



BRADEN AND EVARUCI IN PREDICTING PRESSURE INJURIES AMONG CRITICALLY-ILL PATIENTS: A COHORT STUDY

BRADEN E EVARUCI NA PREDIÇÃO DE LESÃO POR PRESSÃO EM PACIENTES CRÍTICOS: ESTUDO DE COORTE

BRADEN Y EVARUCI PARA PREVENIR ÚLCERAS POR PRESIÓN EN PACIENTES CRÍTICOS: ESTUDIO DE COHORTE

Taline Bavaresco¹

Ketlin Laufer Schuh¹

Brena Alice Rodrigues¹

Karina de Oliveira Azzolin¹

Shana Marques²

ORCID: 0000-0001-5944-1941

ORCID: 0009-0008-9463-2119

ORCID: 0009-0009-9930-1885

ORCID: 0000-0002-2363-2858

ORCID: 0000-0003-1405-4133

¹ Federal University of Rio Grande do Sul, School of Nursing and Public Health. Porto Alegre, RS, Brazil

² Porto Alegre Clinical Hospital, Intensive Care Nursing Service. Porto Alegre, RS, Brazil

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RESUMO

Objetivo: Avaliar a acurácia das escalas Braden e EVARUCI na predição de risco de lesão por pressão em pacientes críticos. **Método:** Estudo quantitativo do tipo coorte prospectiva realizado em Unidade de Terapia Intensiva de um hospital universitário do sul do Brasil. A amostra foi composta por 145 pacientes internados entre fevereiro e junho de 2025, com permanência mínima de 24h. A coleta de dados ocorreu à beira leito e em prontuário eletrônico. Foram utilizados os testes de sensibilidade, especificidade, predição positiva e negativa tendo como desfecho o desenvolvimento de lesão por pressão. **Resultados:** A amostra foi composta majoritariamente por homens, brancos, com idade média de 59 anos. A incidência de lesão por pressão foi de 25,5% e a sensibilidade encontrada foi igual (85,7%) para ambas as escalas. A Braden apresentou especificidade de 38,7%, valor preditivo positivo de 19,2% e negativo de 94,1%, enquanto a EVARUCI apresentou especificidade de 35,5%, valor preditivo positivo de 18,4% e negativo de 93,6%. **Conclusão:** As escalas Braden e EVARUCI apresentaram acurácia de 45,5% e 42,8%, respectivamente, sendo que ambas demonstraram alta sensibilidade.

Descritores: Lesão por Pressão; Medição de Risco; Unidades de Terapia Intensiva.

ABSTRACT

Objective: To assess the accuracy of the Braden and EVARUCI scales in predicting the pressure injury risk among critically-ill patients. **Method:** A qualitative study of the prospective cohort type conducted in the Intensive Care Unit of a university hospital from southern Brazil. The sample was comprised by 145 patients hospitalized between February and June 2025, with a minimum hospitalization time of 24 hours. The data were collected at the patients' bedside and from their electronic medical charts. Sensitivity, specificity and positive/negative prediction tests were used, with pressure injury development as outcome. **Results:** The sample was mostly comprised by men, white-skinned and with a mean age of 59 years old. The incidence of pressure injuries was 25.5% and the same sensitivity value (85.7%) was found in both scales. The Braden scale presented 38.7% specificity and positive and negative predictive values of 19.2% and 94.1%, respectively; in turn, EVARUCI evidenced 35.5% specificity and positive and negative predictive values of 18.4% and 93.6%. **Conclusion:** The Braden and EVARUCI scales presented 45.5% and 42.8% accuracy, respectively, with both showing high sensitivity.

Descriptors: Pressure Injury; Risk Assessment; Intensive Care Units.

RESUMEN

Objetivo: Evaluar la exactitud de las escalas Braden y EVARUCI para prevenir el riesgo de úlceras por presión en pacientes críticos. **Método:** Estudio cuantitativo del tipo cohorte prospectiva realizado en la Unidad de Cuidados Intensivos de un hospital universitario del sur de Brasil. La muestra estuvo compuesta por 145 pacientes internados entre febrero y junio de 2025, con una permanencia mínima de 24 horas. Los datos se recopilaron al pie de la cama de cada paciente y consultando sus historias clínicas electrónicas. Se utilizaron pruebas de sensibilidad, especificidad y predicción positiva y negativa, con desarrollo de úlceras por presión como desenlace. **Resultados:** La muestra estuvo mayoritariamente conformada por hombres de raza blanca con una edad media de 59 años. La incidencia de úlceras por presión fue del 25,5% y se encontró la misma sensibilidad (85,7%) en ambas escalas. Braden presentó especificidad del 38,7% y valores predictivos positivo y negativo de 19,2% y 94,1%, respectivamente; en EVARUCI, la especificidad fue del 35,5%, mientras que los valores predictivos positivo y negativo fueron 18,4% y 93,6%. **Conclusión:** Las escalas Braden y EVARUCI presentaron 45,5% y 42,8% de exactitud, respectivamente, y ambas demostraron alta sensibilidad.

Descriptores: Úlceras por presión; Medición del Riesgo; Unidades de Cuidados Intensivos.

Editors:

Rosimere Ferreira Santana (ORCID: 0000-0002-4593-3715)

Geilsa Soraia Cavalcanti Valente (ORCID: 0000-0003-4488-4912)

Publisher:

Escola de Enfermagem Aurora de Afonso Costa – UFF

Rua Dr. Celestino, 74 – Centro, CEP: 24020-091 – Niterói, RJ, Brazil

Journal email: objn.cme@id.uff.br

Corresponding author:

Taline Bavaresco

Email: talinebavaresco1@gmail.com

What is already known:

- Pressure injuries are a frequent multifactorial adverse event in Intensive Care and preventing them is an important goal for Nursing teams.
- Currently, there is no consensus in the literature as to the best instrument to analyze the pressure injury risk in this population group.

What this article adds:

- An analysis of how the Braden and EVARUCI instruments perform in predicting pressure injuries in Intensive Care Units based on clinical data collected in a real-world environment.
- Both scales presented good sensitivity in predicting the risk.

INTRODUCTION

Patient safety is recognized as a persistent Public Health challenge at the global level, especially in Intensive Care Units (ICUs), where the risk of adverse events is significantly high⁽¹⁾. In this context, Pressure Injuries (PIs) represent frequent and preventable adverse events and, therefore, they emerge as an assistance quality indicator⁽²⁾.

PIs are defined as localized harm in the skin and/or in underlying soft tissues as a result of intense and/or prolonged pressure combined with shear, usually over a bony prominence or associated with the use of medical devices⁽³⁾. In addition to exerting negative impacts on the patients' experience and quality of life, these injuries extend hospitalization times, raise hospital costs and increase complication rates, representing a significant challenge for institutions and professionals devoted to critical care, especially in Nursing⁽⁴⁾.

International and national data show high PI prevalence values in ICUs, reaching 16.2% at the global level⁽⁵⁾. Patients hospitalized in this scenario are at a higher risk of developing PIs when compared to those admitted to other hospital units due to hemodynamic instability, to the number of devices used, to drug therapies and to mobility restrictions⁽⁶⁻⁷⁾. In Brazil, the incidence of PIs remains among the most notified adverse events since 2013⁽⁸⁾.

In order to prevent these injuries, systematic risk assessments are a fundamental stage in the Nursing Process, as they help nurses to critically think about each patient's actual needs, promoting care individualization. These assessments are frequently made with the aid of predictive scales. So as to properly perform this function, a risk prediction scale should present high specificity, sensitivity and predictive capacity, in addition to offering fast and easy applicability to nurses⁽⁹⁻¹⁰⁾. Despite presenting limitations for not considering clinical singularities inherent to critically-ill patients⁽⁹⁻¹⁰⁾, the Braden scale is the most frequently used in Brazil. On the other hand, the Assessment Scale for the Risk of Developing Pressure Injuries in Intensive Care (*Escala de Valoración Actual del Riesgo de desarrollar Úlceras por Presión en Cuidados Intensivos*, EVARUCI) was exclusively developed for this clinical scenario, incorporating physiological, hemodynamic and respiratory parameters. The domains assessed are as follows: Consciousness, Hemodynamic support, Ventilatory support and Mobility, in addition to factors such as temperature, systolic pressure, saturation, skin conditions, position in bed and hospitalization time⁽¹¹⁾. This scale was developed in Spain by Intensive Care specialists with the objective of quickly and specifically assessing the PI risk in critically-ill patients; it was later on adapted to the Brazilian context. The original version presented good predictive validity (AUC=0.86) and high inter-observer reliability (CCI=0.98), proving to be a sensitive and easy-to-apply instrument in ICU environments⁽¹¹⁾. The version in Portuguese presented excellent inter-observer reliability (CCI=0.980) and good predictive capacity (AUC=0.807), also showing satisfactory clinical validity and applicability⁽¹²⁾. In addition,

it is understood that EVARUCI incorporates objective and easy-to-measure parameters based on data that are routinely monitored by Nursing teams, reducing evaluation subjectivity and favoring clinical applicability⁽¹⁰⁻¹²⁾.

Recent studies indicate that specific scales like EVARUCI present better predictive accuracy in ICU patients when compared to Braden's, especially during the first hospitalization days^(10,13). When compared to specific scales for critically-ill patients, EVARUCI also yields positive results and mostly better than those from other scales, such as Cubbin & Jackson's, Waterlow's and Norton's^(10,14). However, there is no consensus in the literature regarding the most effective instrument, as the existing studies were conducted in different contexts, which hinders direct comparisons. They mostly concentrate on individual analyses of each of the scales or between specific risk scales, with few of them simultaneously evaluating Braden and EVARUCI in the same population.

In this sense, an important gap is evidenced in providing safe care to critically-ill patients, given care complexity and the role of Nursing in preventing PIs. In view of this, the objective of this study is to assess the accuracy of the Braden and EVARUCI scales in predicting the PI risk in critically-ill patients.

METHOD

Study design

This is a quantitative study of the prospective cohort type developed according to the *Strengthening the Reporting of Observational Studies* (STROBE) guidelines⁽¹⁵⁾ at a large-sized public hospital located in southern Brazil. It was approved by a Research Ethics Committee under Opinion No. 85928124.5.0000.5327, in full compliance with the ethical precepts set forth in National Health Council Resolution No. 466/2012.

Context

The study was conducted at the Intensive Care Unit of a public hospital that is a reference in high-complexity care, located in Rio Grande do Sul. The institution mostly serves patients from the Unified Health System (*Sistema Único de Saúde*, SUS), in addition to those from the supplementary medical assistance network. In turn, its ICU has 60 beds divided into Clinical, Surgical and Cardiac units, all with multiprofessional teams comprised by nurses, physicians, physiotherapists, nutritionists, speech therapists and other health professionals.

Participants

The study population was comprised by patients hospitalized in the ICU, following a non-probability sampling method. The subjects included were those admitted from

February to June 2025, of both genders, over the age of 18, with minimum and maximum ICU hospitalization times of 24 hours and 14 days, with no PIs at the first evaluation and who agreed to take part in the study or had due authorization from the person responsible for them. For such definition, the institution indicators were taken into account, which point to PI development at the 14th ICU hospitalization day, in general. The patients excluded were those hospitalized for less than six days given the minimum time to apply the scales, considering the minimum of 24 hours and all three application moments at 48-hour intervals. The discontinuity criteria were as follows: death, discharge to another hospital sector or transfer to another health institution while applying the scales. The patients transferred to another hospital unit after 6 ICU hospitalization days were not discontinued, as it was possible to apply the scales to that group. Those who returned to the ICU were not considered again. In addition to that, PIs developed after this ICU return were not counted, as they might have been influenced by other factors external to the ICU.

Variables

The following was analyzed: sociodemographic variables (gender, age and race/skin color); and clinical variables (reason for hospitalization, ICU hospitalization time and outcome, previous comorbidities, PI risk score and classification as per the Braden and EVARUCI scales, and characteristics of the PIs developed).

Data collection

The patients were recruited by means of an active search in the daily record of ICU hospitalizations and included after the patients themselves or those responsible for them had signed the Free and Informed Consent Form (FICF). The outcome evaluated was PI development on the days the scales were applied and during the entire hospitalization period until discharge from the ICU.

The sociodemographic and clinical variables were collected from the patients' electronic medical charts. The risk prediction scales were applied by the researchers (trained in Nursing) at the patients' bedside at three different moments, with 48-hour intervals between each application instance. In the institution where the study was conducted, the institutional protocol foresees applying the Braden scale every seven days or when changes arise in the patients' clinical conditions. However, a 48-hour interval was adopted for the current study because it strikes a balance between the recommendations for both scales under study (Braden every 48 hours and EVARUCI every 24 hours^(11,16) and collection operational viability. The use of varied intervals in similar studies^(12-14,16) is also noted.

The outcome evaluated for the analysis regarding accuracy of the scales was PI development while the scales were applied. Injuries developed after all three application moments until the patients' discharge were counted in order to calculate their incidence in the given scenario.

The Braden scale examines six factors (Sensory perception, Moisture, Activity, Mobility, Nutrition and Friction/Shear) with scores from 6 to 23, where values between 15 and 18 indicate low risk, those between 13 and 14 mean moderate risk, between 10 and 12 point to high risk and ≤ 9 represents very high risk⁽¹⁶⁾.

EVARUCI examines four factors that are scored from 1 to 4: Consciousness, Hemodynamics, Respiratory and Mobility. In addition, other aspects are also considered, namely: axillary temperature, oxygen saturation, blood pressure, skin condition (whether there is skin maceration, moisture, edema or cyanosis) and prone position, scoring 1 point each when applicable; and ICU hospitalization time, which adds 0.5 points per week, with the possibility of reaching a maximum of 2 points. The final score varies from 4 to 23 points, where the higher the values the higher the risk and with a score of 10 as cutoff value for PI risk, as stipulated by the author of the scale. Therefore, scores ≥ 10 indicate high risk and scores ≤ 9 indicate low risk⁽¹¹⁻¹²⁾.

Considering that both scales have different risk classification options and the need to perform a statistical analysis between both tools, two classifications for the Braden scale were defined in this study: Low risk, which encompassed the patients classified during the study as no risk, low/moderate risk; and High risk (which included those classified as at high and very high risk). The original classification was maintained in EVARUCI: Low risk ≤ 9 and High risk ≥ 10 .

Bias

With the intention of avoiding possible biases, measures such as clearly and objectively defining inclusion and exclusion criteria were adopted, thus preventing arbitrary exclusion of participants: Checking the medical chart numbers and initial ICU hospitalization date to avoid duplicates; Offering previous training in charge of the research team for proper filling-out of the research instrument, conducted by a duly qualified professional and aiming at standardizing data collection in all ICU units; and Data collection from the same patients always in charge of the same researcher, thus preserving clinical judgement continuity and avoiding alterations in the evaluations.

Study size

A sample with 140 patients was calculated for the assessment of both risk prediction scales, with 95% confidence and the desired amplitude for a 0.16 confidence interval. Sample calculation was based on the analysis of the literature and was made in the PSS Health tool, online version⁽¹⁷⁾.

Statistical methods

The data collected were stored and organized in a database created in *Google Sheets* to subsequently analyze them by means of statistical methods in SPSS version 18.0.

The quantitative variables were analyzed in relation to their normality with the Kolmogorov-Smirnov test and described as mean and standard deviation in the case of those that maintained symmetry and as median and interquartile range in the case of the asymmetrical ones. The categorical variables were described as frequencies and percentages. A 5% significance level was considered.

The following performance measures were calculated for the scales: Sensitivity, Specificity, Positive Predictive Value (PPV)/Negative Predictive Value (NPV) and Accuracy, all with their respective 95% confidence intervals. Kappa's agreement coefficient between the Braden and EVARUCI tests was calculated. The gold standard considered was

PIs developed during the period while the scales were applied. The performance measures of the scores were compared using the Chi-square test with Yates correction. For the incidence calculation, the total number of patients that developed PIs during the study period was considered, with all monitored patients as reference population regardless of the risk level.

RESULTS

The sample was comprised by 145 patients, mostly male, white-skinned and with a mean age of 59 years old (SD=15.8). It was noticed that most of the patients came from the Emergency sector and from hospitalization units, with a mean ICU hospitalization time of 10 days. There was predominance of pathologies associated with the respiratory/pulmonary and neurological systems, identifying presence of previous comorbidities in 95.2% of the sample and cardiovascular system diseases standing out among them. The most frequent ICU hospitalization outcome was discharge to a hospitalization unit (Table 1).

Table 1 – Sociodemographic and clinical description of the sample (n=145). Porto Alegre, RS, Brazil, 2025

Variables	n	%
Gender		
Male	81	55.9
Female	64	44.1
Race/Skin color		
White	118	81.4
Black	22	15.2
Brown	5	3.4
Origin		
Emergency	64	44.1
Hospitalization	47	32.4
Surgical Center	15	10.3
External	13	9.0
Others	6	4.1
Reason for hospitalization		
Respiratory/Pulmonary	56	38.6
Neurological	29	20.0
Cardiovascular	25	17.2
Others	35	24.13
Previous comorbidities*		
Cardiovascular	60	41.4
Metabolic	43	29.7
Pulmonary	35	24.1
Nephrological	24	16.6
Outcome in the ICU		
Discharge to a hospitalization unit	106	73.1
Death	39	26.9

*The same patient may present more than one comorbidity. Source: prepared by the authors, 2025.

When analyzing the risk classification throughout all three assessments, different behaviors were observed between the Braden and EVARUCI scales. Most of the patients (>50%) presented low risk as assessed with the Braden scale at all three evaluation moments, with the proportion of patients in this class progressively increasing throughout the subsequent evaluation instances. On the other hand, most of the patients (>50%) were classified as high risk at all three evaluation moments as per EVARUCI, with a progressive reduction in this percentage after the first evaluation instance (Table 2).

Table 2 – Distribution of the patients according to the risk found in Braden and EVARUCI at each evaluation moment (n=145). Porto Alegre, RS, Brazil, 2025

Variables	Evaluation 1	Evaluation 2	Evaluation 3
	n %	n %	n %
Braden			
Low risk	74 51.0	78 53.8	82 56.6
High risk	71 49.0	67 46.2	63 43.4
EVARUCI			
Low risk	66 45.5	69 47.6	72 49.7
High risk	79 54.5	76 52.4	73 50.3

Source: prepared by the authors, 2025.

In all, 37 (25.5%) patients developed at least one pressure injury during the study period, resulting in 25.5% incidence (95% CI: 18.7-33.4%). In a total of 63 (100%) injuries, the most frequent stage was Stage II (30.1%), followed by deep tissue pressure injuries (20.6%). However, only considering the periods during which the risk prediction scales were applied, 21 patients presented at least one PI, with 18 of them (85.7%) classified as high risk in at least one of the evaluations as per both scales. In contrast, 76 (61.3%) and 80 (64.5%) subjects were classified as high risk in Braden and EVARUCI, respectively, but did not develop PIs.

The agreement level between both scales was considered good or substantial ($k=0.69$, $p<0.001$). Considering appearance of PIs as the gold standard to determine the performance measures for the scales, sensitivity, specificity, PPV/NPV and overall accuracy tests were performed for both scales. There was no statistically significant difference (Table 3).

Table 3 – Performance measures for Braden and EVARUCI in relation to developing pressure injuries during the study. Porto Alegre, RS, Brazil, 2025

Variables	Braden % (95% CI)	EVARUCI % (95% CI)	p-value*
Sensitivity	85.7 (63.7-97.0)	85.7 (63.7-97.0)	1.000
Specificity	38.7 (30.1-47.9)	35.5 (27.1-44.6)	0.693
Positive Predictive Value	19.2 (11.8-28.6)	18.4 (11.3-27.5)	0.999
Negative Predictive Value	94.1 (83.8-98.8)	93.6 (82.5-98.7)	0.999
Accuracy	45.5 (37.2-54.0)	42.8 (34.6-51.2)	0.723

95% CI: 95% Confidence Interval for the proportion. *Chi-square test, with Yates correction.

Source: prepared by the authors, 2025.

DISCUSSION

In this research, the incidence of PIs was similar to the one found in other national studies⁽¹⁸⁻²⁰⁾. In contrast, the incidence presented in a national cohort with 766 patients from different ICUs was 18.7%⁽²¹⁾. The difference found between the studies can be related to the population and regions under study, to the design and methodology of the studies and to the quality of the assistance provided in the different centers. However, for being an avoidable adverse event influenced by various clinical factors inherent to the patients and also by structural ones related to Nursing teams, these incidence values are considered high⁽²¹⁾.

The analysis of the research participants' sociodemographic characteristics showed a population very close to the older adult age group. Aging renders people more susceptible to chronic diseases and provokes deeper systemic impairment, in addition to aging of the skin itself, favoring PI development to a large extent⁽²²⁾. There was prevalence of men, which is corroborated in the literature, which points out that male individuals hospitalized in ICUs are more vulnerable given the sociocultural construction about masculinity, their low adherence to preventive treatments and their higher exposure to risks⁽²³⁾.

The mean hospitalization time in this study was very similar to the one indicated in the literature⁽⁵⁾: for each hospitalization day added, patients present 3.5% more chances of developing a PI⁽²²⁾. The reasons for hospitalization found in this study are also the most frequent in the literature^(18,22-23), as well as patients coming from Emergency sectors^(14,22). In addition to that, previous diseases (especially those of cardiovascular origin and diabetes) and hospitalization time are known risk factors for PI development^(22,24-25). Diabetes promotes reduced skin sensitivity due to insufficient glucose as a result of cell death caused by the disease itself, hindering a person's sensory perception. In turn, cardiovascular diseases exert an influence on tissue perfusion⁽²²⁾. However, knowing the patients' profiles and the risk factors for PI in isolation may not be enough to ensure precise assessments, especially in ICU contexts. This happens because critically-ill patients present complex and dynamic clinical conditions, demanding accurate instruments to assist nurses in defining risk levels^(9,14).

In this context, a study⁽²⁶⁾ verified that not all of the Braden subscales are associated with PI development, showing its deficit to be used in ICUs, namely: the "Sensory perception" and "Activity" subcategories are not related to increased PI risk. In addition to that, factors such as tissue oxygenation and perfusion (not mentioned in the Braden scale) can be related to PI risk, especially in older adults⁽²⁷⁾.

The scales' behavior throughout the hospitalization period suggests that as the critically-ill patients' clinical conditions stabilize, there is a decreasing trend in the risk factors for developing pressure injuries. This pattern may indicate a positive clinical evolution of the patients during their hospitalization, with a reduction in the risk factors associated with PIs, suggesting clinical improvements and lower severity of the critical condition, as well as a difference across the dimensions used to record the risk levels.

In relation to the performance measures observed in the current study, the results were similar to those found in a survey conducted with a very similar sample and setting, where the Braden scale reached 87.2% sensitivity and 33.1% specificity and EVARUCI presented 84.9% sensitivity and 39.9% specificity⁽²⁰⁾.

In turn, studies that analyzed various scales including Braden and EVARUCI obtained sensitivity values between 66.5% and 93.2% and specificity ones from 26% to 78.6% in the case of Braden and sensitivity between 80.2% and 100% and specificity from 42.9% to 69% for EVARUCI, with this latter presenting the best results among all 13 scales, both generic and specific^(10,28). In this case, both scales presented "from reasonable to good" ability to identify patients at actual PI risk; however, both instruments also classified as at risk several patients that did not actually present high risk, with EVARUCI performing slightly better in this aspect.

When assessed individually, the performance measures for the Braden scale in this study are similar to the ones found in the literature, which points to 89% sensitivity and 28% specificity⁽²⁹⁾. On the other hand, a meta-analysis found 78% sensitivity and 72% specificity, and its performance analysis showed higher predictive capacity for people aged less than 60 years old⁽²⁷⁾. These findings indicate that the scale classified most of the patients that developed PIs as at high risk; however, they also point to low agreement in the classification of those patients at low risk, evidencing its limitation in terms of specificity.

On the other hand and when analyzed individually at two different hospitalization moments (at admission and at 48 hours), EVARUCI reached 90.9% and 72.7% sensitivity, 16.9% and 48.6% specificity, 20.3% and 24.7% positive prediction and 88.9% and 88.5% negative prediction, respectively. These findings indicate that the scales efficiently classified risk in the case of those that developed PIs; however, many patients that did not develop any injury were also classified as at high risk, evidencing a tendency to overestimate this risk in certain cases. However, their negative predictive validity was satisfactory; in other words, the patients classified as at low risk actually presented few chances of developing injuries⁽³⁰⁾. When analyzed along with specific scales for critically-ill patients, sensitivity was 100%, specificity reached 89.2%, PPV and NPV were 47.1% and 100.0% (respectively) and accuracy was 90.1% for a cutoff value of 11 (high risk is considered from 11 points)⁽¹⁴⁾. This variation in the cutoff value to define the risk classification was also found in another study⁽³¹⁾.

The variation in the cutoff value, differentiating it from the one stipulated by the original scale, was also found in the Braden scale in a meta-analysis which showed that the ideal cutoff value would be 18 (low risk), as it was the one that presented the best sensitivity and specificity⁽²⁷⁾. The best cutoff value for any of the scales was not analyzed in this study; however, it is a relevant factor to define accuracy of a scale, especially in a specific context such as Intensive Care⁽¹⁴⁾.

The limitations of this study refer to the fact that the analysis was performed in a single *locus*, limiting generalization of the results to other centers, as well as inter-observer reliability. The sample size and the number of PIs developed can also be considered limiting factors since, even if it was possible to analyze the results, they may exert an influence on the statistical robustness of the accuracy tests.

CONCLUSION

The Braden and EVARUCI scales presented 45.5% and 42.8% accuracy, respectively, and both of them showed good sensitivity and were capable of identifying patients at a higher risk of developing pressure injuries in a sensitive way. The scales overestimate the risk in some cases, showing the need to conduct more research studies to consolidate the findings. The analysis of two different scales may contribute benefits to nurses' clinical practice because it evidences their capacity to classify high-risk patients in the Intensive Care context, favoring deeper attention to preventive care measures in patients that present that risk classification.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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AUTHORSHIP CONTRIBUTIONS

Study conception: Bavaresco T, Schuh KL.
Data acquisition: Schuh KL, Rodrigues BA.
Data analysis: Bavaresco T, Schuh KL.
Data interpretation: Bavaresco T, Schuh KL, Marques S, Azzolin KO.
All authors are responsible for the textual writing and critical review of the intellectual content, for the final published version, and for all ethical, legal, and scientific aspects related to the accuracy and integrity of the study.



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