

## INTER RATER RELIABILITY OF PRESSURE ULCER SCALE FOR HEALING (PUSH) IN PATIENTS WITH CHRONIC LEG ULCERS

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*This study aimed to evaluate the inter rater reliability of the Pressure Ulcer Scale for Healing (PUSH), in its version adapted to the Portuguese language, in patients with chronic leg ulcers. Kappa index was used for the analysis. After accomplishing ethical issues, 41 patients with ulcers were examined. A total of 49% of the ulcers were located in the right leg and 36% of them were venous ulcers. The Kappa indices (0.97 to 1.00) obtained in the comparison between the observations of the clinical nurses and the stomal therapists for all sub-scales and for total score, confirmed the tool inter rater reliability, with statistical significance ( $p < 0.001$ ). The PUSH instrument, in its Portuguese adapted version, showed to be reliable to the use in patients with chronic leg ulcers. Further studies should be conducted to evaluate its prospective performance.*

**DESCRIPTORS:** wound healing; nursing assessment; reproducibility of results

## CONFIABILIDAD INTER-OBSERVADORES DEL PRESSURE ULCER SCALE FOR HEALING (PUSH) EN PACIENTES CON ÚLCERAS CRÓNICAS EN LA PIERNA

*El objetivo del estudio fue probar la confiabilidad inter-observadores del Pressure Ulcer Scale for Healing (PUSH), en su versión adaptada al portugués, en pacientes con úlceras crónicas en la pierna. Para el análisis de concordancia se utilizó el Índice Kappa. Posterior a la aprobación del Comité de Ética, 41 pacientes con úlcera fueron examinados, siendo que 49% de las úlceras se localizaron a la derecha y 36% eran de etiología venosa. Los índices Kappa obtenidos (0,97 a 1,00), con un nivel significativo de  $p < 0,001$ , confirmaron la confiabilidad de los inter-observadores, al obtenerse un nivel de concordancia muy bueno entre el total de las observaciones realizadas por enfermeros clínicos y especialistas en estomatología (patrón-oro), dichos valores obtenidos tanto para todas las sub escalas de PUSH como para el puntaje total. Los resultados permiten concluir que el PUSH, en su versión adaptada para el portugués, mostró confiabilidad para ser utilizado en pacientes con úlceras crónicas en miembros inferiores, debiendo ampliarse el estudio para evaluar su desempeño prospectivo.*

**DESCRIPTORES:** cicatrización de heridas; evaluación en enfermería; reproducción de test

## CONFIABILIDADE INTEROBSERVADORES DO PRESSURE ULCER SCALE FOR HEALING (PUSH), EM PACIENTES COM ÚLCERAS CRÓNICAS DE PERNA

*Testar a confiabilidade interobservadores do Pressure Ulcer Scale for Healing (PUSH), em sua versão adaptada para o português, em pacientes com úlceras crônicas de perna foi o objetivo deste estudo. Para a análise de concordância, utilizou-se o índice Kappa. Após aprovação pelo Comitê de Ética, pacientes com úlceras (41) úlceras foram examinados, sendo que 49% das úlceras localizavam-se à direita e 36% eram de etiologia venosa. Os índices Kappa obtidos (0,97 a 1,00), com significância estatística ( $p < 0,001$ ), ratificaram a confiabilidade interobservadores, ao ser obtida concordância de muito boa a total entre as observações de enfermeiros clínicos e especialistas em estomaterapia (padrão-ouro), para todas as subescalas do PUSH, como para o escore total. Esses resultados permitem concluir que o PUSH, em sua versão adaptada para o português, mostrou confiabilidade para utilização em pacientes com úlceras crônicas de membros inferiores, devendo-se ampliar o estudo para avaliação de seu desempenho prospectivo.*

**DESCRIPTORES:** cicatrizaçao de feridas; avaliação em enfermagem; reprodutibilidade dos testes

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## INTRODUCTION

Health professionals have taken special interest in wound care. In this context, the nurses' role stands out, who have searched for new knowledge to base their practice.

It is known that chronic leg ulcers are part of a set of chronic diseases, whose incidence has gradually increased all over the world. Regarding the negative impact on patients' quality of life, chronic ulcers in the inferior limbs represent the typical chronic injury problem because they cause different levels of pain, affect mobility and are almost always recurrent<sup>(1-2)</sup>. Therefore, it is necessary to systemize care for these patients, in which wound assessment is a determinant factor for adequate therapy.

The wound assessment process is of essential importance for the development of a good therapeutic plan. Appropriate topical care and assessment of the lesion are only possible when the observations and results of interventions are recorded.

In a retrospective cohort study of 260 patients, the authors<sup>(3)</sup> demonstrated that the initial area of the ulcer, the presence of fibrin and the excess of exudate were some of the risk factors compromising the healing of chronic venous ulcers. Other authors<sup>(4-5)</sup> verified that chronic leg wound area reduction percentages, respectively in the first two and four weeks of treatment, were significant predictive factors of healing time.

In a previous study, the authors<sup>(6)</sup> performed the transcultural adaptation of PUSH for the Portuguese language, according to a methodology recommended in international literature, attesting interrater convergent validity and reliability of the already translated version. The results obtained for the Kappa indices (0.90 to 1.0) between the observations of nurses and stomal specialists (gold standard) for all subscales and the total score of the scale, as well as the existence of a statistically significant ( $p < 0.001$ ) positive correlation between the observations with regard to the staging of ulcers and the total score of the scale attested respectively, both measurement properties, confirming the future utilization of the adapted version of the PUSH in our area. The availability of this scale in our language, the ease and feasibility of its application

– also confirmed in the study<sup>(6)</sup> – as well as its component factors or subscales (*length and width, exudate amount and tissue type in the wound bed*) – common and essential to assess the healing process of any chronic wound – motivated the realization of this research to test its applicability in another kind of lesion: chronic ulcers of inferior limbs. In 2004, when the abstract of this study was published\*, during the 15<sup>th</sup> Biennial Congress of the World Council of Enterostomal Therapists, this was the first study with this objective, even in international literature. This study aimed to test the interrater reliability of the PUSH in its adapted version for the Portuguese language.

## PRESSURE ULCER SCALE FOR HEALING (PUSH)

The instrument *Pressure Ulcer Scale for Healing* (PUSH), used for the evaluation of the healing process of PU and intervention results, was developed and validated, in 1996, by the PUSH Task Force at NPUAP<sup>(7-8)</sup>. The PUSH involves three parameters and subscales<sup>(7)</sup>:

- *surface area of the wound*, measures the greatest length (head to toe) and the greatest width (side to side), in square centimeters. After the multiplication of the two measures in order to obtain the surface area of the wound, values that varied between 0 and  $> 24 \text{ cm}^2$  and scores that ranged from 0 to 10 are found, according to the obtained area;

- *exudate amount* present in the wound, assessed after removal of the dressing and before applying any topical agent. It is classified as *none*, *light*, *moderate* and *heavy*, which corresponds to scores from 0 (none) to 3 (heavy); and

- *tissue type* of the wound bed, defined as the types of tissue prevalent in this region, specified as: *necrotic tissue* (eschar), black, brown, or tan tissue that adheres firmly to the wound bed or ulcer edges and may be either firmer or softer than surrounding skin; *slough*, yellow or white tissue that adheres to the ulcer bed in strings or thick clumps, or is mucinous; *granulation tissue*, pink or beefy red tissue with a shiny, moist, granular appearance; *epithelial tissue*, for superficial ulcers, new pink or shiny tissue (skin) that grows in from the edges or as islands on the

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ulcer surface and *closed/resurfaced wound*, the wound is completely covered with epithelium. These tissues correspond to scores 0 (closed wound), 1 (epithelial tissue), 2 (granulation tissue), 3 (slough) and 4 (necrotic tissue).

When added up, the subscale scores generate the total score, which can range from 0 to 17. Higher scores indicate worse ulcer conditions and diminishing scores indicate improvement in the wound healing process. Therefore, by measuring only three variables, the instrument PUSH generates scores whose magnitude and direction can describe the condition and evolution of wounds<sup>(7)</sup>. Besides the three parameters, the instrument contains operational definitions for each, a table where the scores of each parameter and the total score are registered according to the date. There is also a chart to visualize the evolution of the total scores and an instruction sheet for the evaluator.

## METHOD

This methodological study aimed to evaluate the interrater reliability of the PUSH scale, applied to people with chronic leg ulcers.

*Reliability* is defined as the degree of coherence and precision by which a certain instrument measures the attribute it is proposed to measure<sup>(9)</sup>. *Interrater reliability* analyzes the degree of concordance or the consistence of the *performance* of two or more observers in recording the same responses at the same time<sup>(9)</sup>. In this study, this property was verified by comparing observations made by stomal therapy specialist nurses (ST) and clinical nurses, when using PUSH simultaneously and independently.

PUSH was clinically applied at the outpatient units of five public hospitals in the City of São Paulo, to adult patients with chronic leg ulcers (venous, arterial, mixed, diabetic and others), independently of the conditions they were in and/or treatment protocols used.

Before starting the data collection, the research project was approved by the Review Board of the University of São Paulo School of Nursing as well as by the hospital services responsables. The data collection was carried out by four clinical nurses and three STs – responsible for the services where the data were collected and supervisors of the nurses'

clinical practice, during specialized education in stomal therapy. They comprised, respectively, two groups: nurses and stomal therapy specialists (ST). The clinical nurses received previous technical support, related to the prevention, evaluation and topical and systemic treatment of acute and chronic wounds, during the Specialization Course in Stomal Therapy Nursing; the STs' observations were considered as the gold standard for statistical comparison.

All adult patients with chronic leg ulcers, who comprised the convenience sample in this study, were present at the outpatient clinics during the data collection period and chosen by the STs in the routine care process. Although it was a convenient sample, a minimum of 30 lesions was established for the viability of the study – ten observations for each evaluated parameter (three subscales) – based on the determination recommended in the transcultural adaptation and validation method of PUSH, used in the previous study<sup>(6)</sup>. When contacted, the patients were duly informed about the study goals and procedures, followed by the signing of the free and informed consent term, when they accepted to participate in the study.

Data were collected during topical wound treatment. Each assessment was performed simultaneously and independently by three observers: one ST and two nurses, generating, at the end, three assessments of each lesion. First, the patient's inferior limbs were meticulously examined, aiming to identify the number and location of the chronic wounds. In case of patients with more than one ulcer, each ulcer was considered as an independent case. After this identification, the wound dressing was removed, proceeding with the visual exam, and the amount of exudate and length and width of the wound were evaluated and recorded, according to the procedures described in the instrument. After the cleansing the wound with 0.9% PS, the third instrument item, that is, the tissue type present in the wound bed was evaluated.

For data collection, the PUSH, in its adapted version for the Portuguese language<sup>(6)</sup>, was only modified by replacing the term "pressure ulcers" by "chronic leg ulcers", whenever possible. In addition, two questions were included about the kind and location of the wound.

## Data Analysis

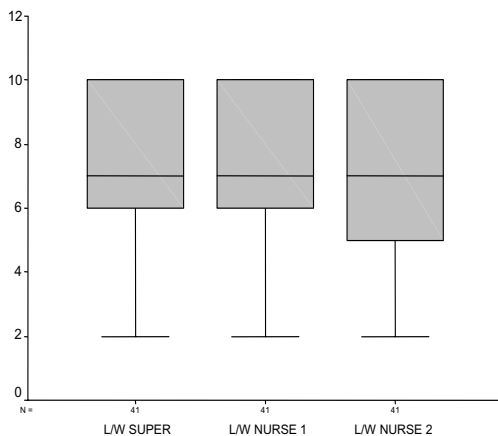
The data collected in the completion of the PUSH, besides the type and location of the chronic

ulcer, were submitted to descriptive analysis, aiming to characterize the assessed ulcers. To test interrater reliability (ST and Nurse 1 and 2), the Kappa ( $k$ ) agreement measure was used. For this study, the same categorization for Kappa coefficients was adopted as used in the previous study (6):  $k = 1.0$  as total agreement and  $0.81 = k = 0.99$  for very good agreement. The Kappa coefficient was always calculated in relation to the ST's observation.  $P$ -value under 0.05 was used for statistical significance. SPSS for Windows version 10.0 was used for data processing.

## RESULTS

Forty-one ulcers were analyzed and comprised the study sample: 36% were vasculogenic of venous origin, 15% arterial, 15% mixed, 5% diabetic and 29% did not have a defined diagnosis. A total of 49% of the lesions were located on the right inferior limb.

Next, the comparative box-plots (Figures 1 to 4) of the subscores of the three PUSH parameters are presented, besides the total score, for the three evaluators – ST and nurses 1 and 2 – related to interrater reliability analyses. The respective Kappa and  $p$  coefficients are always presented below the figures.

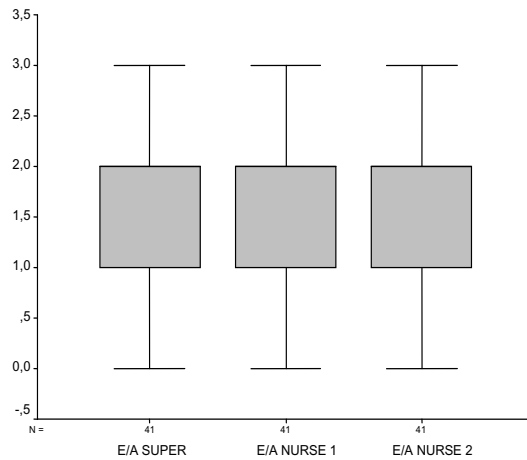


Kappa ST x Nurse 1 = 1,00 ( $p < 0,001$ )  
Kappa ST x Nurse 2 = 0,97 ( $p < 0,001$ )

Figure 1 – Comparative Box-plot of the sub-scores of the length x width variable. São Paulo, 2003

Figure 1 shows that the nurses presented total and very good agreement levels, respectively, in

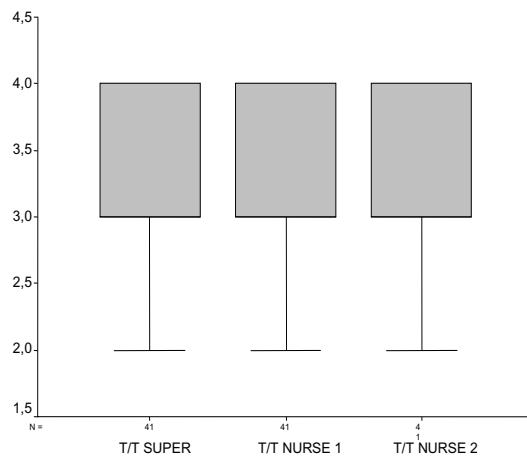
relation to the observations made by the ST ( $p < 0.001$ ). All observers equally measured an average area of  $7.0 \pm 2.7 \text{ cm}^2$ .



Kappa ST x Nurse 1 = 1,00 ( $p < 0,001$ )  
Kappa ST x Nurse 2 = 1,00 ( $p < 0,001$ )

Figure 2 – Comparative *box-plot* of the sub-scores of the *exudates amount* variable. São Paulo, 2003

For exudate amount (Figure 2), total agreement among all observers' answers was verified ( $k=1,00$  e  $p < 0,001$ ). Thus, the mean score obtained for all was  $1.83 \pm 0.70$ .



Kappa ST x Nurse 1 = 1,00 ( $p < 0,001$ )  
Kappa ST x Nurse 2 = 1,00 ( $p < 0,001$ )

Figure 3 - Comparative *box-plot* of the sub-scores of the *tissue type* variable. São Paulo, 2003

Figure 3 shows, again, statistically significant ( $p < 0.001$ ) total agreement ( $k=1.00$ ) among all observers' answers (ST and nurses 1 and 2), with an average score of  $3.20 \pm 0.75$  for all.

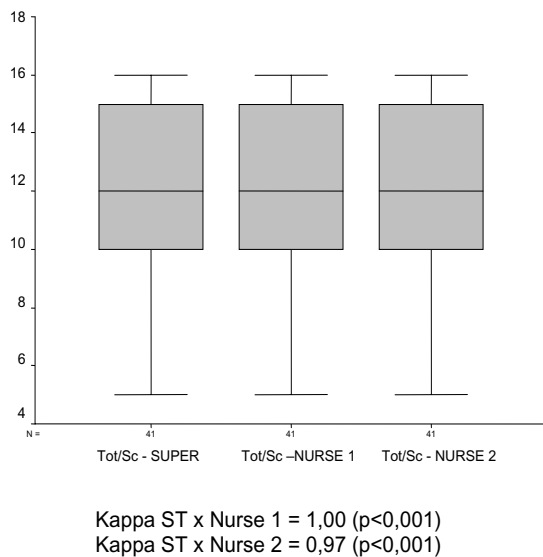


Figure 4 - Comparative *box-plot* of the sub-scores of the *total score* variable. São Paulo, 2003

Levels of total and very good agreement were verified between the responses of Nurse 1 and ST and Nurse 2 and ST, respectively, both statistically significant ( $p < 0.001$ ). Nurse 1 and ST and nurse 2 attributed average scores of  $12.0 \pm 3.2$  e  $12.0 \pm 3.3$ , respectively.

## DISCUSSION

Due to the need for a precise and practical method of monitoring the clinical evolution and healing of pressure ulcers, the *National Pressure Ulcer Advisory Panel* (NPUAP) developed the *Pressure Ulcer Scale for Healing* (PUSH)<sup>(7-8,10)</sup>, whose main characteristic is its easy application<sup>(11)</sup>. Another author<sup>(12)</sup> considers that the greatest utility of PUSH is the assessment of wound healing over a long period of time, which permits monitoring global healing results in a wound treatment program.

The ease and feasibility of its application, as well as its component factors, present in the healing assessment of any chronic wound, made the authors of this project adapt and validate PUSH to the Brazilian culture and expand the study of its application to other kinds of chronic wounds, such as leg injuries.

Since PUSH is a clinical assessment instrument and, therefore, depends on the direct observation and recording of variables, at the least, it needs to be tested to verify if there is interrater reliability<sup>(9)</sup>, which was confirmed in this research. The high levels of – total and very good – agreement between the answers of the nurses and the stomal

specialist, all with statistical significance of 1%, ratified the interrater reliability of the instrument for use with this kind of chronic lesion as well, which is different from the pressure etiology.

In other previous studies<sup>(6,10,12-13)</sup>, the authors had already tested the sensibility and validity of the PUSH, though always applied to pressure ulcers. Some of these authors<sup>(10)</sup> confirmed that the instrument meets the researchers' requirements, although including only three variables, and recommend that its analysis must occur prospectively, in a minimum period of two weeks.

More recently, only one prospective study was found<sup>(14)</sup> about the use of PUSH in venous chronic ulcers. Outpatients with 27 lesions, followed by two specialist nurses, obtained important changes in the total average scores of the scale: from 12, in the initial assessment, to 9 and 8, respectively, at the end of the first and second months of follow-up. A total of 23 patients reached total healing after two months of follow-up. The authors concluded that the instrument revealed to be effective for the evaluation of chronic venous ulcers – the most frequent ones among chronic leg ulcers, also in our research.

A similar study discusses the adaptation of the *Pressure Sore Status Tool* (PSST) for the evaluation of chronic leg ulcers. When tested, the instrument that originated from it – *Photographic Wound Assessment Tool* (PWAT) – also obtained a score of  $>0.8$  for interrater reliability, confirming the possibility of its future use in other chronic ulcers<sup>(15)</sup>. Both studies confirm some authors' beliefs, who indicate the use of the same instruments to assess different kind of lesions, provided that they include common indices or variables for analysis.

Some study limitations should be indicated. Besides the reduced number of cases, it must be taken into account that the nurses who participated in the study received previous theoretical instruction regarding care of people with wounds. Although this aspect is not established by NPUAP as a requirement for using PUSH, the previous instruction may have favored the good performance of the scale. On the other hand, the lack of literature regarding the use of PUSH to assess other kinds of ulcers makes the discussion of findings more difficult.

## FINAL CONSIDERATIONS

In this study, in which the version of the *Pressure Scale for Healing* (PUSH) adapted to

Portuguese was used, modifying only the expression "pressure ulcers" by "chronic leg ulcers", the interrater reliability of the instrument was confirmed by the obtained Kappa coefficients, which ranged from 0.97 to 1.00. That is, levels of agreement between the observations made by the clinical nurses and stomal specialists ranged from very good to total for all the subscales and for the total score of PUSH.

Since the acronym PUSH refers to pressure ulcers, once the use of this instrument has been confirmed to assess chronic ulcers, we suggest that its name be changed to *Chronic Ulcer Scale for Healing*, which would generate the acronym *CUSH*. However, this change will need the approval of NPUAP. The acronym and title of the already adapted scale, in English – as proposed in previous study<sup>(6)</sup> – were maintained due to the need of its recognition, in

international communication, with standardized acronyms.

We also recommend prospective studies to better assess the performance of the scale, especially with regard to the analysis of the healing process – for which this instrument was designed – in chronic leg wounds, as well as with nurses not previously trained. We inform that prospective studies to evaluate the performance of PUSH, both in pressure ulcers and those of leg, are already being concluded.

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