International Journal of Health Science

ISSN 2764-0159 vol. 6, n. 3, 2026

ARTICLE 2

Acceptance date: 10/03/2026

THE *OUTCOME* OF CPOT IN PAIN ASSESSMENT IN CRITICALLY ILL PATIENTS VENTILATED IN INTENSIVE CARE UNITS

Adriana Felgueiras
ULSBE. Internal Medicine Service 4.

Bruna Atilano
ULSBE, Internal Medicine Service 4.

Joana Oliveira
ULSGE, Multipurpose Intensive Care Medicine Service.

Filipe Fernandes
Adjunct Professor. Artificial Intelligence and Health Research Unit (IA&Saúde), Northern Polytechnic Institute of Health (CESPU –CRL), Vila Nova de Famalicão, Portugal.
https://orcid.org/0000-0002-6043-1078 .

Tiago Alves
Assistant Professor. Artificial Intelligence and Health Research Unit (IA&Saúde), Northern Polytechnic Institute of Health (CESPU –CRL), Vila Nova de Famalicão, Portugal.
https://orcid.org/0000-0002-1347-2977 .

Isabel Araújo
Coordinating Professor. Artificial Intelligence and Health Research Unit (IA&Saúde), Northern Polytechnic Institute of Health (CESPU –CRL), Vila Nova de Famalicão, Portugal.
https://orcid.org/0000-0002-1721-9741 .

Abstract Background: One of the major difficulties in nursing is pain assessment, especially in critically ill ventilated patients due to the absence of self-reporting. Therefore, reliable assessment tools that allow for accurate pain monitoring are needed, such as the CPOT, which is a practical and reliable tool for pain assessment in critically ill ventilated patients, whether conscious or unconscious. Objective: To describe the scientific evidence on the use of the CPOT in assessing pain in critically ill ventilated patients in ICUs. Methodology: Integrative literature review, using the PubMed, CINAHL, and MEDLINE databases, supplemented with gray literature. The search equation used was *"Pain* Measurement" AND *"Critical* Care" AND *"Intensive Care* Units" AND "CPOT." Data collection took place between July 19 and 22, 2025. This search resulted in 506 articles, of which 5 were selected for critical analysis after applying the exclusion criteria. Results: CPOT is a valid, reliable, and clinically useful tool for assessing pain in this type of patient in an ICU setting. Its implementation increased the daily number of pain assessments and reassessments. At the same time, it also proved effective in optimizing analgesic therapy. The validation of the Portuguese version of the CPOT confirmed its reliability and applicability, reinforcing its relevance as a pain assessment tool. Conclusion: The systematic use of the CPOT contributes to better clinical outcomes due to its advantages. Despite the evidence of its benefits, the international literature on the subject remains limited. This reinforces the need for further research and evaluation of its applicability in different clinical populations.

Keywords: Pain Measurement, Critical Care, Intensive Care Units, CPOT

Introduction

The assessment of pain, as the 5th vital sign (Directorate-General for Health, 2003), represents an ongoing challenge for nursing due to its subjective nature, which makes it even more difficult to monitor. In this sense, it is essential to use assessment tools that are appropriate to the physical and psychological conditions of each patient, supported by scientific evidence, and that enable the implementation of quality care in pain management.

Pain is a complex phenomenon that directly influences the patient's quality of life and their ability to interact socially. Initially, it was understood only as a response to tissue damage (Cunha & Lisboa, 2020), but with advances in neuroscience and psychology, it has come to be recognized as a multifaceted experience resulting from the dynamic interaction between biological, emotional, cognitive, and social components (Camelo Filho et al., 2025). y should be understood as a subjective experience of a biopsychosocial nature, modulated by neurophysiological, affective, cultural, and historical factors, reflecting uniquely in each individual (Cunha & Lisboa, 2020). This complexity becomes even more challenging in the context of Intensive Care Units (ICUs).

ICUs are highly specialized areas designed to provide complex care to critically ill patients at imminent risk of vital organ failure (Central Administration of the Health System, 2024). In these environments, in addition to the biomedical dimension, it is also important to integrate the emotional, social, and ethical aspects of the care process. One of the biggest challenges is the assessment and management of pain, which is made difficult by the presence of patients

who are unable to self-report due to mechanical ventilation or sedation. According to the National Pain Assessment Plan, only 25% of Portuguese ICUs use instruments that are suitable for this type of patient (Cunha & Lisboa, 2020). This reality exposes patients to an increased risk of pain underestimation and associated complications, with studies indicating that 50% of these patients experience pain, which reinforces the need for appropriate monitoring strategies, particularly in the case of critically ill patients (Salviano et al., 2025).

Critically ill patients are characterized by the presence of multi-organ dysfunction or failure, whose survival depends on advanced monitoring and therapeutic methods (Portuguese Medical Association (College of Intensive Care Medicine) & Portuguese Society of Intensive Care, 2023). In the case of ventilated critically ill patients, invasive mechanical ventilation often arises as a response to respiratory failure or worsening, implying a level of sedation that further limits the patient's ability to communicate (Morais et al., 2021). Given this scenario, it is essential to use validated scales that allow the detection of nonverbal manifestations of suffering. Among these tools is the *Critical-Care Pain Observation Tool* (CPOT).

The CPOT, developed by Gélinas and colleagues in 2006, is a practical and reliable tool for assessing pain in critically ill ventilated patients, whether conscious or unconscious, who are unable to express their pain experience. The scale assesses four behavioral indicators—facial expression, body movements, muscle tension, and *compliance* with the ventilator (in ventilated patients) or vocalization (in non-ventilated patients). Each parameter is scored between 0 and 2, allowing for a total score between 0 and 8. Whenever the results obtained are equal to or greater than 3, the presence of pain is verified, requiring an intervention to minimize it () (Marques et al., 2022) . Currently, the CPOT is validated for the Portuguese population and is recommended by *the Society of Critical Care Medicine*, representing an advantageous tool in clinical nursing practice in an intensive care context (Ordem dos Enfermeiros, 2023).

In view of the above, the following question is asked, using the PICO methodology strategy: Participants (critically ill ventilated patients), Intervention (pain assessment), Context (ICUs), Objective (CPOT *outcome*): what is the *outcome* of *the Critical-Care Pain Observation Tool* in assessing pain in critically ill ventilated patients in Intensive Care Units? The answer to this question aimed to describe the scientific evidence on the use of CPOT in pain assessment in critically ill ventilated patients in ICUs.

Methodology

An integrative literature review was conducted, based on the six steps outlined by Mendes et al. (2008). The bibliographic search was conducted in the PubMed, CINAHL, and MEDLINE databases (via the EBSCOhost platform), supplemented with gray literature identified through Google Scholar.

The search strategy was based on cross-referencing health science descriptors and the natural concept - CPOT - using the following equation: *"Pain* Measurement" AND *"Critical* Care" AND *"Intensive Care* Units" AND "CPOT". The research was conducted between July 19 and 22, 2025,

with no time restrictions, in order to consider all published studies.

The Portuguese and English languages and the availability of full text were defined as filters. The choice of these criteria is justified by the scarcity of scientific production on the subject and the need to ensure full accessibility to the selected publications. Thus, 506 records were identified through advanced search.

On the Rayyan platform, before screening the articles, 115 duplicates were removed. Only at this stage were the cut-off criteria applied, and 221 were eliminated because they were published before 2020, 34 because they were available in languages other than Portuguese or English, and 34 because there was no free access to the full text.

Thus, the following exclusion criteria were applied to the remaining 102 articles: studies with a pediatric population (age <18 years), presence of critically ill patients not on ventilation, the location of the approach not being in an ICU, and not answering the research question of this integrative literature review, leaving 5 articles for review.

The selection process is represented in the adapted PRISMA 2020 flowchart, prepared according to the guidelines of Page et al. (2021).

Presentation of Results

For each of the five studies included, data were extracted regarding: author(s), year, publication and country of publication, type of study, data collection instrument, participants/sample, general objective, and main conclusions. The synthesis was conducted in tabular form, with data grouped into thematic categories that reflect the evidence regarding the *outcome* of CPOT in critically ill ventilated patients.

Discussion of Results

The results of this review allowed us to synthesize the current scientific evidence on the *outcome* of the CPOT in the assessment of pain in critically ill patients ventilated in ICUs, demonstrating the usefulness, sensitivity, and accuracy of the scale.

The studies analyzed reinforce that the CPOT is a reliable and clinically relevant tool for nursing practice. Due to its operational simplicity, it allows for an increase in the number of pain assessments and reassessments in patients unable to report it verbally (Alotni et al., 2025). In addition, the scale demonstrates versatility by being applicable to both conscious and unconscious patients (Marques et al., 2022). This is in line with the findings of Wojnar-Gruszka et al. (2022), who highlight the ability of the CPOT to identify signs of pain in critically ill patients, even when they are deeply sedated.

The observational and prospective study conducted by Aktas & Yilmaz (2020) showed that some routine nursing procedures, such as secretion suctioning and repositioning, are potentially painful. Other authors add that interventions such as wound treatment and dressing changes are also identified as painful, according to CPOT results (Wojnar-Gruszka et al., 2022).

These data reinforce the need for adequate pain management, which often involves the administration of analgesic or opioid medications, such as fentanyl. To this end, it is pertinent to assess the intensity of pain felt

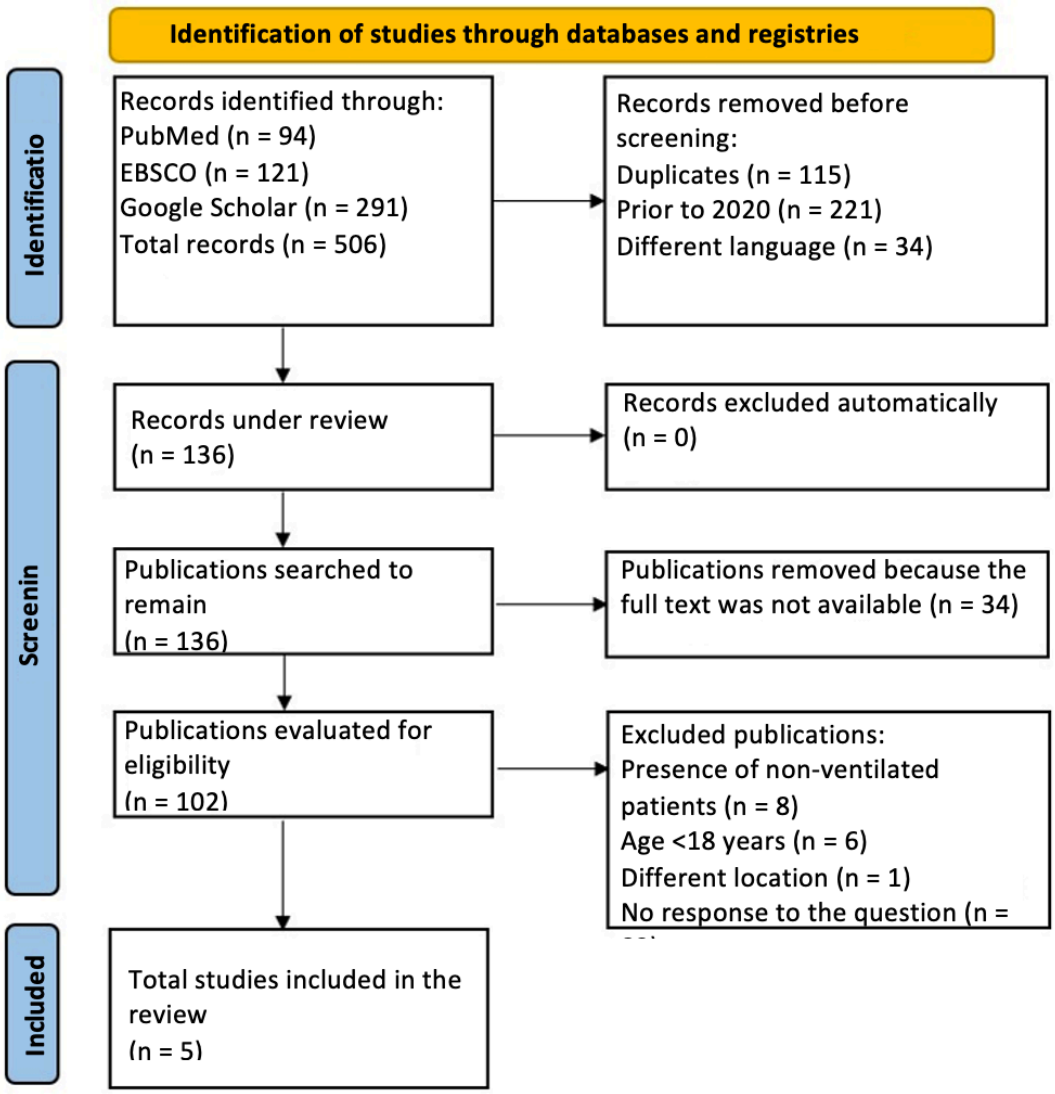

Figure 1 - Flowchart of the study selection process according to the PRISMA 2020 model

Author(s) / Year / Publication / Country	Type of study / Data collection instrument	Participants/Sample	General objective
Article 1 *– Impact of implementing the critical-care pain observation tool in an adult intensive care unit: A nonrandomized stepped-wedge trial*			
• Majid A. Alotni, Jenny Sim, Ginger Chu, Michael Guilhermino, Daniel Barker, Stuart Szwed, Ritin Fernandez • 2024 • Australian Critical Care Journal • Saudi Arabia	• Non-randomized clinical trial using a stepped-wedge model • CPOT	• n = 725 (patients unable to report pain)	• Implementation of CPOT to improve pain assessment
Main conclusion • The implementation of CPOT significantly increased the daily number of pain assessments and reassessments in patients unable to report pain.			
Article 2 *– Investigating the effect of the CPOT-based pain management program on pain intensity and dose adjustment of analgesics in mechanically ventilated patients: A randomized clinical trial*			
• Fatemeh Kouhi, Razieh Froutan, Ahmad Bagheri Moghaddam • 2023 • Nursing Practice Today • Iran	• Randomized controlled clinical trial • CPOT • Behavioral Pain Scale (BPS) • Recording of analgesic dosage – fentanyl	• n = 35 (control group) • n = 35 (intervention group)	• To determine the effect of a CPOT-based pain control program on pain intensity and on the adjustment of analgesic management.
Main conclusions • CPOT proved to be adequate for determining the presence of pain and assessing its intensity, reducing the dose of analgesics used.			
Article 3 *– Validation testing of the European Portuguese Critical-Care Pain Observation Tool*			
• Rita Marques, Filipa Araújo, Marisa Fernandes, José Freitas, Maria Anjos Dixe, Céline Gélinas • 2022 • Healthcare Journal • Portugal	• Prospective observational cohort study • CPOT • BPS	• n = 63 (unconscious patients) • n = 47 (conscious patients)	• To translate and validate the Portuguese version of CPOT.
Main conclusions • CPOT is a valid and reliable tool for pain assessment in patients admitted to ICUs and can be applied to both conscious and unconscious patients.			
Article 4 *– The diagnostic accuracy of the Critical-Care Pain Observation Tool (CPOT) in ICU patients: A systematic review and meta-analysis*			

• Yue Zhai, Shining Cai, Yuxia Zhang • 2020 • Journal of Pain and Symptom Management • China	• Systematic review and meta-analysis • Studies involving diagnostic accuracy tests	• n = 25 (studies)	• To determine the accuracy of CPOT in pain assessment.
Main conclusion • CPOT shows fair accuracy; however, it is not excellent due to differences in the minimum cut-off value used to indicate the presence of pain.			
Article 5 - *Determination of procedural pain intensity: adult intensive care unit survey*			
• Sare Aktas, Meryem Yilmaz • 2020 • *International Journal of Caring Sciences* • Turkey	• Observational and prospective study • Questionnaire - 10 questions • CPOT	• n = 64 (sedated patients)	• To determine pain intensity based on behaviors before, during, and 20 minutes after endotracheal suctioning and positioning changes.
Main Conclusions • Through the CPOT, it was possible to determine that patients experience pain during the endotracheal suctioning procedure and during positioning changes. According to the scores obtained through the CPOT, positioning changes are less painful than secretion suctioning.			

Table 1 – Synthesis of scientific evidence

using scales, proving that the use of CPOT allows for a reduction in the dose of analgesic administered (Kouhi et al., 2023). Thus, the implementation of this tool significantly improves pain management, being an effective strategy in analgesic decision-making and in reducing associated complications, improving the clinical outcome of patients (Afenigus, 2024).

However, the evidence is not entirely consistent regarding the accuracy of the CPOT. According to Zhai et al. (2020), after analyzing 25 studies on this scale, they suggest that it does not perform excellently due to the difference in the minimum value to be considered as an indicator of pain. However, the operational definition of the CPOT establishes that a score greater than or equal to 3 points indicates the presence of pain (Marques et al., 2022).

When compared to other widely used tools, such as the BPS, the scale addressed in this review proves to be slightly more time-consuming in its application; however, it offers more reliable clinical assessments, bringing significant benefits to clinical nursing practice (Sedighi et al., 2024). Therefore, considering that the CPOT was only validated in 2022 for Portugal (Marques et al., 2022), its implementation requires continuous training and institutional integration through adequate training (Afenigus, 2024).

Overall, the literature recommends the routine use of CPOT in ICUs due to its accuracy and sensitivity in this type of patient, and the systematic introduction of the scale in pain monitoring is beneficial (Wojnar-Gruszka et al., 2022). The incorporation of the scale into electronic medical records is

a strategic step to ensure continuity of care (Afenigus, 2024).

Conclusion

The scientific evidence gathered and analyzed in this integrative literature review allows us to recognize the CPOT as a reliable and clinically useful tool in the daily routine of nurses, particularly in the assessment of pain in critically ill ventilated patients who are unable to self-report their discomfort. The scale demonstrates efficacy in identifying pain associated with routine procedures, which allows for adequate planning and safe management of the analgesic therapy instituted, thus contributing to the improvement of nurses' clinical practice. The results also indicate that the systematic application of the CPOT can reduce its administration, improving clinical outcomes.

The literature highlights relevant advantages of the CPOT over other pain assessment scales, emphasizing its relevance in ICU contexts and in the patients considered in this review. Therefore, its implementation requires adequate training and integration into clinical record systems to ensure effective and continuous use.

However, some limitations remain, namely the small number of studies published on the subject and, in particular, the scarcity of research exploring the use of the CPOT in the Portuguese context. This gap reinforces the need to expand research in this area, including the application of the scale to other specific population subgroups, such as neurological, pediatric, and geriatric patients.

In summary, the CPOT is a valuable tool for clinical nursing practice, contributing to a more accurate assessment of pain and an overall improvement in the quality of care provided. Continued research will be essential to strengthen the standardization of the scale, validate its use in different clinical contexts, and promote its widespread adoption.

References

Administração Central do Sistema de Saúde. (2024). Recomendações Técnicas para Instalações de Unidade de Cuidados Intensivos. Em *RT 09/2013, V. 2024* (p. 8).

Afenigus, A. D. (2024). Evaluating pain in non-verbal critical care patients: a narrative review of the critical care pain observation tool and Its clinical applications. *Frontiers in Pain Research*, *5*. https://doi.org/10.3389/fpain.2024.1481085

Aktas, S., & Yilmaz, M. (2020). Determination of Procedural Pain Intensity: Adult Intensive Care Unit Survey. *International journal of caring sciences*, *13*(1), 497–506.

Alotni, M. A., Sim, J., Chu, G., Guilhermino, M., Barker, D., Szwec, S., & Fernandez, R. (2025). Impact of implementing the critical-care pain observation tool in the adult intensive care unit: A nonrandomised stepped-wedge trial. *Australian Critical Care*, *38*(2), 101129. https://doi.org/10.1016/j.aucc.2024.09.014

Camelo Filho, A., Lopes Junior, J. E. G., Ferreira, T. S., Montenegro, J. P., Santos, J. de S., Neves, E. de A. e, Vanderlei, E. de S. O., & Pinheiro, D. G. M. (2025). DOR: COMO DEFINIR – UMA REVISÃO BIBLIOGRÁFICA. *Revista Contemporânea*, *5*(5), e8029. https://doi.org/10.56083/RCV5N5-011

Cunha, J. M., & Lisboa, J. (2020). *Gestão da Dor na Pessoa em Situação Crítica* [Relatório de Estágio]. Escola Superior de Enfermagem de Lisboa.

Direção-Geral de Saúde. (2003). A Dor como 5º sinal vital. Registo sistemático da intensidade da Dor. Em *Circular Normativa Nº9/DGCG*.

Kouhi, F., Froutan, R., & Moghaddam, A. B. (2023). 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*. https://doi.org/10.18502/npt.v10i3.13430

Marques, R., Araújo, F., Fernandes, M., Freitas, J., Dixe, M. A., & Gélinas, C. (2022). Validation Testing of the European Portuguese Critical-Care Pain Observation Tool. *Healthcare*, *10*(6), 1075. https://doi.org/10.3390/healthcare10061075

Mendes, K. D. S., Silveira, R. C. de C. P., & Galvão, C. M. (2008). Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. *Texto & Contexto - Enfermagem*, *17*(4), 758–764. https://doi.org/10.1590/S0104-07072008000400018

Morais, O. M. dos, Mata, C., Fernandes, M. de F., Monteiro, M. de F., Castro, S., Príncipe, F., & Mota, L. (2021). Doente sedado, consciente e ventilado invasivamente: terapêuticas de enfermagem. *Revista de Investigação & Inovação em Saúde*, *4*(1), 7–17. https://doi.org/10.37914/riis.v4i1.118

Ordem dos Enfermeiros. (2023, Abril 28). *Critical-Care Pain Observation Tool (CPOT)*. https://www.ordemenfermeiros.pt/eventos/conteudos/critical-care-pain-observation-tool/.

Ordem dos Médicos (Colégio de Medicina Intensiva), & Sociedade Portuguesa de Cuidados Intensivos. (2023). *Transporte de Doentes Críticos Adultos - Recomendações*. https://www.spci.pt/media/documentos/15827260365e567b2411424.pdf.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. https://doi.org/10.1136/bmj.n71

Salviano, F. W. B., Vieira, J. E. B. A., & Silva, M. R. L. e. (2025). Avaliação da dor em pacientes sob cuidado intensivo: Uma revisão integrativa. *Research, Society and Development*, *14*(1), e2314147985. https://doi.org/10.33448/rsd-v14i1.47985

Sedighi, L., Shirozhan, S., Talebi-Ghane, E., Taher, A., Eliasi, E., Gomar, R., & Mollai, Z. (2024). Comparison of the accuracy and the response time to behavioral pain scales (BPS and CPOT) during painful procedures in the intensive care unit. *Journal of Education and Health Promotion*, *13*(1). https://doi.org/10.4103/jehp.jehp_780_23

Wojnar-Gruszka, K., Sega, A., Płaszewska-Żywko, L., Wojtan, S., Potocka, M., & Kózka, M. (2022). Pain Assessment with the BPS and CCPOT Behavioral Pain Scales in Mechanically Ventilated Patients Requiring Analgesia and Sedation. *International Journal of Environmental Research and Public Health*, *19*(17), 10894. https://doi.org/10.3390/ijerph191710894

Zhai, Y., Cai, S., & Zhang, Y. (2020). The Diagnostic Accuracy of Critical Care Pain Observation Tool (CPOT) in ICU Patients: A Systematic Review and Meta-Analysis. *Journal of Pain and Symptom Management*, *60*(4), 847-856.e13. https://doi.org/10.1016/j.jpainsymman.2020.06.006