which was usually during the first week of hospitalization.<sup>(19,20)</sup> In the literature, a higher incidence of category-I PUs and a lower incidence of category-III PUs were observed, which was not observed in the present study, wherein a predominance of category-II and category-III PUs was observed.<sup>(5,17)</sup>

Data from the second day of hospitalization were used for both scales in the reliability analysis. The second day was chosen because “the lower the variability of intra-subject responses and the greater the variability of inter-subject responses, the greater is the value of  $\alpha$ .”<sup>(21)</sup> Thus, a greater variation exists in the clinical evolution of the patients as well as a greater range of possible results. Cronbach’s alpha value obtained in the Sunderland Scale was 0.702, which “generally means that the tool or test is classified as having adequate reliability when  $\alpha$  is at least 0.70.”<sup>(21)</sup> The Cronbach alpha for the C&J Revised Scale was 0.708, which, as previously mentioned, is an appropriate reliability value.

**Table 8** - Predictive properties of the scales in the days prior to pressure ulcer formation

	Day 1			Day 2			Day 3		
	SE	CJRS	BS	SE	CJRS	BS	SE	CJRS	BS
Precision	82.22	84.44	21.11	81.82	85.23	18.89	82.56	86.05	17.44
Coefficient phi	0.43	0.53	0.02	0.36	0.47	-0.12	0.35	0.47	0.08
Sensitivity	60.00	73.33	100.00	53.85	61.54	86.67	54.55	63.64	100.00
Specificity	86.67	86.67	5.33	86.67	89.33	5.33	86.67	89.33	5.33
Positive predictive value	47.37	52.38	17.44	41.18	50.00	15.48	37.50	46.67	13.41
Negative predictive value	91.55	94.20	100.00	91.55	93.06	66.67	92.86	94.37	100.00
Likelihood ratio (+)	4.50	5.50	1.06	4.04	5.77	1.06	4.09	5.97	1.06
Likelihood ratio (-)	0.46	0.31	0.00	0.53	0.43	0.00	0.52	0.41	0.00
Efficiency	73.33	80.00	52.67	70.26	75.44	46.00	70.61	76.48	52.67

SE - Sunderland Scale; CJRS - Cubbin & Jackson Revised Scale; BS - Braden Scale.

Regarding the validity and considering the values obtained, the Sunderland Scale had acceptable predictive values for the development of PU in ICU patients, and thus this scale should be used. The same finding is true for the C&J Revised Scale, which was the scale that yielded the best overall values. The Braden scale, by the data obtained, suggests the necessity of intensifying nursing care in a greater number of patients who will not develop PU; therefore, its application should not be recommended, so that patients with a higher risk are provided with more available resources.

The finding obtained in this study are corroborated by the literature. Several studies comparing the Braden and C&J Scale in ICUs note that the C&J should be used based on the sensitivity, specificity, predictive, and AUC values, and the C&J always yields better predictive values overall.<sup>(5,7,22)</sup>

Based on the ROC analysis and AUC values, it was verified that altering the cutoff points of the scales could improve their predictive capabilities, which has already been studied, especially for the Braden Scale.<sup>(23)</sup> However, given the sample used in

the present study, the decision was to maintain the recommendation of the original authors. Analysis of the predictive capabilities allows inferences about the necessity for constant monitoring, as the best overall values were observed within 24 hours preceding the development of PU, thus meeting the current recommendations.

The limitations of this study were the sample size, the type of ICU (i.e., not comprehensive, with homogeneity of diagnosis), and lack of inter-rater reliability verification (because it will be essential that this tool yields the same results when used by different professionals).

## CONCLUSIONS

The results suggest that the C&J Revised Scale should be used in ICUs because it yielded the best overall predictive values. This study contributed to the validation of tools appropriate for critical intensive care unit patients and thus identifies patients who require greater vigilance and intensity of care, thereby leading to better staff management and medical care.



## RESUMO

**Objetivo:** Traduzir para o português e avaliar as propriedades de medidas da Escala de Sunderland e da Escala Revista de Cubbin & Jackson, instrumentos cuja finalidade é avaliar o risco de desenvolvimento de úlceras por pressão em terapia intensiva.

**Métodos:** O estudo compreendeu os processos de tradução e de adaptação das escalas à língua portuguesa, bem como o processo de validação dos instrumentos em estudo. A amostra foi constituída por 90 pacientes internados na unidade de terapia intensiva. Na avaliação da fiabilidade, foram identificados valores de alfa de Cronbach de 0,702 e de 0,708 para a Escala de Sunderland e a Escala Revista de Cubbin & Jackson, respectivamente. A validação de critério (preditiva) foi realizada comparativamente com a Escala de Braden (padrão-ouro), sendo as principais medidas avaliadas a sensibilidade, a especificidade, o valor preditivo positivo, o valor preditivo negativo e a área sob uma curva, que foram calculadas com base nos pontos de corte definidos pelos autores.

**Resultados:** A Escala de Sunderland obteve 60% de sensibilidade, 86,7% de especificidade, 47,4% de valor preditivo positivo, 91,5% de valor preditivo negativo e 0,86 para a área sob uma curva. A Escala Revista de Cubbin & Jackson obteve 73,3% de sensibilidade, 86,7% de especificidade, 52,4% de valor preditivo positivo, 94,2% de valor preditivo negativo e 0,91 para a área sob uma curva. A Escala de Braden obteve 100% de sensibilidade, 5,3% de especificidade, 17,4% de valor preditivo positivo, 100% de valor preditivo negativo e 0,72 para a área sob uma curva.

**Conclusão:** Ambos os instrumentos demonstram possuir fiabilidade e validade para a utilização. Nessa amostra, a Escala Revista de Cubbin & Jackson obteve melhores valores preditivos para desenvolvimento de úlceras por pressão em terapia intensiva.

**Descritores:** Estudos de validação; Medição de risco; Úlcera por pressão/prevenção & controle; Úlcera por pressão/enfermagem; Terapia intensiva

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