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RESEARCH PAPER (ORIGINAL)
ARTIGO DE INVESTIGAÇÃO (ORIGINAL)

Psychometric study of the Nursing Care Scale for Pain Management

Estudo psicométrico da Escala de Práticas de Enfermagem na Gestão da Dor

Estudio psicométrico de la Escala de Prácticas de Enfermería en la Gestión del Dolor

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Abstract

Background: Pain is inefficiently managed by nurses in part due to the lack of tools capable of measuring and monitoring such practice.
Objective: To assess the psychometric properties of the Nursing Care Scale for Pain Management.
Methodology: This descriptive correlational study assessed internal consistency using Cronbach's alpha coefficient and confirmatory factor analysis using the covariance matrix - maximum likelihood algorithm.
Results: The study involved 260 nurses with a mean age of 35.42 years, 78.5% of whom were women. After the refinement of the scale, the overall internal consistency was $\alpha = 0.95$, and the score by factors was: initial assessment $\alpha = 0.85$; Planning $\alpha = 0.76$; Implementation of non-pharmacological interventions $\alpha = 0.80$; Educating the person with pain $\alpha = 0.89$; Registration $\alpha = 0.76$; Reassessment $\alpha = 0.81$, and Implementation of pharmacological interventions $\alpha = 0.70$. The highest mean values of the overall scores are related to pharmacological interventions (3.13 ± 0.60).
Conclusion: The scale is a reliable and valid tool for assessing the pain management practices of Portuguese nurses. Most nurses apply pharmacological interventions to manage the pain endured by patients.

Keywords: pain; pain management; nursing care; psychometrics

Resumo

Enquadramento: A dor é gerida de forma ineficaz pelos enfermeiros, em parte pela inexistência de um instrumento capaz de medir e monitorizar esta prática.
Objetivo: Avaliar as propriedades psicométricas da Escala de Práticas de Enfermagem na Gestão da Dor.
Metodologia: Este estudo descritivo-correlacional avaliou a consistência interna através do alfa de Cronbach e a análise fatorial confirmatória através da matriz de covariâncias - algoritmo da máxima verosimilhança.
Resultados: Foram incluídos 260 enfermeiros com uma média de 35,42 anos, sendo 78,5% mulheres. Após o refinamento da escala, a consistência interna global foi de $\alpha = 0,95$ e por fatores de: Avaliação inicial $\alpha = 0,85$; Planeamento $\alpha = 0,76$; Execução de intervenções não farmacológicas $\alpha = 0,80$; Ensino à pessoa com dor $\alpha = 0,89$; Registo $\alpha = 0,76$; Reavaliação $\alpha = 0,81$, e Execução de intervenções farmacológicas $\alpha = 0,70$. Os valores médios mais elevados dos *scores* globais são relativos às intervenções farmacológicas (3,13 ± 0,60).
Conclusão: A escala é fiável e válida na avaliação das práticas de gestão da dor em enfermeiros portugueses. Os enfermeiros aplicam maioritariamente as intervenções farmacológicas para gerir a dor dos utentes.

Palavras-chave: dor; manejo da dor; cuidados de enfermagem; psicometria

Resumen

Marco contextual: Los enfermeros gestionan de manera ineficaz el dolor, en parte debido a que no disponen de un instrumento capaz de medir y monitorear esta práctica.
Objetivo: Evaluar las propiedades psicométricas de la Escala de Prácticas de Enfermería en la Gestión del Dolor.
Metodología: Este estudio descriptivo-correlacional evaluó la consistencia interna a través del alfa de Cronbach y el análisis factorial confirmatorio a través de la matriz de covarianza - algoritmo de máxima verosimilitud.
Resultados: Se incluyeron 260 enfermeros con una edad media de 35,42 años, de los cuales el 78,5% eran mujeres. Tras el perfeccionamiento de la escala, la consistencia interna global fue $\alpha = 0,95$ y por factores de: Evaluación inicial $\alpha = 0,85$; Planificación $\alpha = 0,76$; Ejecución de intervenciones no farmacológicas $\alpha = 0,80$; Enseñanza a la persona con dolor $\alpha = 0,89$; Registro $\alpha = 0,76$; Reevaluación $\alpha = 0,81$, y Ejecución de intervenciones farmacológicas $\alpha = 0,70$. Los valores medios más altos de las puntuaciones globales están relacionados con las intervenciones farmacológicas (3,13 ± 0,60).
Conclusión: La escala es fiable y válida en la evaluación de las prácticas de la gestión del dolor en enfermeros portugueses. La mayoría de los enfermeros aplican intervenciones farmacológicas para controlar el dolor en los pacientes

Palabras clave: dolor; manejo del dolor; atención de enfermería; psicometría

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Introduction

Pain is an universal experience of every human being since we all endure pain at some point in life (Larner, 2014). Despite this inevitability, not all people stand pain and refer to it in the same way, the universality of painful experience thus encompassing the multiple facets of human subjectivity (Larner, 2014). For this reason, and primarily due to its subjectivity, it is assumed that the most reliable method for measuring pain should be self-report, enabling the patient himself to assess and characterize his/her pain (Barr et al., 2013).

Due to the high prevalence of pain, it is necessary to implement measures for its management, and it is essential to adequately train the professionals who deliver care to the person with pain (Hong & Lee, 2014; Kizza, Muliira, Kohi, & Nabirye, 2016; Andersson et al., 2017). However, many patients still have their pain managed inefficiently, mainly due to non-compliance with the recommendations for pain management practices and even to inadequate training (Hong & Lee, 2014; Kizza et al., 2016; Andersson et al., 2017).

As pain has not been given the right priority and health professionals are still unable to manage it well, the purpose of this study is all the more crucial. The study sought to assess the psychometric properties, namely the factor structure and internal consistency of the Nursing Care Scale for Pain Management (António, 2017). This scale is a self-administered instrument consisting of 68 items. It was developed in Portugal in 2017 and includes a two-part questionnaire, the first consisting of social-demographic questions and the second part is the scale *per se*. It is used for measuring and monitoring such practices in view of implementing measures for improving the outcomes.

Background

Pain has different presentations, and it can disappear quickly, last for months, years, or become recurrent. It can disrupt a person's daily routine slightly or make one's lifestyle completely unviable (Ribeiro, 2013). In this sense, pain is fundamentally a complex and multidimensional process, an experience that involves physical, psychological, emotional, and social-cultural factors (Ribeiro, 2013; Glowacki, 2015).

Pain is a highly prevalent phenomenon, and studies have shown that it is common among hospitalized patients, mainly due to lack of adherence to pain management recommendations and even to inadequate training of health professionals who manage the person with pain (Hong & Lee, 2014; Kizza et al., 2016; Andersson et al., 2017). Therefore, it is urgent to improve pain management, which involves not only the development of new drugs or technologies but also the use and enhancement of existing knowledge of health professionals by the institutions (Kizza et al., 2016; Andersson et al., 2017).

Nurses' role in pain management is crucial and includes its assessment, the use of pharmacological and non-pharmacological means suitable for each case. Examples of non-drug measures include the use of heat and cold, distraction, massage, relaxation, promotion of comfort, therapeutic touch, among others (Drake & Williams, 2017), It is recommended that pain be systematically monitored to ensure proper pain management. However, nurses do not always assess it adequately, as they base themselves on personal pain *estimates* (Drake & Williams, 2017). Consequently, some studies assess nurses' level of knowledge about the principles of pain management and assessment only as adequate (Kizza et al., 2016). Even so, several studies have shown that the adoption of pain management guidelines and continuous training have improved pain management and assessment practices (Hong & Lee, 2014; Kizza et al., 2016; Andersson et al., 2017).

Resorting to an instrument for measuring and monitoring such practices will help make reality more objective and implement targeted strategies that can minimize pain.

Research question

Does the Nursing Care Scale for Pain Management have adequate psychometric properties for assessing such practice?

Methodology

A psychometric descriptive-correlational study was conducted, based on cross-sectional data collection in a non-probabilistic convenience

sample in two adult emergency departments in central Portugal. Only nurses who worked in this context and did not hold management positions were included.
All participants signed the informed consent form before performing any procedure. The approval was obtained through the Opinion of the Ethics Committee of the Health Sciences Research Unit of the Nursing School of Coimbra (No. 162-05/2013) and the Opinion of the Tondela Viseu Hospital Center (No. 02/05/2018).

Data collection tool
The Nursing Care Scale for Pain Management is a self-administered instrument composed of 68 items, divided into two parts: the first part includes questions about the social and professional status (age, gender, academic qualifications, length of professional experience, length of professional practice in the emergency department); the second part includes questions for assessing nursing practices implemented for pain management in the following domains: initial assessment (items 1-28), planning (items 31-37), implementation of pharmacological (items 38-40) and non-pharmacological (items 41-52) interventions, reassessment (items 53-54; 57-60), recording (items 29-30; 55-56), and educating the person with pain (items 61-68). These items are assessed using a Likert scale that measures frequency with the following scores: (0) *I don't know/no opinion*; (1) *never*; (2) *rarely*; (3) *often*; (4) *always* (António, 2017).
The process of constructing this scale was based on a semantic and content analysis by a panel of experts with subsequent implementation of a pre-test (António, 2017).

Statistical techniques
Descriptive and correlational analyses and an internal consistency study were performed using IBM SPSS Statistics software, version 24.0, by determining Pearson's correlation coefficient and Cronbach's alpha. To analyze the internal consistency, the following reference values were considered: >0.9 *very good*; 0.8-0.9 *good*; 0.7-0.8 *average*; 0.6-0.7 *reasonable*; 0.5-0.6 *poor*; <0.5 *unacceptable* (Marôco, 2014). The Pearson's correlation coefficient assumed the following associations: $r < 0.2$ *very low*; $0.2 \leq r \leq 0.39$ *low*; $0.4 \leq r \leq 0.69$ *moderate*; $0.7 \leq r \leq 0.89$ *high*; $0.9 \leq r \leq 1$ *very high* (Marôco, 2014).
The AMOS V.24.0 software (IBM SPSS, Chicago, Illinois, USA) was used for the confirmatory factor analysis, and the algorithm of maximum likelihood provided the matrix of covariances. Before performing this analysis, the assumptions of normality were confirmed through the asymmetry coefficients, kurtosis, and the multivariate coefficient of Mardia, whose reference values are ≤3.0; ≤ 7.0 and 5.0, respectively (Hair, Black, Babin, Anderson, & Tatham, 2005; Kline, 2005; Marôco, 2014).
As recommended, different global adjustment indices were used, namely the Chi-square to Degrees of Freedom ratio (x^2/gl), Goodness-of-Fit Index (GFI), Comparative-of-Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), Root Mean Square Residual (RMR), and Standardized Root Mean Square Residual (SRMR). A good model adjustment is assumed when: $x^2/gl < 3$; GFI and CFI values > 0.90; RMSEA, RMR and SRMR values < 0.06 are considered ideal, although scores between 0.08 and 0.10 are acceptable. To analyze the quality of the local adjustment of the model, the lambda coefficients (λ) and the individual reliability of the items (r^2) were considered, whose reference values are 0.50 and 0.25, respectively (Byrne, 2000; Marôco, 2014).

Results

This study involved 260 nurses, between the ages of 22 and 59 years and a mean age of 35.42 years (Standard deviation - *SD* ± 7.62 years), mostly female (78.5%), 75.8% had undergraduate degrees, and 70.7% were undergoing post-graduate studies. They had on average 12.21 years of professional experience (*SD* ± 7.76 years), and the length of experience in the emergency department was 9.21 years (*SD* ± 6.89 years).
The analysis of the reliability of the Nursing Care Scale for Pain Management revealed that the means of the items ranged from 1.85 (item 45) to 3.38 (item 6). The study of internal consistency by item and the overall value ($\alpha = 0.95$; Table 1) was considered very good.

Table 1
Internal consistency of the Nursing Care Scale for Pain Management

Item No.	Items	Mean	Standard deviation	α w/out item
1	I realize that the individual is the best assessor of his/her pain	3.12	0.74	0.95
2	I always believe in the person with pain	2.99	0.77	0.95
3	I perform the physical examination while taking the pain history	2.73	0.98	0.95
4	I characterize pain according to duration	3.08	0.78	0.95
5	I characterize pain according to frequency	3.08	0.82	0.95
6	I characterize pain according to location	3.38	0.59	0.95
7	I characterize pain according to intensity	3.33	0.71	0.95
8	I characterize pain according to quality	2.68	1.12	0.95
9	I inquire about the person's usual ways of communicating/ expressing pain	2.58	1.08	0.95
10	I consider pain relief and/or aggravation factors	3.15	0.68	0.95
11	I ask about coping strategies in pain management	2.39	1.10	0.95
12	I ask the person about the impact of pain on daily life activities	2.77	0.89	0.95
13	I explore a person's knowledge of pain	2.18	1.08	0.95
14	I assess the emotional impact of pain	2.50	0.97	0.95
15	I assess the social-economic impact of pain	1.97	0.95	0.95
16	I assess the spiritual impact of pain	1.93	0.98	0.95
17	I identify symptoms associated with pain	3.07	0.70	0.95
18	I adapt the pain assessment instrument to the person's characteristics	2.92	1.05	0.95
19	I monitor pain using pain scales	3.21	0.90	0.95
20	I assess the intensity of pain by giving preference to self-assessment instruments	2.66	1.10	0.95
21	I assess pain in people with verbal communication disability and/or cognitive changes, based on physiological and behavioral indicators, using hetero-assessment scales	2.75	1.06	0.95
22	I regularly and systematically assess the intensity of pain, as for assessing other vital signs	3.19	2.65	0.96
23	Alongside pain assessment, I measure heart rate	2.90	0.92	0.95
24	Alongside pain assessment, I measure breathing rate	2.62	1.03	0.95
25	Alongside pain assessment, I measure blood pressure	2.64	1.05	0.95
26	I maintain the same pain assessment scale for all assessments of the same person, except if the clinical situation justifies its change	2.88	1.09	0.95
27	I adapt the frequency of pain assessment to a person's clinical condition	3.04	0.88	0.95
28	I assess pain at least once per shift	3.03	1.03	0.95
29	I record the intensity of pain on the vital signs' app available in the software	2.95	1.03	0.95
30	I record pain characteristics and history in nursing notes	2.74	0.95	0.95
31	I identify pain diagnosis	2.18	1.13	0.95
32	I plan interventions for pain management	2.66	1.08	0.95

33	I use the flowchart (e.g., headache, abdominal pain, chest pain) to plan pain management interventions	2.42	1.21	0.95
34	I consider the discriminator (e.g., moderate, severe, precordial pain) when planning pain management interventions	2.70	1.10	0.95
35	I actively collaborate with the rest of the multidisciplinary team to set up a pain management intervention plan	2.83	0.94	0.95
36	I involve the person in setting up the treatment plan and adjusting it	2.42	1.16	0.95
37	I adjust the treatment plan to the reassessment results and the available resources	2.68	1.05	0.95
38	I know which analgesic drugs were prescribed (indications, contraindications, side effects, drug interactions)	3.27	0.68	0.95
39	I monitor the safety of analgesic therapy	3.28	0.64	0.95
40	I prevent and control pain arising from nursing care and diagnostic or therapeutic procedures	2.87	0.93	0.95
41	I am familiar with non-drug pain control methods (indications, contraindications, side effects)	2.76	1.04	0.95
42	I use non-pharmacological interventions to complement pharmacological therapy	2.48	1.06	0.95
43	I apply heat and cold, where appropriate, to control pain	2.66	0.88	0.95
44	I use distraction, where appropriate, to control pain	2.41	1.01	0.95
45	I use guided imagination, where appropriate, to control pain	1.85	0.93	0.95
46	I use massage, where appropriate, to control pain	2.14	0.89	0.95
47	I use relaxation, where appropriate, to control pain	1.97	0.97	0.95
48	I foster an appropriate physical environment (light, noise, ambient temperature, etc.) to control pain	2.40	0.95	0.95
49	I position the person adequately to control pain	3.14	0.62	0.95
50	I foster comfort to control pain	3.15	0.67	0.95
51	I foster therapeutic touch to control pain	2.60	1.01	0.95
52	I execute or maintain physical restraint to prevent alignment in trauma situations	2.91	1.05	0.95
53	I monitor the effectiveness of implemented pharmacological interventions	2.98	0.91	0.95
54	I monitor the effectiveness of implemented non-pharmacological interventions	2.69	1.02	0.95
55	I record systematically pharmacological interventions, their effects, and changes in the therapeutic plan	2.70	1.14	0.95
56	I systematically record non-pharmacological interventions, their effects, and changes to the therapeutic plan	2.48	1.09	0.95
57	I schedule in the computer system subsequent reassessments after intervention for pain management	2.22	1.09	0.95
58	When reassessing pain, I compare with the previous value	2.82	1.05	0.95
59	I report the outcomes of the pain assessment/intervention to the multidisciplinary team, ensuring continuity of care	2.92	0.93	0.95
60	I report the outcomes of the pain assessment/intervention to other teams on the transfer of the patient to another unit	2.73	1.07	0.95
61	I assess the person's knowledge of pain self-control	2.16	1.08	0.95
62	I teach the person how to control his/her pain	2.20	1.06	0.95

63	I assess the person's knowledge of pharmacological strategies for pain control	2.35	1.07	0.95
34	I assess the person's knowledge of non-pharmacological strategies for pain control	2.33	1.01	0.95
65	I teach the person pharmacological strategies and for pain control	2.56	0.97	0.95
66	I teach the person non-pharmacological strategies and for pain control	2.54	0.94	0.95
67	I educate the person about the collateral effects of analgesic therapy	2.75	0.85	0.95
68	I educate the person about the need to give health professionals an early indication of changes in pain (aggravation, change in pattern, new sources and types, side effects of analgesic therapy)	2.97	0.77	0.95
	Overall Cronbach's coefficient alpha			0.95

Confirmatory factor analysis

At first, item trajectories for the respective factors, the corresponding critical ratios and the lambda coefficient of the hepta-factorial solution were analyzed, and all ratios were found to be statistically significant ($p < 0.05$). However, it was found that several items had saturations below 0.50 and individual reliability was below 0.25, negatively affecting the overall adjustment indices, so it was recommended to take out these items during the model refinement process (Marôco, 2014). Consequently, 24 items were eliminated.

It was also found that the correlational values between the factors were high, and a hierarchical structure with a 2nd order factor was thus proposed (Figure 1).

The lowest correlation with the overall factor was observed in factor 7, which explains 45%, and the highest with factor 6, with a variability of 96% (Figure 1).

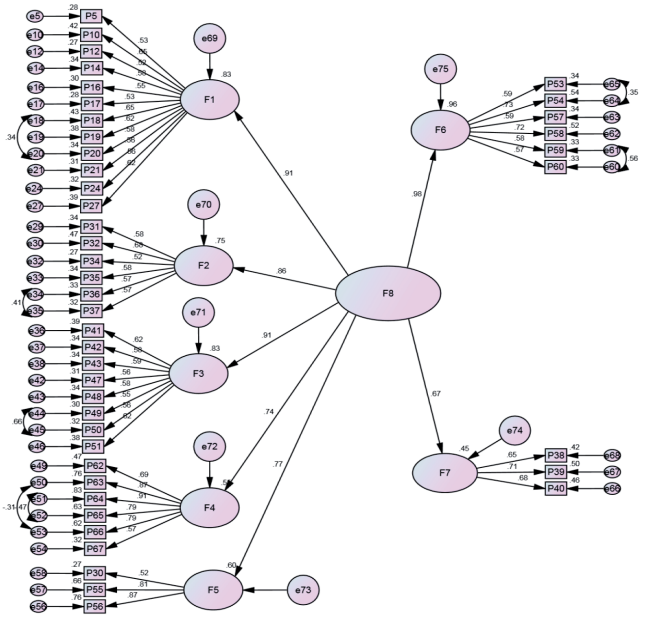

Figure 1. Second-order model.

Table 2 provides an overview of the global adjustment indices.

Table 2
Adjustment quality indices for all models

Model	x^2/gl	GFI	CFI	RMSEA	RMR	SRMR
Initial model	2.70	0.58	0.55	0.08	0.07	0.07
Model with modification indices	2.98	0.63	0.66	0.08	0.07	0.07
Model with deleted items	2.12	0.75	0.82	0.06	0.06	0.06
Second-order model	2.18	0.74	0.81	0.06	0.06	0.06

Note. x^2/gl - Chi-square / Degrees of Freedom; GFI - Goodness-of-Fit Index; CFI - Comparative-of-Fit Index; RMSEA - Root Mean Square Error of Approximation; RMR - Root Mean Square Residual; SRMR - Standardized Root Mean Square Residual.

It should be noted that, in the process of refining the model, the adjustment indices improved and recorded adequate values, except the GFI, which proved to be inadequate, and the CFI with poor adjustment.

It was also possible to analyze its factor structure and the consistency by factors based on the final version of the scale (Table 3).

Table 3
Internal consistency by factors

Items	Mean	Standard deviation	Total *r*/item	r^2	α w/out item
Initial assessment					0.85
5	3.08	0.82	0.47	0.32	0.85
10	3.15	0.68	0.57	0.42	0.84
12	2.77	0.89	0.46	0.28	0.85
14	2.50	0.97	0.51	0.33	0.84
16	1.93	0.98	0.51	0.32	0.84
17	3.07	0.70	0.45	0.31	0.85
18	2.92	1.05	0.64	0.50	0.83
19	3.21	0.90	0.60	0.40	0.84
20	2.66	1.10	0.57	0.42	0.84
21	2.75	1.06	0.53	0.37	0.84
24	2.62	1.03	0.51	0.29	0.84
27	3.04	0.88	0.57	0.37	0.84
Planning					0.76
31	2.18	1.13	0.39	0.18	0.76
32	2.66	1.08	0.59	0.38	0.70
34	2.70	1.10	0.46	0.28	0.74
35	2.83	0.94	0.51	0.30	0.73
36	2.42	1.16	0.54	0.42	0.72
37	2.68	1.05	0.54	0.41	0.72

Implementation of non-pharmacological interventions					0.80
41	2.76	1.04	0.56	0.35	0.77
42	2.48	1.06	0.51	0.32	0.78
43	2.66	0.88	0.51	0.32	0.78
47	1.97	0.97	0.46	0.31	0.78
48	2.40	0.95	0.54	0.34	0.77
49	3.14	0.62	0.54	0.62	0.78
50	3.15	0.67	0.51	0.60	0.78
51	2.60	1.01	0.52	0.28	0.77
Education of the person with pain					0.89
62	2.20	1.06	0.65	0.45	0.88
63	2.35	1.07	0.78	0.71	0.85
64	2.33	1.01	0.83	0.76	0.85
65	2.56	0.97	0.72	0.58	0.86
66	2.54	0.94	0.70	0.58	0.87
67	2.75	0.85	0.54	0.31	0.89
Recording					0.76
30	2.74	0.95	0.45	0.21	0.83
55	2.70	1.14	0.66	0.51	0.61
56	2.48	1.09	0.71	0.54	0.55
Reassessment					0.81
53	2.98	0.91	0.50	0.40	0.80
54	2.69	1.02	0.63	0.53	0.77
57	2.22	1.09	0.50	0.30	0.80
58	2.82	1.05	0.62	0.44	0.77
59	2.92	0.93	0.61	0.52	0.78
60	2.73	1.07	0.61	0.53	0.78
Implementation of pharmacological interventions					0.70
38	3.27	0.68	0.54	0.30	0.58
39	3.28	0.64	0.54	0.31	0.59
40	2.87	0.93	0.51	0.26	0.66

For the Initial assessment factor, the most favorable item was item 19, while item 16 was the least favorable. The Cronbach's alpha coefficients obtained in the 12 items ranged from 0.83 in item 18 to 0.85 in items 5, 12, and 17, indicating a good consistency, with a overall alpha of 0.85. The highest correlation value was found in item 18 (r = 0.64), with variability of 50.9%, and the one with the lowest correlation was item 17 (r = 0.45), with 32.0% explained variance.

Concerning the Planning factor, in average terms, the most favorable item was 35, and the least favorable item was 31, although the results suggest that they were well centered, given the mean values and the respective standard deviations obtained. The coefficients of the six items of this dimension ranged from α = 0.76 in item 31 to α = 0.70 in item 32, indicating a reasonable internal consistency, with an overall alpha of 0.76. The highest correlation value was found in item 32 (r = 0.59), and item 31

had the lowest correlation (r = 0.39), 38.6% and 18.2% variance.

Regarding the Implementation of non-pharmacological interventions factor, the highest mean was recorded in item 50, and item 47 had the lowest. The coefficients ranged from α = 0.77 in item 41 and α = 0.78 in item 47, with an overall coefficient of α = 0.80, which revealed a good internal consistency. The highest correlational value obtained was in item 41 (r = 0.56) and the lowest in item 47 (r = 0.46), with percentages of explained variance of 35.9% and 31.0%, respectively.

Under Education of the person with pain, the most favorable item was 67, and 62 was the least favorable item. The coefficients of the six items ranged from α = 0.76 in item 64 to α = 0.89 in item 67, suggesting good internal consistency, with an overall alpha of 0.89. The highest correlation value was found in item 64 (r = 0.83), with variability of 76.5%, and the one with the lowest correlation was item 67 (r = 0.54), with 31.1% explained variance.

Regarding the Recording factor, item 30 had the highest mean, while the lowest was item 56. The coefficients ranged from α = 0.55 in item 56 and α = 0.83 in item 30, with an overall coefficient of α = 0.76, which revealed a good and reasonable internal consistency. The highest correlational value obtained was in item 56 (r = 0.71) and the lowest in item 30 (r = 0.45), with 54.5% and 21.3% explained variance, respectively.

Concerning Reassessment, in average terms, the most favorable item was 53, and 57 was the least favorable item. The coefficients of the six items of this dimension ranged from α = 0.77 in item 54 to α = 0.80 in item 57, indicating a reasonable internal consistency, with an overall alpha of 0.81. The highest correlation value was found in item 54 (r = 0.63), and item 57 had the lowest correlation (r = 0.50), with 53.0% and 30.7% variance.

Lastly, for the Implementation of pharmacological interventions factor, according to the mean values, the most favorable item was 39, and item 40 was the least favorable. The coefficients of the three items ranging from α = 0.58 for item 38 to α = 0.66 for item 40 suggest good internal consistency, with an overall alpha of 0.70. The highest correlation value was found in item 39 (r = 0.54), with a variability of 31.0%, and item 40 had the lowest correlation (r = 0.51), with 26.2% explained variance.

Pain management practices

The results regarding the mean values of the overall score and factors of the Nursing Care Scale for Pain Management suggest that the highest mean value was that of Implementation of pharmacological interventions (Mean - M = 3.13 ± 0.60), followed by the Initial assessment (M = 2.80 ± 0.58), Reassessment (M = 2.72 ± 0.73), Implementation of non-pharmacological interventions (M = 2.64 ± 0.59), Recording (M = 2.64 ± 0.88), Planning (M = 2.57 ± 0.73), and Educating the person with pain (M = 2.45 ± 0.79) factors.

The statistics on pain management practices by gender revealed that participants of both genders had the same mean value for Planning (M = 2.66), Educating the person with pain (M = 2.50), Reassessment (M = 2.83) and Implementation of pharmacological interventions (M = 3.00). However, female nurses differ from male nurses, as they present better pain management practices under Initial assessment (M = 2.91 *vs.* M = 2.58), Implementation of non-pharmacological interventions (M = 2.75 vs. M = 2.50), and Recording (M = 2.83 vs. M = 2.66).

Discussion

This study on the validation of the psychometric properties of the Nursing Care Scale for Pain Management focused on the validity, content, and criteria of the construct, and sought to enhance further its validity.

The construct validity seeks to ascertain whether the instrument measures what it intends to measure and is accepted since the tests in its favor are superior to the opposing tests (Cunha et al., 2018).

Internal consistency was considered very good, according to an overall score of α = 0.95. The internal consistency of the 68 final items that make up the scale ranged between reasonable and good consistency. The adjustment of the final model (2nd order) showed adequate values in four of the six indices, except the GFI and CFI. Therefore, it is recommended to replicate

the psychometric study in larger samples to obtain higher sensitivity. Overall, the scale proves to be reliable and valid for assessing the pain management practices of Portuguese nurses.

The results of applying the scale also showed that, of all pain management practices, nurses carry out mostly pharmacological interventions. This finding, which several studies sustain, is mainly because this is an interdisciplinary intervention and that there are difficulties in implementing other pain management measures, such as non-pharmacological interventions and pain assessments (which include initial assessment, planning, education, recording, and reassessment; Becker et al., 2017; Dequeker, Van Lancker, & Van Hecke, 2018; Gan et al., 2018).

Pain assessment is recognized in the scientific literature as a challenge, pain education and intervention planning being the most neglected areas in clinical practice (Araujo & Romero, 2015; Medrzycka-Dabrowka, Dąbrowski, Gutysz-Wojnicka, Gawroska-Krzemińska, & Ozga, 2017). The results of this study also corroborate these findings since the overall mean scores for pain education and planning were the lowest. In addition, the difficulties and barriers imposed by the specific context of emergency departments are acknowledged, such as lack of time, overwork, and reluctance to prescribe and implement pharmacological measures due to an inadequate assessment of the painful experience (Pretorius, Searle, & Marshall, 2015). This study also found that Recording had lower mean scores, which may compromise the following process of pain monitoring and reassessment, invariably resulting in ineffective pain management. Female nurses showed better pain management practices than male nurses.

It should be noted that this study has some limitations. First, although the size of the sample is satisfactory, the scale has many items even after it was refined. As previously mentioned, 24 items were eliminated, but 44 items were retained. However, even if the sample were to be increased, the results would remain similar because bootstrap re-sampling simulations (n = 2000) were performed, and the models presented did not change significantly. Finally, despite the fact that the sample is composed of two emergency departments, this does not invalidate the importance of conducting a broader multicenter study or additional studies for other more specific contexts in the future.

Conclusion

The uniqueness of pain and the numerous factors affecting it require it to be managed using the appropriate practices, which often materialize with the implementation of continuous pain assessment improvement programs. However, the lack of instruments for measuring this construct means that this reality is hardly ever studied. Therefore, the Nursing Care Scale for Pain Management was developed, paving the way for this psychometric study, which revealed very good internal consistency, demonstrating that the scale is a reliable and valid means to assess pain management practices of Portuguese emergency department nurses.

Of all pain management practices, nurses implement mostly pharmacological interventions. Female nurses showed better pain management practices than male nurses.

As for the impact on practice, and because nurses mostly apply the pharmacological interventions to manage pain, while "devaluing" other practices, it is necessary to plan continuous training in and audit of such alternative practices. This scale can make a valid contribution to optimizing monitoring.

Finally, and based on the implications for research, it is essential to strengthen the current evidence and, although important psychometric properties have been assessed, studies in the future should focus on the properties that have not received attention, namely the temporal stability of the scale due to its potential use for monitoring practices.

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