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# CRITICAL CARE PAIN OBSERVATION TOOL (CPOT) BEHAVIORAL SCALE IN THE ASSESSMENT OF PAIN IN CRITICALLY ILL PATIENTS: INTEGRATIVE REVIEW

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## INTRODUCTION

Pain in critically ill patients is a frequent, complex and often underestimated phenomenon, especially in situations of sedation, mechanical ventilation or altered state of consciousness (Raja et al., 2020; Silva et al., 2020) . This underestimation significantly compromises the quality of care and is associated with adverse outcomes such as hemodynamic dysfunctions, prolonged mechanical ventilation and hospitalization, and increased morbidity and mortality (Pota et al., 2022) .

Recognized as the fifth vital sign, pain requires a systematic assessment approach, based on an understanding of its multidimensional nature, which involves sensory, emotional and behavioural components (Raja et al., 2020) . However, in intensive care units, patients' inability to communicate verbally is an obstacle to effective assessment (Chanques and Gélinas, 2022) .

In this context, instruments based on observable behaviors have emerged, such as the *Critical-Care Pain Observation Tool* (CPOT), recommended by several international guidelines as a valid and reliable tool for assessing pain in non-communicating critically ill patients (Gélinas et al., 2006; Marques et al., 2022) . The CPOT integrates indicators such as facial expression, body movements, muscle tension and synchrony with the ventilator, allowing for a structured and replicable assessment.

However, despite its widespread adoption and recognition of its potential, there are still gaps regarding its applicability in specific clinical contexts, its sensitivity to different patient profiles and the real impact on care practice (Sandvik et al., 2020; Teixeira and Silva, 2023) . This scenario justifies the need for an up-to-date integrative analysis of the scientific evidence.

Therefore, the aim of this study was to critically analyze the available evidence on the use of CPOT in the assessment of pain in critically ill patients, with a special focus on its validity, reliability, clinical applicability and impact on pain management.

## MATERIAL AND METHODS

This integrative review was developed according to the methodology proposed *by the Joanna Briggs Institute* (JBI) (Aromataris et al., 2024).

### REVIEW QUESTION

The formulation of the research question followed the PCC (Population, Concept and Context) strategy, and the target population was defined as adult patients admitted to intensive care units; the central concept was the use of the CPOT scale in pain assessment; and the context was intensive care units, covering medical-surgical, neurological and post-operative aspects, among others. The guiding question was: *"What evidence is available on the use of the CPOT scale to assess pain in critically ill patients?"*

### INCLUSION AND EXCLUSION CRITERIA

Publications were included which investigated the application of the CPOT in adult patients (aged 18 or over) in an intensive care setting, and which addressed aspects such as validity, reliability, clinical applicability or impact of the scale. Only studies available in full text, written in Portuguese, English or Spanish and using quantitative, qualitative or mixed methodologies were considered. Studies focused on pediatric populations were also excluded, as were opinion pieces, editorials or non-systematic narrative reviews, as well as investigations in which the CPOT was not assessed independently.

### RESEARCH STRATEGY

The search was carried out in May 2024 on the EBSCO platform to access the electronic databases: *CINAHL Complete, MEDLINE Complete, Nursing & Allied Health Collection: Comprehensive, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, Cochrane Methodology Register, Library, Information Science & Technology Abstracts, MedicLatina and Cochrane Clinical Answers.* The search strategy combined MeSH terms and free descriptors. The following search equation was formulated: *"Critical Care Pain Observation Tool" AND "Critical Care" OR "Critical Illness" AND "Pain Measurement"*. One of the examples of the expression used was: *("Critical-Care Pain Observation Tool" OR CPOT) AND ("Intensive Care Units" OR "Critical Care") AND ("Pain Measurement" OR "Pain Assessment").*

### STUDY SELECTION

The process of selecting the studies was carried out in two distinct phases. In the first phase, two reviewers independently analyzed the titles and abstracts, based on the defined inclusion criteria. In the second phase, the pre-selected studies were analyzed in their entirety. Any disagreements between the reviewers were resolved by consensus. The studies were selected using the *Rayyan* platform. The study selection process was described using the PRISMA diagram (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to ensure transparency and methodological rigor (Page et al., 2021) (Figure 1).

### DATA EXTRACTION AND ANALYSIS

The data was extracted using a previously defined grid containing information on: authors, year of publication, country, type of study, sample characteristics, objectives, main results and conclusions relevant to the use of CPOT.

The results were summarized in a narrative and descriptive way, grouping them into thematic categories (validation, clinical application, impact, limitations).

## RESULTS

A total of 731 articles were obtained from the database search. Of these, 667 articles were excluded based on the inclusion and exclusion criteria, applying filters to the search. Subsequently, a further 31 articles were excluded after reading the title and 3 articles after reading the abstract. This left 12 articles for full reading. However, 2 of these articles had access blocked, resulting in 10 articles available for full reading. After this reading, 5 articles were selected for critical analysis. Table 1 summarizes the main methodological characteristics of the studies included.

### VALIDITY AND RELIABILITY OF THE CPOT SCALE

The CPOT scale showed good psychometric indicators in the included studies. Kiesewetter et al. (2019) validated the German version of the scale in 292 patients after cardiac surgery, showing high interobserver reliability (weighted kappa index) and discriminative validity, with significantly higher scores during nociceptive stimuli ($p < 0.001$). The study by Wojnar-Gruszka et al. (2022) also showed a strong correlation between CPOT and BPS ($r = 0.622$-$0.907$) at different levels of sedation, including deep sedation, reinforcing the scale's consistency in multiple clinical contexts.

In the study by (Gélinas et al., 2019) , the authors observed that certain behaviors indicative of pain, such as pain expression and muscle rigidity, were less frequent in patients with altered state of consciousness. Despite this, it was possible to identify relevant behavioral patterns, which supports the content validity of the CPOT, although the authors recommend adjustments to the scale for brain-injured populations.

### CLINICAL APPLICABILITY OF CPOT IN DIFFERENT ICU CONTEXTS

All the studies included showed the practical applicability of CPOT in different intensive care settings. The CPOT has been used effectively in mechanically ventilated patients (Kouhi et al., 2023) , in patients under deep sedation (Wojnar-Gruszka et al., 2022) , and in neurological patients with varying levels of consciousness (Gélinas et al., 2019) . The scale has been shown to be sensitive to behavioral variation during nociceptive stimuli such as position change, tracheal suctioning and wound care.

Wojnar-Gruszka et al. (2022) point out that even at deep levels of sedation (RASS -4/-5), CPOT made it possible to detect signs compatible with pain, reinforcing its usefulness even when the patient does not interact with the healthcare team.

### IMPACT OF USING CPOT ON PAIN MANAGEMENT AND CLINICAL OUTCOMES

Two studies directly explored the clinical impact of CPOT. Kouhi et al. (2023) demonstrated that the systematic use of CPOT, integrated into an analgesia protocol, resulted in a significant reduction in pain intensity and more precise adjustments to the dose of fentanyl ($p < 0.05$), compared to the control group that followed the usual routine based on vital signs.

In a complementary way, Kontou et al. (2023) showed that greater variations in CPOT scores were associated with worse prognosis, namely increased time on mechanical ventilation and mortality. In addition, the administration of additional analgesia, based on pain assessment, was associated with a reduction in ICU length of stay ($p = 0.016$). These results suggest that the regular use of CPOT can have a positive impact on the clinical evolution of critically ill patients.

## DISCUSSION

The results of this integrative review show that CPOT is a valid, reliable and clinically applicable tool for assessing pain in critically ill patients, particularly in contexts where verbal communication is compromised, as is often the case in situations of mechanical ventilation, deep sedation or altered state of consciousness.

The validity and reliability of the CPOT has been confirmed in different cultural and linguistic contexts, in particular the studies by Kiesewetter et al. (2019) and Wojnar-Gruszka et al. (2022) . Both demonstrated internal consistency and high inter-observer reliability, reinforcing the scale's rigor in clinical environments with multi-professional teams. The German version validated by Kiesewetter et al. (2019) proved to be particularly robust from a psychometric point of view, contributing to the dissemination of the CPOT in international contexts.

In terms of clinical applicability, CPOT has been shown to be effective in various clinical situations, including in patients with deep sedation (Wojnar-Gruszka et al., 2022) and in neurological patients with different levels of consciousness (Gélinas et al., 2019) . This data is particularly relevant for nurses specializing in medical-surgical nursing, who play a central role in the systematic assessment of pain in critically ill patients, who are often unable to express their suffering verbally.

In terms of clinical impact, the study by Kouhi et al. (2023) showed that the systematic use of CPOT allows for a more appropriate adjustment of analgesia and a significant reduction in pain intensity during invasive procedures. In addition, Kontou et al. (2023) showed that not using additional analgesia, even when CPOT scores are higher, is associated with longer mechanical ventilation time, prolonged hospitalization and higher mortality. These results reinforce the importance of actively in-

## FIGURES

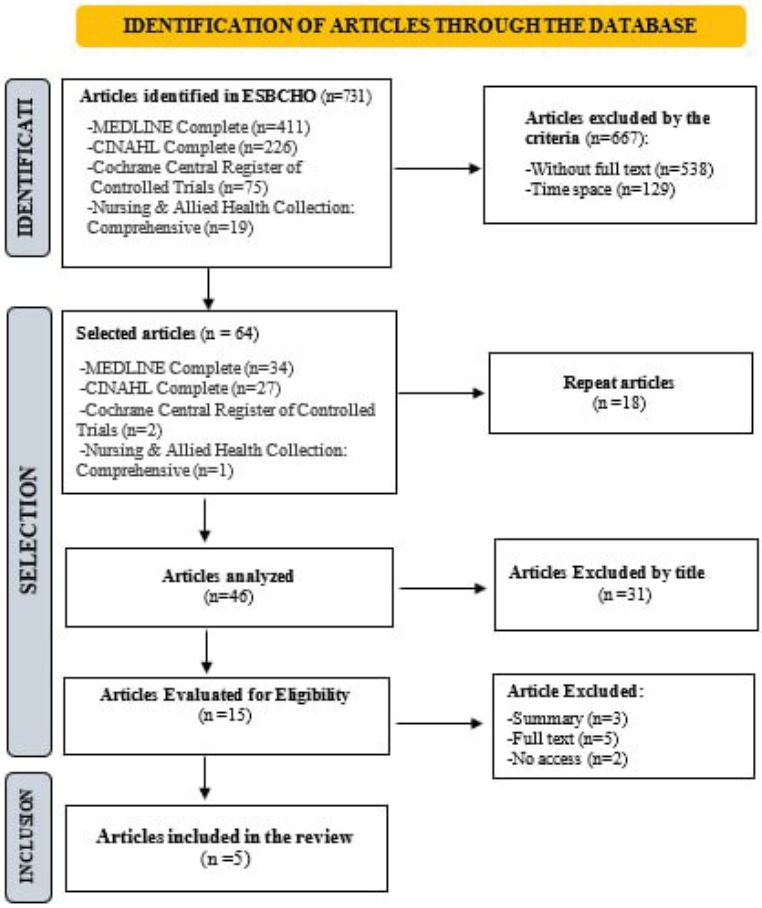


Figure 1 - Method of selecting articles

## TABLES

| Author (Year) | Country | Type of Study | Sample | Context | Main objective |
|---|---|---|---|---|---|
| Gélinas et al. (2019) | Canada | Prospective observational | 147 patients with brain damage | Neurological ICU | Describe behaviors indicative of pain according to level of consciousness; suggest revision of CPOT. |
| Kouhi et al. (2023) | Iran | Randomized clinical trial | 70 ventilated patients | General ICU | To evaluate the impact of the use of CPOT on pain intensity and the adjustment of analgesia. |
| Kiesewetter et al. (2019) | Germany | Prospective validation study | 292 post-cardiac surgery patients | Surgical ICU | Validate the German version of the CPOT and assess inter-observer reliability and discriminative validity. |
| Wojnar--Gruszka et al. (2022) | Poland | Analytical observational | 81 patients (1005 reviews) | Multipurpose ICU | Compare CPOT and BPS in patients under analgesic sedation, including deep sedation. |
| Kontou et al. (2023) | Greece | Prospective cohort | 28 patients (160 painful stimuli) | General ICU | Evaluate painful procedures with CPOT and BPS and correlate with clinical results. |

Table 1 - Study characteristics

terpreting the results of the scale and making timely clinical decisions, with direct implications for improving clinical outcomes.

Despite the promising results, there are still some limitations. In neurological patients, certain behaviors traditionally associated with pain - such as muscle rigidity or facial expression - may be absent or less obvious, which was evidenced by **Gélinas et al. (2019)** . This limitation suggests the need for a possible adaptation or revision of the CPOT scale for specific populations, namely patients with severe brain injury.

In addition, although some studies include structured analgesia protocols, clinical practice in many units continues to rely on the assessment of isolated physiological signs, which are admittedly not very sensitive or specific. Therefore, continuous training and the qualification of nurses in the use of CPOT are essential elements for its correct implementation and for improving the quality of care provided.

## CONCLUSIONS

This integrative review shows that CPOT is a valid, reliable and applicable tool in clinical practice for assessing pain in critically ill patients, especially those who are unable to communicate verbally. Its use allows for more accurate identification of pain, even in contexts of deep sedation or altered state of consciousness, and is associated with more appropriate clinical decisions in pain control, with a positive impact on indicators such as duration of mechanical ventilation, length of stay and mortality.

The systematic integration of the CPOT into care routines is therefore a promising strategy for improving the quality of care provided in intensive care units, reinforcing the role of the specialist nurse in pain assessment and management. However, challenges remain, particularly with regard to adapting the scale to specific populations, such as brain-injured patients, and the need for ongoing training of healthcare teams in its application.

It is recommended that future research delves deeper into the effectiveness of CPOT in specific clinical subgroups, explores its large-scale impact on clinical outcomes and evaluates strategies for sustained implementation in real-life practice settings. Pain in the critical care setting remains an often underappreciated phenomenon, so the systematic use of behavioral scales, such as CPOT, should be promoted as an integral part of clinical assessment in intensive care.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

## AUTHOR CONTRIBUTIONS

Conceptualization: MM, TA; Research (obtaining data): MM; Formal analysis: MM, TA, IA, FF; Supervision, Software: TA, IA, FF; Writing - preparation of the original draft, MM, TA; Writing - revision and editing: TA, IA, FF. All authors have read and agreed with the published version of the manuscript.

## REFERENCES


Aromataris E, Lockwood C, Porritt K, Pilla B and Jordan Z. JBI Manual for Evidence Synthesis, (JBI ed), 2024

Chanques G and Gélinas C. Monitoring pain in the intensive care unit (ICU). *Intensive care medicine* **48(10)**:1508–1511, 2022

Gélinas C, Boitor M, Puntillo KA, Arbour C, Topolovec-Vranic J, Cusimano MD, Choinière M and Streiner DL. Behaviors Indicative of Pain in Brain-Injured Adult Patients With Different Levels of Consciousness in the Intensive Care Unit. *Journal of pain and symptom management* **57(4)**:761-773., 2019

Gélinas C, Fillion L, Puntillo KA, Viens C and Fortier M. alidation of the critical-care pain observation tool in adult patients. American journal of critical care : an official publication. *American Association of Critical-Care Nurses* **15(4)**:420–427, 2006

Kiesewetter I, Bartels U, Bauer AS, G. and Pilge S. The German version of the Critical-Care Pain Observation Tool for critically ill adults : A prospective validation study. *Der Anaesthesist* **68(12)**:836–842, 2019

Kontou P, Kotoulas SC, Kalliontzis S, Synodinos-Kamilos S, Akritidou S, Kaimakamis E, Anisoglou S and Manika K. Evaluation of Pain Scales and Outcome in Critically Ill Patients of a Greek ICU. *Journal of pain & palliative care pharmacotherapy* **37(1)**:34–43, 2023

Kouhi F, Froutan R and Moghaddam A. Investigating the effect of the CPOT-based pain management program on the pain intensity and dose adjustment of analgesics in mechanically ventilated patients: A randomized clinical trial. *Nursing Practice Today* **10(3)**:208-218, 2023

Marques R, Araújo F, Fernandes M, Freitas J, Dixe MA and Gélinas C. Validation Testing of the European Portuguese Critical-Care Pain Observation Tool. *Healthcare (Basel, Switzerland)* **10(6)**:1075, 2022

Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, Shamseer L, Tetzlaff JM, Akl EA, Brennan SE, Chou R, Glanville J, Grimshaw JM, Hróbjartsson A, Lalu MM, Li T, Loder EW, Mayo-Wilson E, McDonald S, McGuinness LA, Stewart LA, Thomas J, Tricco AC, Welch VA, Whiting P and Moher D. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Bmj* **372**:n71, 2021

Pota V, Coppolino F, Barbarisi A, Passavanti MB, Aurilio C, Sansone P and Pace MC. Pain in Intensive Care: A Narrative Review. *Pain and therapy* **11(2)**:359–367, 2022

Raja SN, Carr DB, Cohen M, Finnerup NB, Flor H, Gibson S, Keefe FJ, Mogil JS, Ringkamp M, Sluka KA, Song XJ, Stevens B, Sullivan MD, Tutelman PR, Ushida T and Vader K. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. *Pain* **161(9)**:1976–1982, 2020

Sandvik RK, Olsen BF, Rygh LJ and Moi AL. Pain relief from nonpharmacological interventions in the intensive care unit: A scoping review. *Journal of clinical nursing* **29(9-10)**:1488–1498, 2020

Silva D, Barbosa T, Bastos A and Beccaria L. Associação entre dor, analgossedação e mortalidade de pacientes em unidade terapia intensiva / Association between pain, analgosedation and mortality of patients in intensive care unit. *Brazilian Journal of Health Review* **3(4)**:7849-7862, 2020

Teixeira J and Silva M. Monitorização e avaliação da dor na pessoa em situação crítica: uma revisão integrativa de litera. *Brazilian Journal of Health Review*:1056-1072, 2023

Wojnar-Gruszka K, Sega A, Płaszewska-Żywko L, Wojtan S, Potocka M and Kózka M. Pain Assessment with the BPS and CCPOT Behavioral Pain Scales in Mechanically Ventilated Patients Requiring Analgesia and Sedation. *nternational journal of environmental research and public health* **19(17)**:10894, 2022