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Translation and cultural adaptation of the Brazilian Portuguese version of the Behavioral Pain Scale

Tradução e adaptação cultural da versão portuguesa (Brasil) da escala de dor Behavioural Pain Scale

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ABSTRACT

Objective: The objective of this study was to translate and culturally adapt the Behavioral Pain Scale to Brazilian Portuguese and to evaluate the psychometric properties of this scale.

Method: This study was conducted in two phases: the Behavioral Pain Scale was translated and culturally adapted to Brazilian Portuguese and the psychometric properties of this scale were subsequently assessed (reliability and clinical utility). The study sample consisted of 100 patients who were older than 18 years of age, admitted to an intensive care unit, intubated, mechanically ventilated, and subjected or not to sedation and analgesia from July 2012 to December 2012. Pediatric and non-intubated patients were excluded. The study was conducted at a large private hospital that was situated in the city of São Paulo (SP).

Results: Regarding reproducibility, the results revealed that the observed agreement between the two evaluators was 92.08% for the pain descriptor "adaptation to mechanical ventilation", 88.1% for "upper limbs", and 90.1% for "facial expression". The kappa coefficient of agreement for "adaptation to mechanical ventilation" assumed a value of 0.740. Good agreement was observed between the evaluators with an intraclass correlation coefficient of 0.807 (95% confidence interval: 0.727-0.866).

Conclusion: The Behavioral Pain Scale was easy to administer and reproduce. Additionally, this scale had adequate internal consistency. The Behavioral Pain Scale was satisfactorily adapted to Brazilian Portuguese for the assessment of pain in critically ill patients.

Keywords: Pain measurement; Respiration, artificial; Translating; Intensive care units

INTRODUCTION

Pain during hospitalization frequently occurs and is related to the severity of disease and necessary treatment procedures, which are often invasive and aggressive, especially in intensive care units (ICU).[1] Communication of the pain experience to health professionals is critical to understanding pain symptoms, implementing analgesic regimens, and evaluating therapeutic efficacy. Therefore, pain assessment tools that utilize a universal language about the painful experience are urgently needed.[2]

The most widely used instruments for assessing pain in adults are based on self-reporting, which is difficult to evaluate in patients who have cognitive deficits or who require mechanical ventilation.[3-5] A common problem in ICU is the large number of critically ill patients who are unconscious and under

mechanical ventilation. These patients are unable to verbally express their pain in an effective way because of the underlying disease or the use of sedatives with or without neuromuscular blockade.[6] Several scales have been developed to assess pain in adult patients who are under mechanical ventilation in the ICU, including the Behavioral Pain Scale (BPS)[7] and the Critical-Care Pain Observation Tool (CPOT);[8] however, further studies are needed to evaluate the psychometric properties of these scales. A previous review recommended the use of the BPS and the CPOT when these scales were compared with the Behavioral Pain Rating Scale (BPRS), the Pain Assessment and Intervention Notation Algorithm, the Nonverbal Pain Scale (NVPS), and the Pain Behavior Assessment Tool.[9] In another analysis of the BPS, the CPOT, and the NVPS scales, the BPS was recommended because this scale was tested in a larger group of patients and had good validity and reliability in three studies.[10]

Among the scales that have been developed to assess pain in ICU patients under mechanical ventilation, the BPS has garnered consensus for use in clinical practice.[11] The BPS was one of the first to be used for the measurement of pain in patients who were unable to verbally communicate, and the BPS is currently one of the most studied pain assessment scales.[10,12]

The BPS is used to assess pain in sedated and unconscious patients under mechanical ventilation. This scale consists of the following three aspects: facial expression, body movements, and tolerance to mechanical ventilation. The intensity of pain is scored on a scale of 3 (no pain) to 12 (highest pain intensity).[12] Each indicator is categorized into four descriptions of behavior that range from no pain (a score of 1) to a maximum amount of pain (a score of 4). The total score ranges from 3 (no pain) to 12 (maximum pain).[10] The BPS can be completed in approximately 2-5 minutes.[12,13]

This study aimed to translate and culturally adapt the BPS to Brazilian Portuguese and to evaluate the psychometric properties of this scale (reliability, inter-evaluator agreement, and clinical utility).

METHODS

This study was performed in two phases: the translation and cultural adaptation of the Portuguese version of the BPS scale for Brazil (Phase I) and the study of the psychometric properties of this scale (reliability and clinical utility) (Phase II). This study was conducted on 100 patients in the ICU who were intubated, mechanically ventilated,

and sedated. The inclusion criteria were adult patients on mechanical ventilation with and without sedation and analgesia. No exclusion criteria were used in this study.

This study was conducted in an ICU at a large private hospital in São Paulo (SP). A form was structured using demographic and clinical data and the BPS scale, which was subsequently translated and culturally adapted for application in this study. This form was administered to the eligible patients for data collection from July 2012 to December 2012. The translation and cultural adaptation process followed data collection.

In Phase I, the scale was translated independently by two native Portuguese translators (T1 and T2) after authorization by the author of the scale. In Phase II, a board of seven experts (six nurses and one physiotherapist) who cared for the ICU patients and had experience in pain assessment validated a consensus version (T3) of the scale. This consensus validation was based on the semantic and cultural aspects of the scale after the two translations (T1 and T2). In Phase III, this version was independently translated into English by two native American and Canadian English translators. In Phase IV, a new board that was composed of the same professionals defined a consensus version, which was compared with the original version of the scale to obtain equivalence (T4). Finally, Phase V consisted of a training period with the evaluators, followed by a pilot test. Next, the test scale (pilot) was administered to the patients. The final version (T5) was completed with minor adjustments. The Brazilian version of the BPS scale is shown in table 1.

Table 1 - Final Brazilian Portuguese version of the Behavioral Pain Scale

Item	Description	Score
Facial expression	Relaxed	1
	Partially tense (e.g., lowers the eyebrow)	2
	Fully tense (e.g., closes the eyes)	3
	Grimaces: the presence of a perilabial groove, a furrowed brow and occluded eyelids	4
Upper limbs	Motionless	1
	With partial flexion	2
	With full flexion and finger flexion	3
	Permanent retraction: fully contracted	4
Adaptation to mechanical ventilation	Tolerates movements	1
	Coughs with movements	2
	Fights with the fan	3
	Unable to control mechanical ventilation	4
Total		

The research project was approved by the Committee of Ethics and Research of *Hospital Alberto Einstein* under approval number 113,605, and the study was started shortly thereafter. Data collection was performed after all of the relatives of the patients signed the Informed Consent Form (ICF).

The descriptive analysis of the categorical variables was performed using the absolute, relative, and continuous frequencies and the minimum, maximum, first quartile, and third quartile location measures. A normal distribution was not observed according to the Kolmogorov-Smirnov test.

The agreement between the two evaluators (inter-evaluators) was performed using Cohen's kappa coefficient for the ordinal variables. These values were assessed using the following criteria: 0.41-0.60, moderate; 0.61-0.80, substantial; and 0.81-1.0, excellent.[14] The intraclass correlation coefficient (ICC) was used to quantify the agreement of the total score of the scale. Good agreement was considered at values higher than 0.75.[15] The Kaiser-Meyer-Olkin (KMO) test was used to assess the appropriateness of the factorial analysis. Double-entry tables and Fisher's exact tests were used to assess the relationship between pain intensity and the use of analgesia or sedation. The data were analyzed using Statistical Package for the Social Sciences (SPSS), version 17.0, for Windows®.

RESULTS

This study enrolled a total of 100 patients who were older than 18 years of age, intubated for mechanical ventilation, and admitted to a general ICU from July 2012 to December 2012. Overall, 61% of the patients were male, and the average age of the patients was 63 years. In addition, 75% of the patients had a higher education. The length of ICU stay ranged from 1 day to 32 months with an average of 4 months. The type of sedation and analgesia and the reason for admission are detailed in table 2.

Among the pain descriptors in the scale, "facial expression" was the only item that was evaluated as classification 4 (severe pain). This item was rated with a pain intensity score of 2 in approximately 25% of the cases. The items "upper limbs" (less pain, 88.1% for evaluator 1 and 84.2% for evaluator 2) and "adaptation to mechanical ventilation" (96% for the two evaluators) were mostly rated a score of 1. These results indicate that "facial expression" was classified as indicating stronger pain (Table 3).

Table 2 - Distribution of the patient characteristics, including age, length of hospital stay, gender, analgesia, and sedation

Variables	Results
Age (years)	63 (18-94)
Length of hospital stay (months)	4 (1-32.4)
Reason for hospitalization	
Respiratory diseases	30 (30)
Cardiovascular diseases	16 (16)
Kidney disease	11 (11)
Gastrointestinal and infectious diseases	9 (9)
Other conditions	34 (34)
Sex	
Female	39 (39)
Male	61 (61)
Use of sedation	
Intermittent	47 (46.5)
Continuous	54 (53.5)
Use of analgesia	
Intermittent	44 (43.6)
Continuous	56 (56.4)
Sedation (Ramsay)	
Score 4-5	80 (80)
Score 3	20 (20)

The results are expressed as the number (%) and the median (25%-75%).

Table 3 - The frequency of pain descriptors as obtained by two evaluators

Assessment of the pain intensity	Evaluator	1	2	3	4	Total
Facial expression	1	71 (70.3)	28 (27.7)	1 (1.0)	1 (1.0)	101 (100)
	2	74 (73.3)	25 (24.8)	2 (2.0)	0 (0.0)	101 (100)
Upper limbs	1	89 (88.1)	10 (9.9)	2 (2.0)	0 (0.0)	101 (100)
	2	85 (84.2)	16 (15.8)	0 (0.0)	0 (0.0)	100 (100)
Adaptation to mechanical ventilation	1	97 (96.0)	4 (4.0)	0 (0.0)	0 (0.0)	101 (100)
	2	97 (96.0)	4 (4.0)	0 (0.0)	0 (0.0)	101 (100)

The results are expressed as the number (%).

The mean pain intensity score according to the scale was 3.5 (mild pain), which was obtained by evaluator 1 and evaluator 2. The total score ranged from 3-8 (mild to moderate pain) out of a total range of 3-12. Approximately 65% of the patients had mild pain intensity (3). However, 32% of the patients had pain intensity scores of 4 and 5 (moderate), and 3% of the patients had scores of 6 or 8.

A factor with an eigenvalue greater than 1 (eigenvalue =1.532) and an explained variance of 51.08% was found in the main components analysis. The scale indicator "facial expression" had the strongest correlation with the

factor (0.748), and "adaptation to mechanical ventilation" had the lowest correlation (0.039). The KMO test was used to assess the appropriateness of the factorial analysis, which presented a value of 0.509.

The scale had good internal consistency (a Cronbach's alpha value of 0.501). The indicator "upper limbs" was best correlated with the scale total (0.498). In contrast, "adaptation to mechanical ventilation" was poorly correlated with the scale total (0.070).

The agreement between the two evaluators was 98.0% for "adaptation to mechanical ventilation", 88.1% for "upper limbs", and 90.1% for "facial expression". The kappa coefficient of agreement for "adaptation to mechanical ventilation" assumed a value of 0.740. The calculation of the kappa agreement coefficient for the other two items was not possible because a different number of categories were classified by the evaluators. Good agreement was found between the evaluators for the total score of the scale with an ICC of 0.807 (95% confidence interval, CI: 0.727-0.866) (Table 4).

Regarding the total score of the scale, the two evaluators classified 60.4% of the cases as having pain intensity scores of 3, 14.9% with a score of 4, 5.9% with a score of 5, and 1.0% with a score of 6 or 8 (Table 5). The inter-evaluator agreement was 82.2%, which indicated good agreement between the two evaluators. In addition to the ICC, the kappa coefficient was calculated for the total score, which resulted in a value of 0.731 (95% CI: 0.40-1.00). This finding suggested good agreement and reproducibility (Table 5).

DISCUSSION

This study demonstrated that the BPS scale is reliable with a total variance of 51.08% and good agreement and reproducibility between the evaluators, which is similar to other studies.[6,12] The range of the kappa agreement coefficient was 95%.

Less than 50% of practitioners assess pain.[16] The evaluation of pain and sedation in the ICU is particularly complex because patients are often incapable or unable to verbally communicate with health professionals[17,18] for several reasons, including tracheal intubation, altered consciousness, sedation, and the effect of medications.[11] Patients who undergo mechanical ventilation should be assessed for pain and sedation to optimize the dose of medication. This evaluation aims to reduce time on mechanical ventilators and the length of ICU stay.[19]

In this study, 64% of the patients under sedation (55%) had no pain, and 36% had mild pain according to the BPS scale. In a recent study, a lack of instruments for the measurement of pain and analgesia protocols was observed in a care unit for trauma patients. This study found that 48% of the patients did not receive analgesic treatment for up to 3 hours after admission.[20]

The analysis of facial expression provides valid, sensitive, and specific information regarding the nature and intensity of pain, thereby enabling effective communication between the patient and their caretakers.[21]

The noxious response due to pain is considered unnecessary; therefore, the control and relief of pain should be a top priority in patient care. However, despite the unfavorable impact of pain, including patient suffering and the consequences of this suffering, treating pain in critically ill patients remains a major challenge.[21] It is often difficult to identify pain in these patients. Several national initiatives have aimed to institute pain as the fifth vital sign in hospitals; however, health professionals tend to be passive when in daily contact with patients, which has led to the subidentification and underreporting of pain.[17] The indicator "upper limbs" was best correlated with the scale total (0.498), which has been previously confirmed by other studies.[6,19]

Good internal consistency (Cronbach's alpha value =0.501) was detected in the translation and cultural

Table 4 - The analysis of the Behavioral Pain Scale according to the agreement between the evaluators regarding the pain evaluation items

Evaluator 1	Evaluator 2 Facial expression			Total	Evaluator 2 Upper limbs		Total	Evaluator 2 Mechanical ventilation		Total
	1	2	3		1	2		1	2	
1	68 (67.3)	3 (3)	0 (0)	71 (70.3)	82 (81.2)	7 (6.9)	89 (88.1)	96 (95)	1 (1)	97 (96)
2	6 (5.9)	22 (21.8)	0 (0)	28 (27.7)	3 (3)	7 (6.9)	10 (9.9)	1 (1)	3 (3)	4 (4)
3	0 (0)	0 (0)	1 (1)	1 (1)	0 (0)	2 (2)	2 (2)			
4	0 (0)	0 (0)	1 (1)	1 (1)						
Total	74 (73.3)	25 (24.8)	2 (2)	101 (100)	85 (84.2)	16 (16)	101 (100)	97 (96)	4 (4)	101 (100)

The results are expressed as the number (%).

Table 5 - The analysis of the Behavioral Pain Scale according to the agreement between the evaluators

Evaluator 1	Evaluator 2				Total
	3	4	5	6 or 8	
3	61 (60.4)	6 (5.9)	0 (0)	0 (0)	67 (66.3)
4	4 (4)	15 (14.9)	3 (3)	0 (0)	22 (21.8)
5	1 (1)	2 (2)	6 (5.9)	0 (0)	9 (8.9)
6 or 8	0 (0)	0 (0)	2 (2)	1 (1)	2 (2)
Total	66 (65.3)	23 (22.8)	11 (10.9)	1 (1)	101 (100)

The results are expressed as the number (%). The highlighted values show the observed agreement between the evaluators (82.2%), which indicates good conformity.

adaptation of the BPS, and good agreement was found in the total score of the scale (82.2%), which is consistent with previous studies.[20]

The use of a specific tool to assess pain in critically ill patients may aid in the identification and treatment of pain, thereby providing nursing staff a tool for implementing pain as the fifth vital sign and for developing analgesia protocols. Because the BPS is a behavioral scale, this scale requires team building and training and dependable evaluators; however, this scale is easy and quick to administer and may be used in clinical practice. The patients in this study were under the influence of sedatives, which may be considered a limitation because the results of the pain assessment may have been influenced.

CONCLUSION

The Behavioural Pain Scale was easy to administer and reproduce. Adequate internal consistency was observed in this study; therefore, this scale was satisfactorily adapted to Brazil for the assessment of pain in critically ill patients.

Considering the lack of a specific scale to assess pain in this population, the Behavioural Pain Scale should greatly aid in the early identification of pain and, therefore, the early treatment of pain in these critical patients.

RESUMO

Objetivo: Realizar tradução e adaptação cultural para português do Brasil da escala de dor *Behavioural Pain Scale*, e avaliar suas propriedades psicométricas.

Método: Estudo ocorreu em duas fases: versão portuguesa da escala *Behavioural Pain Scale* para o Brasil e estudo das suas propriedades psicométricas (confiabilidade e utilidade clínica). A amostra foi constituída por 100 pacientes maiores de 18 anos no decorrer do segundo semestre de 2012. Como critério de inclusão, deveriam estar internados em unidades de terapia intensiva, intubados, sob ventilação mecânica, fazendo uso ou não de sedação e analgesia. Foram excluídos pacientes pediátricos e que não estavam intubados. O estudo foi realizado em um hospital privado de grande porte, situado na cidade de São Paulo (SP).

Resultados: Os resultados mostraram que, em relação à reprodutibilidade, a concordância observada entre os dois avaliadores foi 92,08% para "Adaptação à ventilação mecânica", 88,1% para "Membros superiores" e 90,1% para "Expressão facial". O coeficiente de concordância Kappa para "Adaptação à ventilação mecânica" assumiu valor 0,740. Observamos boa concordância entre os avaliadores, com um coeficiente de correlação intraclasse de 0,807 (intervalo de confiança de 95%: 0,727-0,866).

Conclusão: A escala *Behavioural Pain Scale* mostrou ser de fácil aplicação e reprodutibilidade, assim como teve adequada consistência interna, sendo satisfatória a adaptação da escala *Behavioural Pain Scale* para o Brasil para avaliação da dor em pacientes graves.

Descritores: Medição da dor; Respiração artificial; Tradução; Unidades de terapia intensiva

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