

TRANSLATION, CULTURAL ADAPTATION AND VALIDATION OF THE MUNRO SCALE TO BRAZILIAN PORTUGUESE

TRADUÇÃO, ADAPTAÇÃO CULTURAL E VALIDAÇÃO DA MUNRO SCALE PARA PORTUGUÊS DO BRASIL

TRADUCCIÓN, ADAPTACIÓN CULTURAL Y VALIDACIÓN DE LA ESCALA MUNRO AL PORTUGUÉS DE BRASIL

 Cristina Silva Sousa¹

¹Hospital Sírio-Libanês, Bloco Operatório. São Paulo, SP - Brazil.

Corresponding author: Cristina Silva Sousa
E-mail: crissousa@usp.br

Authors' Contributions:

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 Tânia Couto Machado Chianca

ABSTRACT

Objective: to translate, adapt and validate the *Munro Scale* for Brazilian patients in the perioperative period. **Method:** a methodological study conducted in six stages: translation, synthesis, back-translation, adaptation by experts committee, pre-test, and validation of the instrument. The experts committee consisted of seven nurses. For the psychometric tests, 39 patients were selected in the pre-test stage, and 75 in the validation stage, and *Cronbach's* alpha, the Intraclass Correlation Coefficient and the Content Validity Index were measured, as well as internal consistency with Friedman's test and concurrent validity with *Spearman's* correlation between the *Munro Scale* and the ELPO instrument. **Results:** *Cronbach's* alpha was 0.82, the Intraclass Correlation Index was 0.75, and the Content Validity Index was 0.89 in the adaptation phase by the evaluators. In the pre-test, *Cronbach's* alpha was 0.91, the Intraclass Correlation Index was 0.91, and there was internal consistency ($p < 0.0001$) and concurrent validity in the intraoperative period (0.38; $p = 0.018$). In the validation stage, *Cronbach's* alpha was 0.86, the Intraclass Correlation Index was 0.86, and there was internal consistency ($p = 0.000$) and concurrent validity in the intraoperative period (0.30; $p = 0.010$). **Conclusion:** the *Munro Scale* was translated, adapted and validated with good validity and reliability indices and presents itself as a reliable instrument to assess the risk of pressure ulcer in the perioperative period.

Palavras-chave: Validation Study; Pressure Ulcer; Risk Assessment; Patient Positioning; Perioperative Nursing.

RESUMO

Objetivo: traduzir, adaptar e validar a *Munro Scale* aos pacientes brasileiros no perioperatório. **Método:** estudo metodológico realizado em seis etapas: tradução, síntese, retrotradução, adaptação por comitê de especialistas, pré-teste, validação do instrumento. O comitê de especialistas foi composto de sete enfermeiros. Para os testes psicométricos, foram selecionados 39 pacientes no pré-teste e 75 na validação, mensurados o alfa de *Cronbach*, coeficiente de correlação intraclass, e índice de validade de conteúdo, consistência interna com teste de *Friedman* e validade concorrente com correlação de *Spearman* entre a *Munro Scale* e ELPO. **Resultados:** o alfa de *Cronbach* foi 0,82, índice de correlação intraclass 0,75, índice de validade conteúdo dos juízes 0,89 na fase da adaptação. No pré-teste o alfa de *Cronbach* foi 0,91, índice de correlação intraclass 0,91, a consistência interna ($p < 0,0001$) e validade concorrente no intraoperatório (0,38; $p = 0,018$). Na validação, o alfa de *Cronbach* foi 0,86, índice de correlação intraclass 0,86, consistência interna ($p = 0,000$) e validade concorrente no intraoperatório (0,30; $p = 0,010$). **Conclusão:** A *Munro Scale* foi traduzida, adaptada e validada, com boa validade e confiabilidade e apresenta-se como um instrumento confiável para mensurar o risco de lesão por pressão no perioperatório.

Keywords: Estudos de Validação; Lesão por Pressão; Medição de Risco; Posicionamento do Paciente; Enfermagem Perioperatória.

RESUMEN

Objetivo: traducir, adaptar y validar la *Escala Munro* para pacientes brasileños en el período perioperatorio. **Método:** estudio metodológico realizado en seis etapas: traducción, síntesis, retro traducción, adaptación a cargo de comité de expertos, pretest y validación del instrumento. El comité de expertos estuvo compuesto por siete enfermeros. Para las pruebas psicométricas se seleccionaron 39 pacientes en el pretest y 75 en la validación, se midió el alfa de *Cronbach*, el Coeficiente de Correlación Intraclass, el Índice de Validez de Contenido, la consistencia interna con la prueba de *Friedman* y la validez concurrente con la correlación de *Spearman* entre la *Escala Munro* y el instrumento ELPO. **Resultados:** el alfa de *Cronbach* fue 0,82, el Índice de Correlación Intraclass fue 0,75, y el Índice de Validez de Contenido de los jueces fue 0,89 en la fase de adaptación. En el pretest, el alfa de *Cronbach* fue 0,91 y el Índice de Correlación Intraclass fue 0,91, hubo consistencia interna ($p < 0,0001$) y validez concurrente intraoperatoria (0,38; $p = 0,018$). En la validación, el alfa de *Cronbach* fue 0,86 y el Índice de Correlación Intraclass fue 0,86, hubo consistencia interna ($p = 0,000$) y validez concurrente intraoperatoria (0,30; $p = 0,010$). **Conclusión:** la *Escala Munro* se tradujo, adaptó y validó con buena validez y confiabilidad, y se presenta como un instrumento confiable para medir el riesgo de lesión por presión en el período perioperatorio.

Palabras clave: Estudio de Validación; Úlcera por Presión; Medición de Riesgo; Posicionamiento del Paciente; Enfermería Perioperatoria.

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INTRODUCTION

Among surgical and/or anesthetic complications, pressure ulcers due to surgical positioning stand out as avoidable adverse events, increasing costs for hospital units and patients.¹

Appropriate surgical positioning ensures efficiency and safety during the procedure and is one of the main quality indicators in perioperative care.² Risk for perioperative positioning injury is a Nursing diagnosis, and interventions for this diagnosis include: use of support surfaces, protection of bony prominences, monitoring of surgical positioning, assessment of skin conditions, and risk assessment.³

Currently, the only risk assessment scale for surgical patients available in Portuguese is the Risk Assessment Scale for the Development of Injuries due to Surgical Positioning (*Escala de Avaliação de Risco para o Desenvolvimento de Lesões Decorrentes do Posicionamento Cirúrgico*, ELPO). ELPO is a tool developed and validated in Brazil that assesses the risk of developing injuries due to surgical positioning whose score varies from seven to 35 points: the higher the score, the greater the risk of development of positioning injuries. It was grounded on recent evidence and encompasses factors recommended by experts on the subject matter.⁴

There are other American scales, such as the *Munro Scale*⁵ and the *Scott Triggers* risk classification tool,⁶ both of which are included in the recommendations for preventing pressure ulcers by the *Association of PeriOperative Registered Nurses* (AORN).

The *Munro Scale* includes three assessment moments: preoperative, with six risk categories: mobility, nutritional status, Body Mass Index (BMI), recent weight loss, age and comorbidities; intraoperative, with seven categories: classification according to the *American Society of Anesthesiologists* (ASA) scale, type of anesthesia, body temperature, hypotension, moisture, surfaces and surgical positioning; and postoperative, with two risk categories: length of the perioperative period and blood loss.⁵

In each phase (pre-, intra- and post-), the items of the scale are scored from one to three points. The higher the score obtained, the greater the patient's risk in each phase. The preoperative measure determines the risk for the intraoperative period, the intraoperative measure determines the risk for the immediate postoperative period, and the postoperative measure determines the risk for the mediate postoperative period.

One of the benefits of the *Munro Scale* is its cumulative nature, which facilitates communication and care transfer between the preoperative, intraoperative and postoperative departments and hospitalization units for care continuity. In addition to risk assessment, it becomes a documentary and communication tool.

This period-based evaluation allows knowing the risk before the patient entries into the operating room and, thus, preparing preventive measures such as support surface and adhesive dressings for positioning moderate- to high-risk patients.

Another fact is identifying patients who may progress from low and moderate risk to high risk; for example, a patient having moderate risk in the preoperative period who underwent a 10-hour surgical procedure in the supine position can evolve to high risk at the end of the procedure and require risk-based interventions during anesthetic recovery.⁷

The *Scott Triggers* tool assesses patient's age (>62 years old), albumin values (<3.5 mg/dL or <35 g/L), ASA classification (>3), and estimated duration of the surgery (>180 minutes or 3h), with high-risk patients being those with scores equal to or higher than 2 triggers.⁶

However, for our reality in Brazil, albumin levels are not collected in surgical patients during the preoperative period. Despite being an intrinsic factor with evidence for the occurrence of injuries, they are not measured in the preoperative period, which may lead to failure in the adequate assessment using the *Scott Triggers*.

The *Munro Scale* was translated into Mandarin, and the translation, cultural adaptation and validation process had a high degree of inter-rater reliability, high content validity, and acceptable construct validity.⁸ Moreover, it has been culturally adapted and validated to Turkish recently. It was concluded that the scale can be used by perioperative nurses in Turkey and assist in the identification of high-risk patients.⁹

With the need to identify the risk prior to patient's admission to the operating room and to implement risk-based interventions, it is necessary to find new risk assessment instruments that encompass the specificities of the perioperative area. The *Munro Scale* was the scale of choice, as it assesses different phases of the perioperative period, monitors risk evolution during this period, and promotes communication between the areas, thus allowing for care transition. Consequently, the objective of this study was to translate, adapt and validate the *Munro Scale* for Brazilian patients in the perioperative period.

METHOD

This is a methodological study, concerning the translation, cultural adaptation and validation of the *Munro Scale* to Brazilian Portuguese. The translation process was initiated after agreement of the author of the original instrument, was based on a theoretical framework¹⁰ about cultural adaptation and comprised the following stages: translation, synthesis, back-translation, adaptation by the experts committee, pre-test and validation of the instrument (Figure 1).^{11,12}

The study locus to apply the scale is a general philanthropic hospital in the municipality of *São Paulo*, Brazil, with nearly 1,300 procedures per month, in which data collection was performed in the following units: preoperative/day-hospital unit (17 beds), surgical ward (22 operating rooms), and anesthetic recovery unit (23 beds). The translation, adaptation and validation process was conducted from February 2019 to February 2020.

Translation and synthesis: two Brazilian bilingual translators (English/Portuguese) participated in the initial translation. None of them had knowledge regarding the perioperative period or were aware of the *Munro Scale*. With both versions of the instrument in Portuguese, consensus of the versions was performed, assembling a first version of the instrument in Portuguese.

Back-translation: two bilingual native translators (English/Portuguese) who did not participate in the first translation back-translated the first version of the instrument in Portuguese to English. At the end of the process, consensus of the versions translated into English was performed, generating a single version.

The translation and back-translation process consisted in only two rounds; the versions presented many similarities, with simple consensus and with no need for further rounds.

The results of the translation and back-translation process were presented to the author of the original version of the *Munro Scale* by email, in order to assess similarity of words and ensure that the purpose of the original version was maintained.

Experts committee: seven perioperative nurses participated of the adaptation of the version in Brazilian Portuguese, based on the experts' opinions. The inclusion criteria were perioperative Nursing professionals with experience of over five years in one of the following areas: surgical ward, preoperative period and anesthetic recovery, and who were members of the institution's staff, as well as professionals not affiliated with the institution who published studies in the perioperative area.

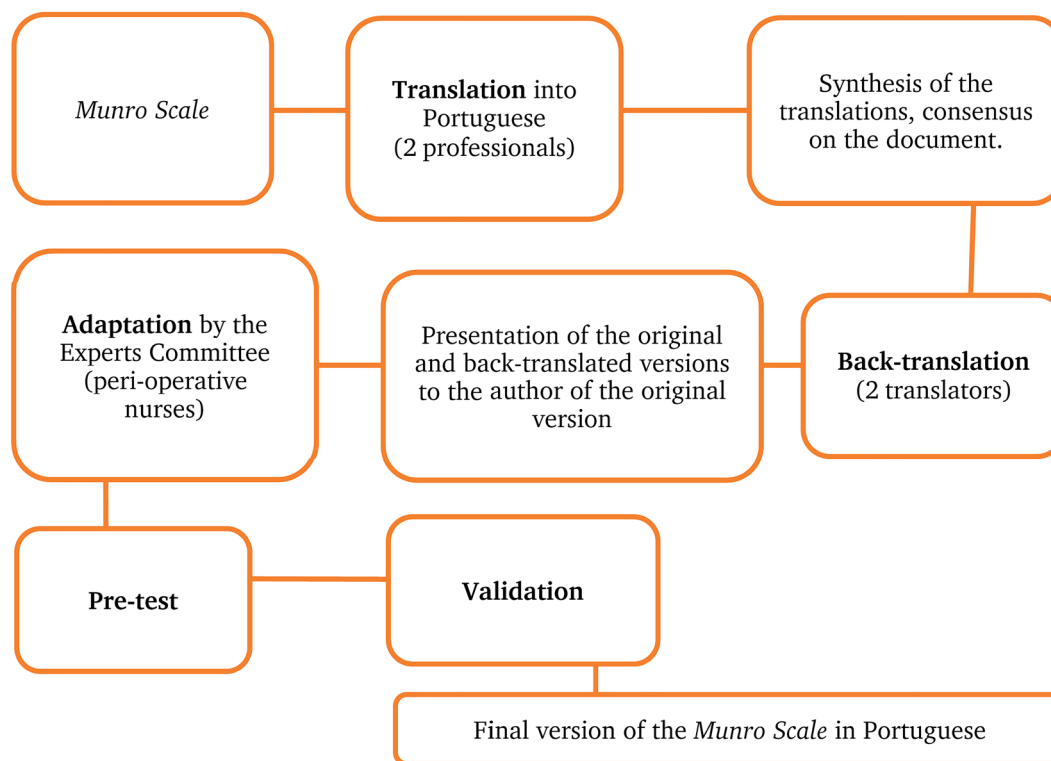


Figure 1 - Methodological path corresponding to the translation, cultural adaptation and validation of the *Munro Scale*. São Paulo, São Paulo, Brazil, 2020

These professionals were invited by the researcher through email, and those who accepted to participate received the link to an electronic assessment form developed in Google Forms. They were advised of the 15 day deadline to answer.

In this process, the experts were advised to analyze each sentence of the translated version in terms of clarity and relevance, using a four-point Likert scale for clarity (1=unclear; 2=little clear; 3=quite clear, and 4=very clear) and relevance of the items (1=not representative; 2=needs major review to be representative; 3=needs little review to be representative, and 4=representative).¹⁰ Therefore, the assessment was considered positive when 80% of the experts chose the following scores: 3=Quite clear, for clarity of the scale; and 3=Needs little review to be representative. In this stage, the experts committee was given the opportunity to offer comments at the end of each of the scale's phases, to make suggestions regarding understanding of the items for more clarity or relevance.

Pre-test: the Portuguese version of the *Munro Scale* was applied to 39 patients. Six nurses took part in application of the scale in this phase, namely: two in the preoperative period, two in the intraoperative period, and two in the postoperative period. The nurses were trained in person by the researcher on the functionality of applying the scale; and they were advised to convey the patient's information to the nurse responsible for the subsequent collection phase. In the postoperative period, the nurse was in charge of keeping the completed scale's instrument in a folder with an elastic band to be fetched by the researcher.

The target population for the pre-test and validation phases consisted of patients in the perioperative period. They were invited to participate in person by the preoperative nurse, and those who accepted to participate and signed the informed consent were included in the research.

The inclusion criteria were as follows: patients aged 18 years old or over, of both genders, who were admitted to the preoperative/day-hospital unit, underwent an elective surgical procedure of any specialty, and spent their postoperative period in the anesthetic recovery unit of the aforementioned study locus. A total of 39 patients were selected in the pre-test phase, as recommended by the framework used in this study.¹⁰

For concurrent validity analysis, the risk assessment scale for the preoperative period called ELPO was applied concomitantly. This is the only instrument available in Portuguese and, due to similarity in the assessment, it was selected for comparison purposes.

At the preoperative moment, the first phase of the *Munro Scale* was applied (preoperative phase) by the nurse of the preoperative/day-hospital unit at admission to the unit. The full instrument of the *Munro Scale* was forwarded together with patient medical record to the operating room, and the patient's moderate or high risk status was communicated to the operating room nurse by telephone.

At the intraoperative moment, the operating room nurse applied the ELPO scale after surgical positioning, according to the author's recommendation; and, at the end of the surgical procedure, when exiting the operating room, the same nurse applied the second phase of the *Munro Scale* (intraoperative phase) and communicated the patient's moderate-to-high-risk status to the nurse of the anesthetic recovery unit.

At the postoperative moment, the nurse of the anesthetic recovery unit applied the third phase of the *Munro Scale* (postoperative phase) at discharge from the anesthetic recovery unit and communicated the risk assessment result to the nurse of the hospitalization unit during handoff.

At the end of the pre-test period, based on the results of the internal consistency and concurrent validity assessment, no changes in the instrument were necessary, and the analysis proceeded to the validation stage.

Validation: the study considered the sample size estimated according to the rule proposed by the *Consensus-based standards for selection of the health measurement instruments* (COSMIN).¹³ Therefore, five to 10 individuals were required for each item of the instrument. Considering that the scale has a total of 15 items (preoperative phase: 6, intraoperative phase: 7, and postoperative phase: 2), 75 individuals were required for application of the instrument, given the complexity of items' response pattern. All the participants signed the Free and Informed Consent Form.

The inclusion criteria for the validation phase were those defined in the pre-test phase. Concurrent validation with the ELPO scale was maintained for validation. The *Munro Scale* was applied in the three perioperative periods, and the ELPO instrument, in the intraoperative period. The nurses participating in the pre-test phase were maintained to apply the scale in the validation phase, as well as the scale's application and communication method applied in the pre-test.

For the reliability analysis: *Cronbach's* alpha coefficient (internal consistency), establishing a minimum value of 0.70 to show that the items measure the same construct.⁸

To assess the scale’s stability, the Intraclass Correlation Coefficient (ICC) was applied with the following criteria: values between zero and 0.20 = poor; between 0.21 and 0.40 = fair; between 0.41 and 0.60 = good; between 0.61 and 0.80 = very good; and between 0.81 and 1.00 = excellent.^{14,15}

For the validity analysis: relevance and representativeness of the items were assessed using the Content Validity Index (CVI), which measures inter-rater agreement; a minimum value of 0.80, or 80%, was considered.⁸ For concurrent validity: the *Munro Scale* and ELPO scores as measured in the pre-test and validation phases were subjected to the Friedman’s test for internal consistency and to the Spearman’s correlation test. Type I error was fixed at 5% as statistically significant ($p < 0.05$). The statistical analyses were performed in the *Statistical Package for the Social Sciences* (SPSS) program, version 20.0.

Translation and use of the *Munro Scale* were authorized by its original author, Cassandra Munro, and the research project was approved by the Research Ethics Committee of the Syrian-Lebanese Teaching and Research Institute, in compliance with the ethical principles of Resolution 466/12.¹⁶

RESULTS

In the translation and synthesis phase, the translated instruments were similar and their synthesis was performed with no need for a new round. In the back-translation phase there were some divergences regarding the scientific nomenclature in Portuguese in relation to the English language, concepts that were adjusted during synthesis of the instruments.

In the assessment by the original author, the following items were pointed out: in the preoperative phase, the translation of “*Length of NPO*” as “*duração da condição*

nutricional pré-operatória” (“length of preoperative nutrition status”) and with regard to the explanation of the meaning of NPO (*nothing by mouth*), which we considered as “*jejum*” (“fasting”). Therefore, the item was corrected to “*duração do jejum pré-operatório*” (“length of preoperative fasting”). In the intraoperative phase, the title *Intraoperative Assessment* was translated as “*avaliação perioperatória*” (“perioperative assessment”); however, as the term “*perioperatória*” encompasses the assessment of the three periods (pre-, intra-, and postoperative), it was corrected to “*avaliação intraoperatória*” (“intraoperative assessment”). In the postoperative phase, the meaning of “*técnico de Enfermagem*” (“Nursing technician”) was questioned, as it appears as LIP (“*Licensed independant practitioner*”) in the scale and corresponds to a physician, assistant or nurse, and the meaning of this professional was explained, with subsequent addition of the word “*anestesiologista*” in the item. After correction, the excerpt was rewritten as follows: “[...] *de acordo com o técnico de Enfermagem ou anestesiologista*” (“[...] according to the Nursing technician or anesthesiologist”).

After these adjustments, the author of the original instrument granted permission to proceed with the pre-test and validation phases.

In the cultural adaptation phase, conducted by the experts committee (seven perioperative nurses), it was necessary to forward the electronic form for two rounds due to lack of sufficient answers in the first round within the established period of 15 days for returning the form. The scale’s content assessment (CVI) score was 0.89, which represents good relevance and representativeness. The values by items are presented in Table 1: with values above 0.70, no item needed review. Cronbach’s alpha coefficient was 0.82, there was good internal consistency, and the Intraclass Correlation Index for the sum of the scale’s items was 0.75 ($p = 0.001$).

Table 1 - Content assessment (CVI) by items of the *Munro Scale*. São Paulo. SP - Brazil. 2020

Item	Clarity	Relevance
Preoperative period		
Mobility domain [not limited, or slightly limited, the patient moves independently]	0.82	1.00
Mobility domain [very limited, the patient needs assistance to move]	0.86	1.00
Mobility domain [completely immobilized, the patient needs full assistance]	0.82	1.00
Nutritional status domain (length of preoperative fasting) [<12h]	0.82	0.86
Nutritional status domain (length of preoperative fasting) [between 12h and 14h]	0.75	0.82
Nutritional status domain (length of preoperative fasting) [<24h]	0.82	0.86
BMI domain [<30 kg/m ²]	0.82	0.89
BMI domain [30 kg/m ² - 35 kg/m ²]	0.82	0.89

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Item	Clarity	Relevance
Preoperative period		
BMI domain [$>35 \text{ kg/m}^2$]	0.82	0.89
Weight loss domain (weight loss at 30-180 days) [weight loss of up to 7.4%, no change in weight or unknown weight loss]	0.71	0.82
Weight loss domain (weight loss at 30-180 days) [weight loss between 7.5% and 9.9%]	0.75	0.82
Weight loss domain (weight loss at 30-180 days) [weight loss $\geq 10\%$]	0.75	0.82
Age domain [39 or less]	0.96	0.96
Age domain [40-59]	0.96	0.96
Age domain [60 or more]	0.96	1.00
Comorbidities domain (each comorbidity/group equals to 1 point. The possible minimum and maximum scores are 0 and 6, respectively) [smoker (currently)]	0.86	1.00
Comorbidities domain (each comorbidity/group equals to 1 point. The possible minimum and maximum scores are 0 and 6, respectively) [pre-hypertension or high BP values (BP $> 120/80 \text{ mmHg}$)]	0.86	0.96
Comorbidities domain (each comorbidity/group equals to 1 point. The possible minimum and maximum scores are 0 and 6, respectively) [vascular/kidney/cardiovascular/peripheral vascular disease]	0.86	0.96
Comorbidities domain (each comorbidity/group equals to 1 point. The possible minimum and maximum scores are 0 and 6, respectively) [asthma/respiratory and/or pulmonary disease]	0.86	0.96
Comorbidities domain (each comorbidity/group equals to 1 point. The possible minimum and maximum scores are 0 and 6, respectively) [history of pressure ulcer/existing pressure ulcer]	0.86	1.00
Comorbidities domain (each comorbidity/group equals to 1 point. The possible minimum and maximum scores are 0 and 6, respectively) [diabetes/IDDM]	0.86	1.00
Intraoperative period		
Physical condition/ASA domain (according to the anesthesiologist) [healthy and with mild systemic disease, no functional limitations]	0.86	1.00
Physical condition/ASA domain (according to the anesthesiologist) [moderate to severe systemic disease, some functional limitation]	0.82	1.00
Physical condition/ASA domain (according to the anesthesiologist) [moderate to severe systemic disease, constant threat to life and functionally incapacitating, or ASA > 3]	0.82	0.96
Anesthesia domain [sedation/local]	1.00	0.96
Anesthesia domain [regional]	0.96	0.96
Anesthesia domain [general]	1.00	0.96
Body temperature domain (calculate high/low change according to the anesthesiologist) [36.1 C - 37.8 C body temperature maintained]	0.86	0.93
Body temperature domain (calculate high/low change according to the anesthesiologist) [$<36.1 \text{ C}$ or $>37.8 \text{ C}$ (+ 2 C; temperature fluctuated + 2 C)]	0.75	0.89
Body temperature domain (calculate high/low change according to the anesthesiologist) [$<36.1 \text{ C}$ or $>37.8 \text{ C}$ (+ $>2 \text{ C}$; temperature fluctuated + $>2 \text{ C}$)]	0.71	0.89
Hypertension domain (calculate high/low change percentage in SBP according to the anesthesiologist) [absent or change $<10\%$ in BP]	0.79	0.82
Hypotension domain (calculate high/low change percentage in SBP according to the anesthesiologist) [variation between 11% and 20% in BP]	0.79	0.82
Hypotension domain (calculate high/low change percentage in SBP according to the anesthesiologist) [persistent or variation between 21% and 50% in BP]	0.79	0.82
Moisture domain (surface below the patient) [remains dry]	0.79	0.89
Moisture domain (surface below the patient) [some moisture]	0.79	0.89
Moisture domain (surface below the patient) [pooled or heavy fluid]	0.79	0.89
Surface/Motion domain (positioning aids, warming blanket, position change) [none/use of warming blanket over the body/stationary position]	0.79	0.93
Surface/Motion domain (positioning aids, warming blanket, position change) [use of positioning aids/warming blanket under the body/stationary position]	0.79	0.93
Surface/Motion domain (positioning aids, warming blanket, position change) [shearing force/added pressure/variable position]	0.79	0.93
Position domain (for the procedure) [lithotomy]	0.96	1.00
Position domain (for the procedure) [lateral]	0.96	1.00
Position domain (for the procedure) [supine/prone]	0.96	1.00

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Postoperative period		
Length of perioperative period domain (total time from arrival to preoperative to departure from postoperative care) [up to 2h]	0.86	0.89
Length of perioperative period domain (total time from arrival to preoperative to departure from postoperative care) [from 2h to 4h]	0.82	0.89
Length of perioperative period domain (total time from arrival to preoperative to departure from postoperative care) [>4h]	0.86	0.89
Blood loss domain (intraoperative and anesthetic recovery; sanguineous fluid through wound, orifice and/or drain according to the Nursing technician and anesthesiologist) [up to 200 mL]	0.89	0.93
Blood loss domain (intraoperative and anesthetic recovery; sanguineous fluid through wound, orifice and/or drain according to the Nursing technician and anesthesiologist) [201-400 mL]	0.89	0.93
Blood loss domain (intraoperative and anesthetic recovery; sanguineous fluid through wound, orifice and/or drain according to the Nursing technician and anesthesiologist) [>400 mL]	0.89	0.93

In the pre-test and validation phases, six nurses worked on application of the *Munro Scale* in the perioperative period, and 114 patients (39 in the pre-test and 75 in the validation) were assessed with the scale. In the pre-test phase, the mean age of these patients was 43 years old, 20 were female and 19 were male; and, in the validation phase, mean age was 49 years old, 37 patients were female, and 38 were male. In both phases, the perioperative period lasted a mean of 5 and a half hours.

In the pre-test with 39 patients, the *Munro Scale* scores presented a median value of six points in the preoperative phase, 19 points in the intraoperative phase, and 23 points in the postoperative phase, with $p < 0.0001$ in Friedman's test. The ELPO scores presented a median of 16 points. *Cronbach's* alpha coefficient was 0.91, there was good internal consistency, and the Intraclass Correlation Index for the sum of the scale's items was 0.91 ($p = 0.000$). With the ELPO scale, concurrent validity represents a statistically significant measure in the intraoperative phase (0.38; $p = 0.018$) in the *Spearman's* correlation test.

Given the significant results found in the preoperative phase it was understood that there was no need for adjustments in the scale application process; therefore, the analysis proceeded to the validation phase with a higher number of patients.

In the validation phase with 75 patients, the *Munro Scale* scores obtained medians of seven, 20 and 24 points in the preoperative, intraoperative and postoperative phases, respectively. The ELPO scores were 15 points. *Cronbach's* alpha coefficient was 0.86, there was good internal consistency, and the Intraclass Correlation Index for the sum of the scale's items was 0.86 ($p = 0.000$). Concurrent validity with ELPO presented statistically significant values ($p = 0.000$) in the Friedman's test and in the *Spearman's* correlation test in the intraoperative phase (0.30; $p = 0.010$).

The results of this process showed good internal consistency (0.82), good content validity (CVI) for the scale (0.89), with variations among the items (0.70-1.0), and a good Intraclass Correlation Coefficient (ICC) (0.75). The mean cumulative scores of the scale were 23.64 in the pre-test and 23.94 in the validation phase.

The results of the *Munro Scale* scores revealed an increased risk for pressure ulcer due to surgical positioning from the preoperative assessment to the intraoperative assessment in 26 patients; in these patients, the results of the scale evolved from low risk in the preoperative period to moderate risk at the end of the surgical procedure in the application at the intraoperative phase; and four patients with moderate risk in the preoperative period evolved to high risk in the intraoperative period. In the assessment of the postoperative phase, one patient evolved from moderate risk in the intraoperative period to high risk in the postoperative period.

There were no sample losses during the pre-test and validation period. The nurses who applied the scale in the different phases of the perioperative period did not report any difficulty applying the scale and praised its application ease; in addition, the predictive risk assisted in determining risk-based interventions in the intra- and postoperative phases.

DISCUSSION

The *Munro Scale* was published by its original author in 2010,⁵ underwent some updates and, in 2016, it was launched in seven states from the United States of America. The original version did not publish its scale validation results, but it was instituted in the AORN recommendations as a tool to assist in the prevention of injuries.¹⁷ To the present day, it is the only scale to dynamically assess the risk of pressure ulcer in adult surgical patients during the perioperative period.

Since 2018, there is a translated version of the *Munro Scale* published in Mandarin, and the Turkish version was published in 2021. Content assessment of both version was similar to the translation into Brazilian Portuguese, with variations from 0.60 to 1.0 across the items. The items with the lowest score (0.71) in the Portuguese version were “body weight loss” and “change in temperature”, although with relevance values from 0.82 to 0.89.

In the Turkish version,⁹ lower content validity indices were reported related to BMI, although not below 0.70, and high values in the other indices, as well as in the version in Portuguese. Based on this result, the Portuguese version of the scale is an adequate measure in terms of language and content validity.

The mean cumulative scores were 26.63 for the Chinese scale and 25.32 for the Turkish scale, which are close to what was obtained in this study (23.94) and, in both versions, the values are considered as moderate risk.

Reliability of the measuring procedures can be defined as a stability or consistency measure.¹⁸ If the scale is not reliable, the results will not be consistent, and different professionals will obtain divergent results when applying it. The reliability results in the *Cronbach's* alpha value (0.82) of this study were better than in the translated and adapted versions in Mandarin (0.54) and Turkish (0.50). However, the version in Mandarin⁸ obtained a higher overall CVI value in the scale, with 0.94.

The ICC of the versions in Mandarin⁸ (0.78) and Turkish (0.82-0.95) were high and similar to those found in the Portuguese version (0.75). The ICC is classified as poor when below 0.40, as moderate when between 0.40 and 0.75, and as good when above 0.75.¹⁹ This result shows that different professionals can obtain the same result when independently assessing a patient as for the risk of pressure ulcers, that is, the *Munro Scale* is consistent and reliable.

Reliability can also be determined by the high degree of correlation between the parallel forms used. In this study, the ELPO scale was used, which is designed for the perioperative population, and significant results were obtained in the correlation (0.30; $p=0.010$). In the Turkish version, concurrent validity was analyzed with the Braden scale and presented a negative and weak correlation in the overall preoperative scores and a negative and moderate correlation between the postoperative scores.⁹

A stronger correlation was evidenced in this study, for using a Brazilian scale with its profile targeted at patients in the perioperative period, encompassing items that are characteristic to the intraoperative period.

After translation, a Chinese study proposed to test the clinical validity of the Chinese version of the *Munro Scale*, compared to the Braden and the Qian-Weiming scales (self-designed). This study concluded that the Chinese version of the *Munro Scale* is more suitable for the assessment of perioperative patients' risk of pressure ulcers than the Braden scale and than the self-designed scales, although the preoperative risk assessment needs to be improved.²⁰

In relation to the cumulative scores of the *Munro Scale*, of the 81 patients assessed with the Turkish version,⁹ 23 were identified as with high risk of pressure ulcer due to surgical positioning, unlike the results found in this study, with only five high-risk patients.

A research study conducted in a Brazilian teaching hospital with 278 patients subjected to elective surgeries evidenced the occurrence of positioning injuries in 77% of the patients.²¹ In another survey with 239 patients, the occurrence of pressure ulcers due to surgical positioning was 37.7%, 81 (90.0%) patients developed stage 1 pressure injury, and the most frequent sites for this type of injury were the sacral region (19; 13.9%), and the right (16; 11.7%) and left (13; 9.5%) calcaneus regions.²²

In view of the high incidence of pressure ulcers, it becomes indispensable to assess the risk of injuries as one of the prevention measures.

The *Munro Scale* assesses the patient's risks in three perioperative phases; the risk is scored for each phase, with a cumulative score at the end. All phases contributed to the risk of developing pressure ulcers.⁵ In this study, the profile of preoperative, intraoperative and postoperative risk mostly consisted of moderate-risk patients, with some evolving to high risk.

This result shows that it is important to assess the patient regarding pressure ulcers in all the perioperative phases. The *Munro Scale* can help perioperative nurses identify high-risk patients during the preoperative period and implement interventions that are more suitable to the risk in the intraoperative period and, similarly, identify the postoperative risk and provide care continuity.

The ELPO instrument is a simple scale and, according to author's recommendation, it should be applied when the patient is positioned on the operating table; in scoring each item, the highest score corresponding to the item should be considered. For example, if the patient was subjected to local anesthesia and sedation, his/her classification under sedation is recommended, receiving score two on the scale.⁴

This scale has been applied in several institutions, as it is currently the only one that presents risk factors of the perioperative period. However, its application in surgical positioning precludes predicting which patients are at high risk before they enter the operating room; similarly, it also precludes providing special resources for high-risk patients, as recommended.

Another fact is that, after the patient is positioned, risk identification does not allow for more position changes, and this limitation turns the instrument into an indicator for postoperative care.

Translation and cultural adaptation processes are complex and must be conducted with caution. Grammatical and cultural adjustments should be made preserving the meaning of the assessment item.¹⁰ Therefore, this study performed the translation, cultural adaptation, and validation of the *Munro Scale* to Brazilian Portuguese.

Among the study limitations are its conduction in a single hospital center and the lack of publications about the validation process of the original scale for comparison with the translated version.

CONCLUSION

The *Munro Scale* was translated, adapted and validated for adult Brazilian patients in the perioperative period and presented good validity and reliability indices, being applicable to perioperative patients. Perioperative nurses can adopt adequate preventive measures after diagnosing the risk. There were no difficulties applying the scale in the practice, in any of the perioperative phases. Previous risk assessment allows providing anticipated preventive measures during the intra- and postoperative periods.

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