Pain assessment tools in critical patients with oral communication difficulties: a scope review

Instrumentos de avaliação da dor em pacientes críticos com dificuldade de comunicação verbal: revisão de escopo

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ABSTRACT

BACKGROUND AND OBJECTIVES: Pain is a frequent experience in intensive care units and its assessment and handling are challenging to healthcare professionals. The objective of this study was to identify and analyze the available tools to assess pain in patients with oral communication difficulties in intensive care units.
CONTENTS: Scope review of the literature in six databases that identified four observational tools to assess pain in critical patients: *Behavioral Pain Scale*, *Critical-Care Pain Observation Tool*, *Nociception Coma Scale* and *Nociception Coma Scale-Revised*. All tools use behavior indicators of pain and only one is adapted to the Portuguese language.
CONCLUSION: The use of a valid, easy to apply instrument, with clear and straightforward descriptions is essential to assess pain in patients with oral communication difficulties in intensive care units. There are good quality tools to assess pain in intensive care units. Most tools, however, are not yet validated to the Portuguese language. Translation and validation studies are necessary so that tools with well-established psychometric properties can be available in our practice.
Keywords: Pain assessment, Critical care, Disorders of consciousness, Pain, Review.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor é uma experiência frequente em unidades de terapia intensiva e sua avaliação e manuseio são desafiadores para os profissionais de saúde. O objetivo deste estudo foi identificar e analisar os instrumentos disponíveis para avaliar a dor em pacientes com dificuldade de comunicação verbal em unidades de terapia intensiva.

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CONTEÚDO: Revisão de escopo da literatura, realizada em seis bases de dados, que identificou quatro instrumentos observacionais para avaliação da dor em pacientes críticos: *Behavioral Pain Scale*, *Critical-Care Pain Observation Tool*, *Nociception Coma Scale* e *Nociception Coma Scale-Revised*. Todos os instrumentos utilizam indicadores comportamentais de dor e apenas um está adaptado para a língua portuguesa.
CONCLUSÃO: A utilização de um instrumento válido, de fácil aplicação, com descrições claras e objetivas é essencial para a avaliação da dor em pacientes com dificuldade de comunicação verbal em unidades de terapia intensiva. Há instrumentos de boa qualidade para avaliar a dor em unidades de terapia intensiva. A maior parte dos instrumentos, no entanto, não está validada para a língua portuguesa. Estudos de tradução e validação são necessários para que instrumentos com propriedades psicométricas bem estabelecidas estejam disponíveis em nosso meio.
Descritores: Avaliação da dor, Cuidado crítico, Distúrbios da consciência, Dor, Revisão.

INTRODUCTION

In the intensive care unit environment (ICU), patients are subjected to several procedures that can be painful, and not always healthcare professionals are alert to pain in these patients[1,2]. In this context, patients incapable of communicating, submitted to sedation, invasive mechanical ventilation or altered mental state pose a higher risk of untreated pain.

The International Association for Studies of Pain (IASP) recently redefined the pain concept as "an overwhelming experience associated with a real or potential tissue injury with sensorial, emotional, cognitive and social components"[3].

Pain is a subjective symptom, difficult to measure and traditionally evaluated using self-report. In sedated patients, unconscious or incapable to tell the presence and intensity of pain, it is important to have other means to assess pain, including objective indicators that can be confirmed without oral communication[4].

Several scales based on behavior indicators of pain are being applied to assess and register this symptom in critical patients[4-8] being considered important tools to assess pain in patients incapable of communicating[5].

Physiological indicators such as heart rate, blood pressure, and the respiratory rate could be used in pain assessment, but they are nonspecific elements in critical patients since they are vulnerable to multiple factors, including the effect of the drugs used in ICU[4,9].

A study that investigated the practice related to pain assessment and management by intensivist nurses found that 98.6% of the nurses used some pain assessment tool in patients capable of self--reporting, and 37.1% indicated the use of more than one tool. However, only 45.7% used one or more tools in patients incapable of communicating[10].

Considering the lack of tools validated for the Portuguese language to assess pain in critical patients, the objective of this study was to identify and analyze the available tools to assess pain in patients with oral communication difficulty in the ICU.

CONTENTS

This is a scope of the literature review on pain assessment tools for patients with difficulty in oral communication as a result of sedation or unconsciousness, which followed the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines and of the Joanna Briggs Institute for scope reviews[11-13]. We included studies published in full in indexed journals, in Portuguese, English or Spanish, with no time limit, that described or analyzed pain assessment tools in adult patients with difficulty in oral communication, sedated, unconscious in the ICUs. Updating articles, editorials, letters to the editor and articles published only in abstract form were excluded.

Search strategy
The search was done from May to July 2016 in the Pubmed, SCOPUS, CINAHL, Web of Science, LILACS and Cochrane electronic databases. We also did manual searches of studies in the references of publications found in the digital search. A reviewer selected the studies and, in cases of uncertainty as to the eligibility of studies, a second reviewer was consulted.
For the selection of the controlled keywords, the tools used were the MeSH (Medical Subject Headings Section), from PubMed/Medline, DeCS (Describing in Sciences of the Health), from the BVS Portal, and CINAHL headings, as well as combinations of synonymous terms by means of previous readings for the selection of the non-controlled keywords, resulting in the combinations: *"intensive care units" OR "critical care" AND "persistent vegetative state" OR "consciousness disorders" OR "unconsciousness" OR "deep sedation" AND "pain" OR "pain measurement" OR "symptom assessment" OR "outcome and process assessment (health care)" AND "pain management".*

Data selection and extraction
Initially, the articles were identified by the heading and the abstract, disregarding those that did not meet the inclusion and exclusion criteria, as well as the repeated ones. Then, the selected articles were read in full. And so we started the data extraction of eligible articles. Data extracted was about the author, year of publication, country of origin, purpose, type of study, location, sample, methodology and major findings, including the pain assessment tool used in the study and the psychometric properties evaluated.

Figure 1 shows the flowchart of the selection process of the studies, and it is based on the model proposed by PRISMA guidelines[11-13].
Of the 17 studies selected for analysis, 15 were observational, 1 was quasi-experimental, and 1 was a systematic review of the literature on pain assessment tools in sedated and unconscious patients in ICU. The search identified four observational and behavioral tools to assess pain in critical, sedated, unconscious patients or with oral communication difficulty: Behavioral Pain Scale (BPS)[4], Critical-Care Pain Observation Tool (CPOT)[5], Nociception Coma Scale (NCS)[7] and Nociception Coma Scale--Revised (NCS-R)[8]. Table 1 represents the main features related to the psychometric properties of the studied tools.

Behavioral Pain Scale (BPS)
Observational tool to assess pain, comprising of three behavioral domains: facial expression, movements of upper limbs and conformity with the mechanical ventilator. Each domain ranges from 1-4 points, and its total score ranges from 3 (no pain) to 12 points (maximum pain)[4]. BPS presents good validity and reliability in the study population. No significant correlation was found between the BPS scores and the physiological variables analyzed[2]. So far, BPS is the only scale found that went through the validation process in Brazil, receiving the name of *Escala Comportamental de Dor* (ECD), showing good internal consistency (Cronbach's α 0.8) and good criterion validity[23]. A previous study on translation and cultural adaptation for the Portuguese language (Brazil), showed good agreement among reviewers, but low internal consistency (Cronbach's α 0.501)[24].

Critical-Care Pain Observation Tool (CPOT)
Initially developed in French and later translated into the English, CPOT comprises four behavioral domains: facial expression, body movements, muscular tension and conformity with the mechanical ventilator for intubated patients or vocalization for extubated patients. Each domain ranges from 0 to 2 points, and the total score may vary from zero to 8 points[5]. It is the most widely tested tool for the psychometric properties and presents good levels of validity and reliability[15,16]. When pain was assessed immediately after the endotracheal aspiration, CPOT scores were significantly higher than at rest[16]. Arbour, Gélinas and Michaud[15] reported higher frequency of pain assessment after training the team on how to use the tool, as well as higher frequency of pain episodes, with reduction of complications in the patients of this group, indicating that the acceptance of the scale by the team is essential for the success of its implementation and use.

Nociception Coma Scale (NCS
A scale developed by Schnakers et al[7] for pain assessment in uncommunicative patients, with consciousness disorders, that contains four subscales that evaluate the motor, oral, visual and facial responses to a nociceptive stimulation. Each subscore ranges from zero to 3 points, reaching a total score that goes from zero to 12 points. It presents less sensitivity and higher specificity when compared with NCS-R[8], with a regular agreement among
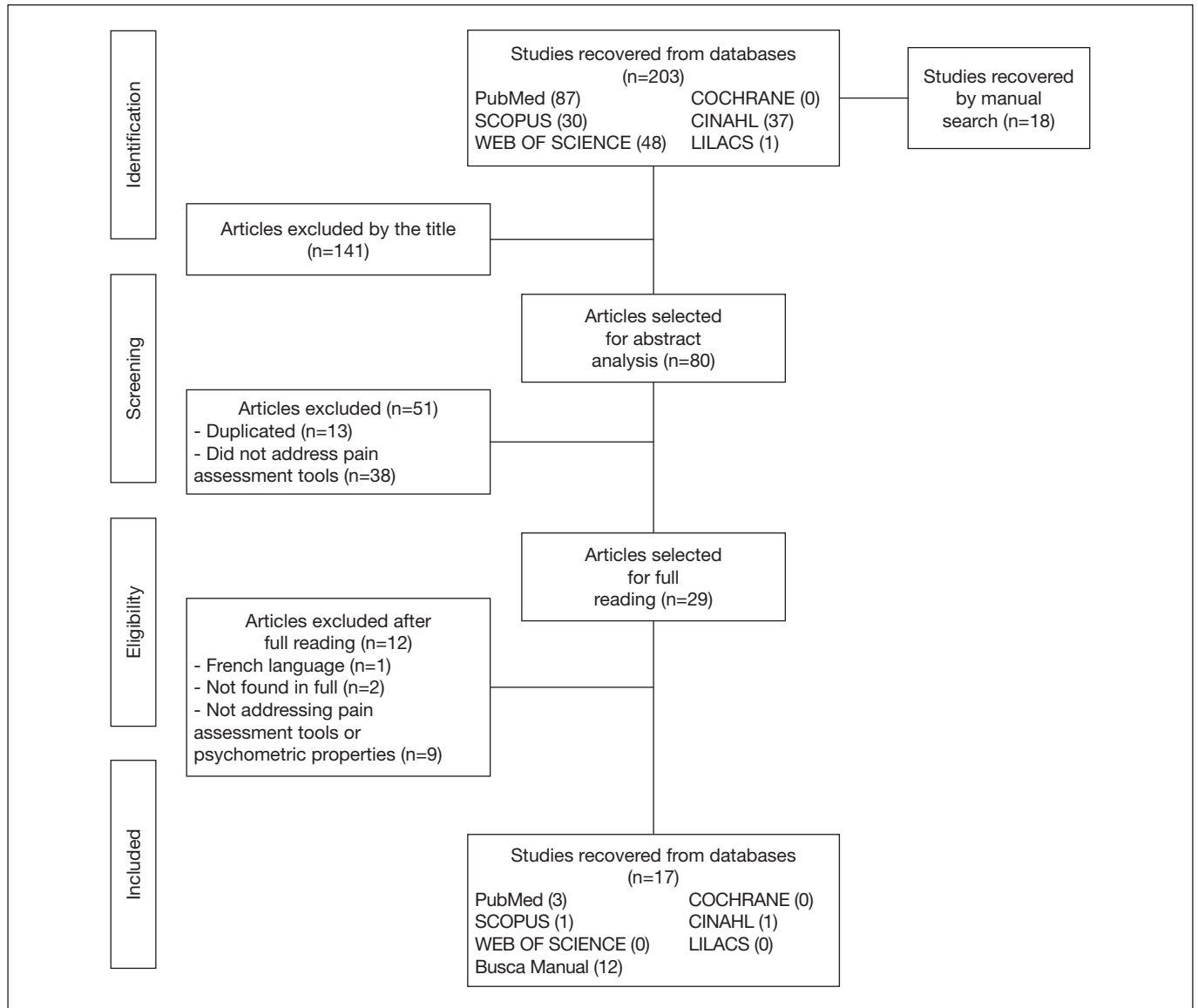
Figure 1. Flowchart of articles selection in the systematic review, adapted from PRISMA guidelines. São Paulo, 2016
PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analysis.

surveyors[7,21]. Thus more studies are necessary to investigate the validity and reliability of the scale.

Nociception Coma Scale-Revised (NCS-R)
Revised version of the NCS, with the exclusion of the visual response domain. It was developed for pain assessment in patients with disorders of consciousness, consisting of 3 subscales that evaluate motor, oral and facial expression responses. Each subscore ranges from zero to 3 points and the total score goes from zero to 9 points[8]. It has higher sensitivity when compared to NCS[8] and higher consistency among surveyors[22].
In the analyzed studies, the main procedures identified as nociceptive in ICU were mobilization and endotracheal aspiration[25,26]. Traditional pain indicators, such as fluctuation in the hemodynamic parameters, are not always accurate measurements to identify pain in unconscious patients[4, 9,18]. Behavioral indica-

tors are more suitable for pain assessment in critical, sedated, unconscious patients or who have oral communication difficulties. A European secondary study identified facial expression, body movement and muscular tension as the main indicators of pain clinically observable in patients with severe brain injury, and found a synchronism with the ventilator only in studies that have exclusively investigated patients under mechanical ventilation[27]. At least two of these indicators are present in four tools included in this study.
BPS was first validated for use in patients deeply sedated and under mechanical ventilation [2,4]. Ahlers et al.[14] have included in their study patients under deep sedation, and sedated and conscious patients and their data indicate that BPS can be a valid pain measure in both groups due to its power of detention and discrimination of pain. The self-report of pain in conscious patients was considered by them the "gold standard" in pain asses-

Table 1. Description of the major characteristics of pain assessment tools in critical patients with difficulty in oral communication. São Paulo, 2016.

Tool	Authors	Key Features
BPS	Payen et al.[4]	Moderate to good internal consciousness[2,9,14], agreement among surveyors from moderate to almost perfect[4,9,14]. No significant correlation was found between the scale and the physiological variables [2].
CPOT	Gélinas et al.[5]	Discriminating properties from moderate to good; good internal consistency[1,20]; regular to almost perfect agreement among surveyors[1,5,18,19]; during the painful stimulus it presented a sensitivity of 66.7-86%, specificity of 78-83.3% and accuracy of 63%[17,18]; a significant correlation between the self-reported pain and the CPOT score during the painful procedure[5,18]. The definition of the cut-off value during the painful procedure varied between >2 and >3[17,18]. Highest CPOT scores during and immediately after a painful procedure[5,16]. After the tool implementation, there was a higher frequency of pain reassessment, of pain episodes, and lower number of complications[15].
NCS/ NCS-R	Schnakers et al.[7] / Chatelle et al.[8]	There was a significant difference in the diagnosis of vegetative state and minimum consciousness state[7,8]. With the ROC curve analysis, the following cut-off values were defined for the NCS: <2 no pain, 2-3 possible presence of pain, and ≥3 probable presence of pain. The NCS-R cut-off values were: <1 no pain, 1-2 possible presence of pain, and ≥2 probable presence of pain. NCS: moderate to good agreement between surveyors[7,21,22]; sensitivity 46-73.6%, specificity 67.3-97% and accuracy 72%[8,22]. NCS-R: good agreement among surveyors[22]; sensitivity of 73-76.7%, specificity of 74.7-97% and accuracy of 85%[8,22].

BPS = Behavioral Pain Scale; CPOT = Critical-Care Pain Observation Tool; NCS = Nociception Coma Scale; NCS-R = Nociception Coma Scale-Revised.

sment and some studies show an inversely proportional relation to the levels of pain related to BPS and the sedation dose and received analgesia.[2,4,9] BPS can be considered a valid and reliable tool applicable to critical, sedated, unconscious patients or with oral communication difficulty, especially those undergoing mechanical ventilation since one of its three domains is specifically designed for ventilation conformity.

CPOT is the most studied tool regarding validity and reliability and has well-consolidated results in the foreign literature. Unlike BPS, beyond the domain intended for patients under mechanical ventilation, it has the vocalization domain, that also encompasses extubated patients. An Iranian study conducted with nurses who, after training, used CPOT in their practice, found a positive impact on managing pain in patients with reduced consciousness level[28.] It can be used for the detection and assessment of pain and the effect of measures to manage pain in critical patients regardless of their level of consciousness[5].

Other secondary studies analyzed clinical tools for pain assessment in critical sedated patients[29,30]. The systematic review included in this study[29] found three pain assessment tools, among them, CPOT and BPS, in which BPS also presented strong evidence that support the validity and reliability of the scale, and CPOT showed a good validity of construct and moderate validity of criterion[29].

There is limited evidence about pain indicators in patients with brain injury, and these patients' response to pain can vary according to the level of consciousness[27]. Disorders of consciousness are mainly due to acquired brain injuries, and pain processing in these patients is different from those in vegetative state (VS), and those in a minimally conscious state (MCS) [31], as well as the total NCS scores, which show a significant difference between the scores of the scale in terms of diagnosis, indicating that those in MCS have a higher score than those obtained in VS[7]. VS is characterized by an unconscious reflective behavioral pattern, i.e. the autonomic functions are preserved in the absence of consciousness, and, in response to a stimulus, there are spontaneous eye opening

or reflexes behaviors not related to the environment[31]. MCS is characterized by a fluctuating conscious behavioral pattern in which patients may exhibit emotional responses and targeted behavioral responses[31].

Although NCS and NCS-R require more studies on their validity and reliability, Chatelle et al.[32] tried to identify which brain regions have correlation with the total NCS-R scores using positron emission tomography in patients with disorders of consciousness, indicating a positive correlation between the NCS-R scores and the metabolism on the posterior part of the anterior cingulate cortex involved in cortical pain processing. Such results interfere with the assessment of pain and in the decision-making related to its management.

The validation of any pain tool requires repeated tests of reliability, validity, and responsiveness of samples, scenarios, and observers[2]. Nurses are the major responsible professionals for assessing pain in critical patients, as well as for applying pharmacological and non-pharmacological measures to manage pain. The training of professionals to use validated tools to assess pain and the acceptance of the scale by the healthcare team provides greater quality in the assessment and management of pain in critical patients, with consequent support for decision making, shorter hospitalization period and lower costs related to health care.

CONCLUSION

A validated tool, easy to use and with clear and straightforward descriptions is essential for the systematic and standardized assessment of pain in ICU. CPOT and BPS showed good validity and reliability and included domains related to mechanical ventilation, which is often present in sedated, unconscious patients or who have oral communication difficulties. NCS-R proves to be promising in critical patients with disorders of consciousness and, although it requires further studies related to its validity and reliability, its correlation with neuroimaging data corroborate the influence of behavioral indicators in the processing and experience of pain.

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