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THE ASSESSMENT OF PAIN IN SEDATED PATIENTS IN INTENSIVE CARE UNITS – AN INTEGRATIVE LITERATURE REVIEW

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Abstract: Introduction: Patients in Intensive Care Units (ICU) experience pain during hospitalization, and factors such as sedation influence communication, preventing patients from reporting their pain. Pain causes stress and changes in the nervous system; therefore, better pain control is associated with a better and faster recovery for the person, reducing the length of hospital stay and associated costs. Nurses must resort to hetero-assessment to carry out pain assessment and monitoring, and the use of behavioral scales is advisable. **Objectives:** To analyze the effectiveness of the Behavior Pain Scale (BPS) and Critical Care Pain Observation Tool (CPOT) in assessing pain in sedated patients in the ICU; identify which procedures are most painful for sedated patients in the ICU. **Methodology:** Integrative Literature Review, based on primary, quantitative, and observational studies, acquired through the search engines EBSCOhost, B-On and the Academic Search Complete, CINAHL Complete, MedicLatina, and Medline Complete databases. We used the PICOD method to conduct the research, selecting six articles published between 2018 and 2023. **Results:** The articles analyzed show that the BPS and CPOT are valid and reliable scales for assessing pain in sedated patients. Both demonstrated sensitivity and reliability, allowing us to infer their pain intensity. Many routine procedures cause pain to the person. **Conclusion:** Both scales demonstrated adequate psychometric parameters to assess pain. Both scales are recommended simultaneously, providing a more rigorous and precise assessment of pain. There are nursing procedures that cause pain to the person, even under sedation and analgesia, such as alternating positions, respiratory rehabilitation, oral hygiene, and aspiration of secretions. The scales proved to be suitable for assessing the existence of pain in these people.
Keywords: Intensive Care Units, pain scales, pain assessment, sedated patient.

INTRODUCTION

Estimates indicate that more than 50% of patients in Intensive Care Units (ICU) experience pain during hospitalization, the most common causes being post-trauma pain, surgical interventions, pain associated with invasive procedures such as arterial line insertion, treatment of wounds, aspiration of the airways and removal of the endotracheal tube, and pain may also be felt during routine procedures, such as hygiene care and alternating positions, and even at rest (Nazari, Froelicher, Nia, Hajihosseini, & Mousazadeh, 2022). However, there are barriers to effective communication in sedated patients, with reduced levels of consciousness and/or endotracheal intubation, limiting the patient's self-assessment/perception of pain. Pain causes stress and changes in the activity of the nervous system; therefore, better pain control is associated with better results in the patient's clinical condition (Gomarverdi, Sedighie, Seifrabiei, & Nikooseresht, 2019).

Most patients in an ICU require sedation at some point during their hospitalization, especially if they undergo procedures such as endotracheal intubation or invasive mechanical ventilation (IMV) (Queiroz et al., 2023). Sedation consists of the administration of drugs to provide comfort to the patient by reducing the level of consciousness. This can be classified as mild, moderate, and profound (Mendes et al., 2020). Adequate pain management and sedation are important to improve the person's comfort, decreasing the duration of IMV and reducing the risk of delirium (Máximo & Puga, 2021).

Pain is an unpleasant sensory and emotional experience associated with or similar to that which produces actual or potential tissue damage (Raja et al., 2020). In 2003, the Directorate General of Health (DGH) considered pain as the 5th vital sign, determining as a rule that the presence of pain and its intensity be valued, diagnosed, evaluated, and recorded. The Portuguese Association for the Study of Pain (2023) emphasizes six fundamental aspects of pain: pain is always a personal experience that is influenced to different degrees/levels by biological, psychological, and social factors.

Pain can be characterized according to its duration (acute or chronic), location (peripheral or central), and etiology, namely neuropathic pain (nerve damage), visceral pain (organ damage), or somatic pain (injury caused to the bones and muscles) (Stites, 2013; Batalha, 2015). Pain assessment should preferably be carried out through self-report, in which the person characterizes the pain they are experiencing. However, self-assessment is not always possible, and it is necessary to resort to hetero-assessment, which is carried out through the observation of physiological and behavioral indicators by others. The nurse, being a professional who establishes a close relationship with the patient, must assess pain to promote pain relief and patient comfort (OE, 2008).

Sedated patients may be unable to report their pain due to their health condition, making pain assessment a challenge. In Persons in Critical Condition (PCC), it must be assumed that pain is present, and it is the patient's right to have it evaluated, and the application of assessment instruments is recommended (Dunwoody, Krenzischek, Pasero, Rathmell, & Polomano, 2008; Bourbonnais, Malone-Tucker, & Dalton-Kischel, 2016). The application of a pain intensity assessment instrument and its recording is considered good practice (OE, 2021). Therefore, it is also recommended by the DGH (2003) to regularly assess and record pain intensity in all healthcare services. "The mandatory assessment and recording of pain are of enormous importance, given that, mainly for cultural reasons, pain is sometimes

underestimated, hidden, denied and, consequently, neglected, both by the person and by health professionals" (OE, 2021).

In this sense, scales were developed to evaluate pain in PCC, such as the Behavioral Pain Scale (BPS), which is a unidimensional scale designed by Payen et al. (2001) and encompasses three behavioral domains: facial expression, upper limb movements, and adherence to mechanical ventilation. Each domain is scored from 1 to 4 and the total score varies between a minimum level of pain (total score = 3) and a maximum level of pain (total score = 12), higher scores correspond, simultaneously, to a greater level of pain and agitation of the person (Dehghani, Keikhaei, Yaghoubinia, Keykha, & Khoshfetrat, 2019).

Another widely used scale is the Critical Care Pain Observation Tool (CPOT), validated for the first time in 2006. This is based on the BPS scale model, with some differences, such as CPOT covering movements of the body and not just the upper limbs as in BPS, in addition to adding a fourth domain, muscle tension, which is not assessed in BPS, with each domain scored from 0 to 2. Furthermore, we can use the vocalization domain instead of adaptation to the ventilator for non-communicative patients who remain autonomous on ventilation. The score ranges from 0 to 8 points, a total score greater than 0 points indicates the presence of pain (Phillips, Kuruvilla, & Bailey, 2019).

Given the complexity and relevance of this topic, we developed the following research question: "How effective are the BPS and CPOT scales in assessing pain in sedated patients in the ICU?". The objectives were to analyze the effectiveness of the BPS and CPOT scales in assessing pain in sedated patients in the ICU; and identify which procedures are most painful for sedated patients in the ICU. To develop our research question, we will use the PICOD mnemonic, which is fundamental for the selection of articles, data extraction, and evidence mapping.

METHODOLOGY

The Integrative Literature Review (ILR) research method is one of the methods used to achieve good Evidence-Based Practice (EBP), as it allows a compilation of evidence and respective analysis, enabling conclusions, to support decision-making and improve clinical practice (Sousa, Vieira, Severino, & Antunes, 2017). An EBP allows the constant review of practices to find more effective ways to improve care, as well as more efficient use of available resources (Conselho Internacional de Enfermeiros, 2012 as mentioned by Chicória, 2013).

For this to be possible, it is necessary to identify the topic, elaborate the research question, define criteria for inclusion and exclusion of studies, analyze the included studies, interpret the results, and present a synthesis of knowledge/presentation of the integrative review (Mendes, Silveira, & Galvão, 2018; Souza, Silva, & Carvalho, 2010). The execution of this IRL will allow us to analyze the effectiveness of assessment instruments for assessing pain in people sedated in the ICU and identify the most painful procedures in patients sedated in the ICU. To formulate the problem question, we used the PICOD mnemonic (Table I) as a basis.

P	Population	Patients sedated in ICU
I	Intervention	Pain Assessment
C	Comparison	Not applicable
O	*Outcomes*	Effectiveness of the BPS and CPOT scales
D	*Study design*	Quantitative observational primary studies

Table 1 – PICOD Method

The inclusion and exclusion criteria were pre-established to achieve results that met the research question elaborated. Thus, the

inclusion criteria were defined as articles published between 2018 and 2023, primary studies, and free access to the full text, available in Portuguese, English, or Spanish, referring to the adult population in ICU, which are submitted sedation. Exclusion criteria include patients with changes in consciousness that are not caused by sedation, duplicate articles, and systematic literature reviews.

The following DeCS/MeSh descriptors were used: "Intensive Care Unit", "pain scales", "pain assessment", "pain measurement", "sedated patient" and "adult", in the B-On search engine, in the available databases, with the following search expression (S1): "TX(sedated patient) AND TX(pain scales) AND TX(pain) AND TX(intensive care unit) NOT TX(neonate or neonatal or premature or preterm or newborn or infant) NOT TX(dementia or alzheimers or cognitive impairment or memory loss) NOT TX(brain injury or head injury or traumatic brain injury or acquired brain injury)".

A search was also carried out in the EBSCOhost search engine, in the databases MEDLINE Complete, CINAHL Complete, and Academic Search Complete, with the search expression (S2): "TX(sedated patient) AND TI(pain) AND TX(pain scales) AND TI(adult) AND TX(intensive care unit)" and also with a different combination of keywords, to obtain more articles, result in the following expression (S3): ("pain assessment" OR "pain measurement " OR pain AND CPOT OR "CPOT pain scale" OR "critical-care pain observation tool" OR BPS OR "behavior pain scale" AND "sedated patient" OR sedation OR sedative AND "intensive care" OR ICU OR "intensive care unit" OR "intensive care units" AND adult OR adults.").

A total of six articles were selected, four articles in the B-On search engine and two articles in EBSCOhost, and they were coded according to the search engine, that is, the articles that were found in the search engine B-On were coded as B1, B2, B3 and B4, respectively, and the EBSCOhost articles as E1 and E2. Table 2 lists the articles selected for our ILR chronologically (from oldest to most recent).

RESULTS

To facilitate the presentation of the results, we prepared tables with the summary of the selected article, where we addressed the respective title, authors and country, the type of study, methodology used, results, and conclusion thereof.

The selected articles comply with the inclusion and exclusion criteria applied during the research and selection. Therefore, the selected articles are primary, with a quantitative methodological approach; E1, B1, B2, and B4 were cross-sectional observational studies, E2 was a prospective observational study, and B3 was a prospective observational cohort study. Regarding the context, all studies were carried out in a hospital environment, more specifically in the ICU and the sample size varied between 45 and 110 participants. In all studies, at least one of the scales was applied and evaluated.

The results of study E1 show a directly proportional relationship between the RASS and CPOT scales, because, when the RASS score decreases (indicator of sedation), the CPOT score also decreases, and when the RASS score increases (indicator of agitation), the CPOT score also increases. The B4 study also found a relationship between the RASS scale and the BPS and CPOT scales. These results indicate that deeply sedated patients show fewer signs of pain, and that, on the other hand, it is difficult to distinguish behaviors derived from agitation with signs of pain, which allows us to conclude that the CPOT is not adapted to the specifications of agitated patients, demonstrating that it is not a good tool for assessing pain in these patients,

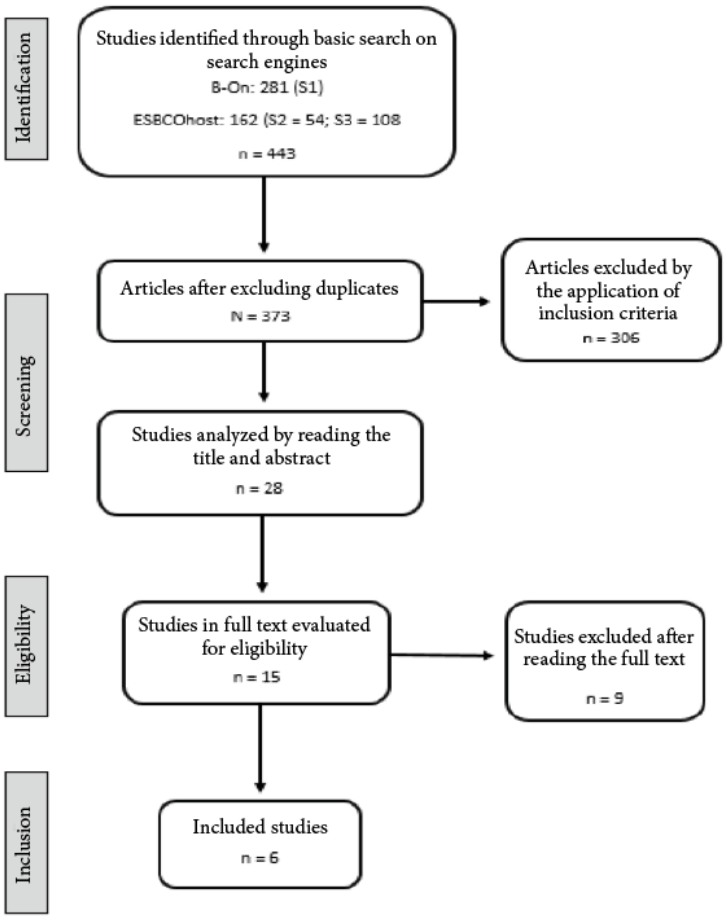

Figure 1 - PRISMA flowchart for article selection (prepared by the authors).

Article / Title	**Year / Authors**	**Journal / Type of Study**
E1 *"The Critical care Pain Observation Tool is reliable in non-agitated but not in agitated intubated patients"*	2018 / H. Chookalayia; M. Heidarzadeh; M. Hassanpour-Darghah; M. Aghamohammadi-Kalkhoran; M. Karimollahi.	*Intensive and Critical Care Nursing / Cross-sectional observational study*
B1 *"Comparison of Two Pain Scales: Behavioral Pain Scale and Criticalcare Pain Observation Tool During Invasive and Noninvasive Procedures in Intensive Care Unitadmitted Patients"*	2019 / S. Gomarverdi, L. Sedighie, M. A. Seifrabiei, M. Nikooseresht	*Iranian Journal of Nursing and Midwifery Research / Cross-sectional observational study*
E2 "Determination of Procedural Pain Intensity: Adult Intensive Care Unit Survey"	2020 / S. Aktas, M. Yilmaz.	*International Journal of Caring Sciences / Prospective observational study*
B2 "Diagnostic Values of the Critical Care Pain Observation Tool and the Behavioral Pain Scale for Pain Assessment among Unconscious Patients: A Comparative Study"	2022 / R. Nazari; E. Froelicher; H. Nia; F. Hajihosseini; N. Mousazadeh	*Indian Journal of Critical Care Medicine / Cross-sectional observational study*
B3 "Validation Testing of the European Portuguese Critical-Care Pain Observation Tool"	2022 / R. Marques; F. Araújo; M. Fernandes; J. Freitas; M. Dixe; C. Gélinas.	*Healthcare / Prospective observational cohort study*
B4 "Pain Assessment with the BPS and CCPOT Behavioral Pain Scales in Mechanically Ventilated Patients Requiring Analgesia and Sedation"	2022 / K. Wojnar-Gruszka; A. Sega, L. Płaszewska-Zywko; S.Wojtan; M. Potocka; M. Kózka.	*International Journal of Environmental Research and Public Health / Cross-sectional observational study*

Table 2 - Articles selected for the ILR.

E1	*The Critical Care Pain Observation Tool is reliable in non-agitated but not in agitated intubated patients*
Authors: H. Chookalayia; M. Heidarzadeh; M. Hassanpour-Darghah; M. Aghamohammadi-Kalkhoran; M. Karimollahi.	
Year: 2018	**Country:** Iran **Type of study:** Cross-sectional observational
Objectives	To evaluate the psychometrics of the CPOT scale
Methodology	Inclusion criteria: age over 18 years old; on IMV for more than 24 hours; ability to hear and respond through movement of the head, eyes, or eyebrows; minimum score of 6 on the Glasgow Coma Scale (GCS); RASS score from -3 to +2. Exclusion criteria: diagnosis of tetraplegia; extensive injuries to the face and arms; muscle function disorders; use of neuromuscular blockers and consumption of substances (drugs and alcohol). Population: patients admitted to the ICU of three hospitals in Ardabil (35 beds). Through convenience sampling, 65 patients were included in the study. Patients were distributed into four groups, with Group 1 including all patients (n=65), the remaining groups were constituted according to the RASS score: Group 2, sedated patients (RASS -3 to - 1; n = 33); Group 3, restless patients (RASS +1; n = 17); Group 4, agitated patients (RASS = +2, n = 15). Calm patients (RASS = 0) were excluded as there were few participants (n=2). Two observers/evaluators carried out the psychometric evaluation of the properties of the CPOT: they applied the scale simultaneously, but individually, before, during, and after a painful procedure (alternation of decubitus) and a non-painful procedure (washing the eyes with cotton wool and saline solution).
Results	In group 1, the score obtained in the painful procedure was higher than the scores in the non-painful procedure and the resting state. The "facial expression" domain score increased during the non-painful procedure compared to the resting state. In group 4 (agitated patients), there was a significant increase in the total CPOT score during the painful procedure, compared to the score for the non-painful procedure and the resting state; however, there was no significant difference between the majority of scores for each domain. The report of pain through movement of the head, eyes, and eyebrows was used to evaluate the criterion validity for the presence of pain. Thus, in 113 assessments out of a total of 390, patients reported the presence of pain. There was a significant difference ($p< 0.001$) in the scores of patients who reported pain than those of patients who did not report pain, which was higher in patients who reported pain. This significant difference was also found in all domains of CPOT in the different groups, except for the domain of body movements and muscle tension, where, in group 4 (agitated patients) there was no significant difference between the scores of patients who reported pain and those who did not.
Conclusion	The study concluded that the CPOT has good and reliable psychometric properties for assessing pain in ICU patients with a RASS score of -3 to +1. CPOT is not a good tool for evaluating pain in agitated patients according to the RASS score, as it does not adapt to their clinical situation, thus recommending further studies in this area. The CPOT and RASS scores are directly proportional, because, when the RASS scale score decreases (sedated patients), the pain score also decreases, and, when the RASS score increases, the score of CPOT also increases. The non-painful procedure was characterized by touching the patient's face, which can cause a natural reaction, increasing the CPOT score even without the presence of pain, constituting one of the disadvantages of this scale.

Table 3 - Summary of study E1.

B1	*Comparison of Two Pain Scales: Behavioral Pain Scale and Critical-care Pain Observation Tool During Invasive and Noninvasive Procedures in Intensive Care Unit-admitted Patients*
Authors: S. Gomarverdi, L. Sedighie, M. A. Seifrabiei, M. Nikooseresht	
Year: 2019	**Country:** Iran **Type of Study:** Cross-sectional observational
Objectives	To compare the BPS and CPOT scales in detecting pain in patients admitted to the ICU during routine procedures; compare the intensity of pain in invasive and non-invasive procedures, such as aspiration of secretions, alternation of positions, oral hygiene, and respiratory rehabilitation, using the two scales.
Methodology	Inclusion criteria: patients in ICU; aged between 18 and 65 years old; patients who were unable to report their pain; expected length of stay in the ICU greater than 12 hours. Exclusion criteria: patients with progressive neuromuscular disease or paralyzed; conscious patients. Population: patients admitted to the ICU, in hospitals affiliated with the Hamadan University of Medical Sciences in Iran; 90 patients were selected. The patient's pain was assessed by a nurse specialized in the use of the BPS and CPOT scales, for 3 months. The patient's pain was assessed during routine procedures, such as alternating positions, suctioning secretions, oral hygiene, and respiratory rehabilitation, and also at rest.

Results	On the BPS scale, the median score was 3 in the resting position, followed by respiratory rehabilitation with 4 points, alternation of decubitus with 5, oral hygiene with 6, and aspiration of secretions with 7. The lowest score on this scale during rest, change of decubitus, oral hygiene, and respiratory rehabilitation was 3, and for aspiration of secretions, 4. The highest score during rest, change of decubitus, oral hygiene, and aspiration of secretions was 12, and in respiratory rehabilitation was 10. On the CPOT scale, the median score during rest was 0, respiratory rehabilitation was 1, change of decubitus and oral hygiene was 3, and aspiration of secretions was 4. The lowest CPOT score was during rest, change of decubitus, oral hygiene, and respiratory rehabilitation with 0 and secretion aspiration with 1. The highest score on this scale was 8 during rest procedures, change of position, oral hygiene, and secretion aspiration, and 7 during respiratory rehabilitation. The results demonstrate a strong correlation between the scales, however, the median pain assessment was significantly different in both scales ($p< 0.001$).
Conclusion	PCC admitted to the ICU felt pain during apparently painless routine procedures and painful procedures. Based on both scales, people did not feel pain during rest, had mild pain during alternating positions and respiratory rehabilitation, mild to moderate pain during oral hygiene, and moderate pain during aspiration of secretions. The positive and strong correlation of the BPS and CPOT indicates that both scales are suitable for assessing pain in PCC. Both scales are sensitive to detect changes in the response to pain and distinguish between painful and non-painful procedures.

Table 4 - Summary of study B1.

E2	Determination of Procedural Pain Intensity: Adult Intensive Care Unit Survey
Authors: S. Aktas, M. Yilmaz.	
Year: 2020	**Country:** Turkey **Type of study:** Prospective Observational
Objectives	To determine the intensity of pain in adults during ICU procedures.
Methodology	Inclusion criteria: patients in ICU levels II and III; over the age of 18; on IMV; sedated with midazolam; sedation levels 5 and 6 according to the Ramsey Sedation Scale; be hemodynamically stable; inability to report pain; Exclusion criteria: patients with peripheral neuropathy or quadriplegics; patients under the influence of neuromuscular agents or neuromuscular blockers. Population: 64 patients admitted to ICU levels II and III of a public hospital in Turkey. The CPOT was applied by a researcher, and the pain was assessed at three moments, more specifically before, during, and 20 minutes after a non-painful procedure (change of positions) and a painful procedure (suction of secretions). In this sense, the evaluation was carried out 18 times on each patient.
Results	During the secretion aspiration and alternation of decubitus, the scores in the domains of facial expression, muscle tension, body movements, and total CPOT scores were significantly higher during the procedures than in the period before the procedure ($p<0.05$). The duration of intubation, sedation, and ICU stay have a significantly positive correlation with the total CPOT score. Patients felt more pain during the secretion aspiration procedure (2.90) than when alternating positions (1.30). The facial expressions subscale score was the highest before, during, and after 20 minutes of both procedures.
Conclusion	Patients experienced pain during secretion aspiration and alternating positions. The patients' facial expressions changed, they tried to express pain through body language, so the pain caused tension in the muscles, causing changes in ventilation during aspiration. According to the study, alternating positions causes less pain than aspiration of secretions, according to facial score, body movements, and muscle tension, and does not affect ventilation.

Table 5 - Summary of study E2.

B2	***Diagnostic Values of the Critical Care Pain Observation Tool and the Behavioral Pain Scale for Pain Assessment among Unconscious Patients: A Comparative Study***
Authors: R. Nazari; E. Froelicher; H. Nia; F. Hajihosseini; N. Mousazadeh	
Year: 2022	**Country:** Iran **Type of study:** Cross-sectional observational
Objectives	To compare the diagnostic value of the Critical Care Pain Observation Tool (CPOT) and the Behavioral Pain Scale (BPS) for assessing pain in unconscious patients.
Methodology	Inclusion criteria: patients in ICU; minimum length of stay of 24 hours in the ICU; age over 18; inability to report pain (determined by a Glasgow Coma Scale score of less than 14. Exclusion criteria: postoperative complications; hemodynamically unstable; cognitive or psychiatric disorders; history of epilepsy; use of neuromuscular blockers or diagnosis of tetraplegia. Population: Carried out in four multipurpose ICUs in two hospitals in Iran. Through convenience sampling, 45 patients were included in the study. Two nurses carried out the simultaneous, but independent, application of the BPS and CPOT scales during a nociceptive procedure (alternation of positions) and a non-nociceptive procedure (non-invasive assessment of blood pressure).

Results	The mean CPOT scores and the domains of facial expression, body movement, and muscle tension were significantly higher during the nociceptive procedure than the non-nociceptive procedure ($p<0.05$). There were no significant differences between nociceptive and non-nociceptive procedures in the mean scores in the ventilation adaptation domain ($p>0.05$). The mean BPS scores and the domains of facial expression and upper limb movement were significantly higher during the nociceptive procedure than in the non-nociceptive procedure ($p<0.05$) The mean score in the ventilation adaptation domain during both procedures was not significant ($p>0.05$). Both scales distinguish nociceptive procedures from non-nociceptive procedures, assuming a significant statistical value ($p<0.05$).
Conclusion	The discriminant validity indicated that both CPOT and BPS are effective in distinguishing nociceptive procedures from non-nociceptive procedures in PSC in ICU; however, the results suggest that BPS differentiates these procedures better than CPOT. All domains of the BPS and CPOT scales differentiate nociceptive procedures from non-nociceptive procedures, except for the domain of adaptation to the ventilator, which can be justified by the fact that patients are sedated and tolerate IMV. The need for nurses to pay attention to non-verbal signs of pain during the application of the BPS and CPOT scales to ICU patients is highlighted.

Table 6 - Summary of study B2.

B3	***Validation Testing of the European Portuguese Critical-Care Pain Observation Tool***
Authors: R. Marques; F. Araújo; M. Fernandes; J. Freitas; M. Dixe; C. Gélinas **Year:** 2022 **Country:** Portugal **Type of study:** Prospective observational cohort	
Objectives	To validate the Portuguese version of the Critical Care Pain Observation Tool (CPOT) in the critically ill adult population in Portugal. To translate the CPOT into Portuguese and validate the translated version. To determine the discriminant validity, criterion validity, and convergent validity of the CPOT, as well as the inter-examiner reliability of the Portuguese version.
Methodology	Inclusion criteria: patient in ICU; minimum length of stay of 24 hours in the ICU; age over 18; on IMV; be able to understand the Portuguese language before intubation. Exclusion criteria: patients with neurological deficits, such as reduced range of motion, decreased strength and functionality, or altered sensitivity. Population: Carried out in an ICU with 11 beds at a University Hospital located in Lisbon. Consecutive sampling of 110 patients. The CPOT and BPS scales were applied (the BPS was used for validity), before, during, and 20 minutes after a nociceptive procedure, including alternating positions and aspiration of secretions; vital signs (heart rate, mean arterial pressure, respiratory rate) were recorded during the assessment. This process was carried out by two nurses simultaneously, but independently.
Results	Significantly higher median CPOT scores were obtained during the nociceptive procedure than those obtained before the procedure ($p<0.001$). The associations between CPOT scores and vital signs were evaluated, through convergent validity, so that it was possible to establish positive connections, albeit moderate, between CPOT scores and heart rate and respiratory rate, but not with mean arterial pressure. CPOT scores during the nociceptive procedure were significantly associated with the presence of pain, through the criterion validity of the BPS. Higher CPOT scores corresponded to higher BPS scores, equivalent to the presence of pain.
Conclusion	The Portuguese version of the CPOT appears to be a valid and reliable tool for assessing pain in ICU patients, constituting an alternative to the BPS scale, which until then had been the only validated scale for assessing pain in Portuguese ICU patients. The inter-rater reliability of the CPOT was excellent at rest and fair to moderate during the nociceptive procedure. CPOT was able to distinguish nociceptive procedures from non-nociceptive procedures. Significant correlations were detected between CPOT scores, heart rate, and respiratory rate during the nociceptive procedure. However, the nurse must use appropriate pain assessment tools, adapted to the patient's clinical condition, such as behavioral scales.

Table 7 - Summary of study B3.

B4	*Pain Assessment with the BPS and CPOT Behavioral Pain Scales in Mechanically Ventilated Patients Requiring Analgesia and Sedation*
Authors: K. Wojnar-Gruszka, A. Sega, L. Płaszewska-Zywko, S. Wojtan, M. Potocka, M. Kózka. **Year:** 2022 **Country:** Poland **Type of study:** Observational cross-sectional	
Objectives	To assess pain in ICU patients undergoing mechanical ventilation using the BPS and CPOT behavioral pain scales.
Methodology	Inclusion criteria: patients in ICU; minimum period of stay of 48 hours in the ICU; age over 18; unable to report their pain; being under sedation (RASS equal to or less than -1) and analgesia; on IMV; hemodynamically stable. Exclusion criteria: Patients with paresis or paralysis of the upper and/or lower limbs; patients under the influence of neuromuscular blockers; after suffering Acute Coronary Syndrome; have other injuries that prevent the assessment of pain (for example, in the craniofacial region). Population: Carried out in an ICU of the Krakow University Hospital. The study included 81 patients. Three observers simultaneously, but independently, applied the BPS and CPOT scales Pain was assessed three times a day for each patient, at fixed times (morning, afternoon, and night), before, during, and after nursing interventions, namely the aspiration of secretions, wound treatment, and alternation of positions.
Results	Pain-free scores were similar on both scales. Signs of pain were observed in approximately one-third of the assessments carried out during nursing interventions. When comparing the mean scores of both scales before, during, and after nursing procedures, signs of pain increased significantly during the procedures ($p<0.001$) and returned to values close to rest during the third observation (after the procedure). The RASS scores correlated significantly ($p <0.05$) and positively with the BPS and CPOT scores, demonstrating that deeply sedated patients show fewer signs of pain.
Conclusion	There is a positive correlation between the BPS and CPOT scales and the RASS scale. The results indicate that some nursing procedures frequently performed in the ICU are sources of pain, even in patients undergoing deep sedation and analgesia. The BPS and CPOT scales are useful tools for assessing the occurrence of pain in this group of patients.

Table 8 - Summary of study B4.

and further studies are recommended in this regard.

Article B1 analyzed the presence of pain in routine procedures in the ICU and found, through the application of BPS and CPOT, that patients did not feel pain at rest, had mild pain during respiratory rehabilitation and alternating positions, mild to moderate pain during oral hygiene and moderate pain during aspiration of secretions. Furthermore, study E2 confirmed the presence of pain during the aspiration of secretions and alternation of positions, through the application of CPOT. Both studies state that the most painful routine procedure in PCC in the ICU is the aspiration of secretions.

The results of study B4 allow us to understand, through the comparison of mean pain assessment scores before, during, and after nursing procedures on the CPOT and BPS scales, that in approximately one-third of the assessments carried out, signs of pain were observed in patients during the intervention. With that said, we emphasize that the assessment of pain in patients sedated in the ICU must be valued, as they feel pain in numerous procedures performed quite frequently during their hospitalization.

In general, studies revealed a positive and strong correlation between BPS and CPOT, namely the study B1, B2, B3, and B4, indicating that both scales are adequate and effective for evaluating pain in PSC, allowing the distinction between nociceptive procedures and non-nociceptive procedures, with the scales presenting higher scores in nociceptive procedures. In addition to the total score, an increase in scores in all CPOT and BPS domains was also evident, except for the ventilator adaptation domain, which did not show a significant difference in studies E2 and B2, which can be because patients are sedated and, for this reason, tolerate IMV better. Still regarding the change in the score of the scale domains, study E1 reported that the domain of facial expression can increase due to a natural reaction, associated with touching the face, not always meaning that there is the presence of pain. As previously mentioned, study B2 states that the BPS and CPOT scales are effective in assessing pain in PSC, but give preference to the BPS scale, as it has better

discriminant validity than CPOT, suggesting that the BPS differentiates better nociceptive from non-nociceptive procedures.

DISCUSSION

Assessing pain in sedated patients in the ICU is a challenge, and this is a topic of increasing relevance in clinical practice. The nurse plays a crucial role, as they are responsible for implementing effective strategies for the assessment and relief of pain, consequently providing a better quality of life for the patient, as pain that is not treated effectively can lead to negative consequences for the patient. Based on scientific evidence, knowledge about pain assessment scales can contribute to better quality practice. This approach could significantly improve the care provided to PCCs with pain. BPS and CPOT allow for an accurate and standardized assessment of pain, helping and facilitating decision-making by healthcare professionals, which can positively impact stability and treatment effectiveness. Furthermore, pain relief contributes to better and faster patient recovery, reducing hospitalization time and, consequently, resulting in lower costs for healthcare institutions (Teixeira & Durão, 2016).

In the ICU, nurses perform autonomous and interdependent interventions daily, which have the potential to cause pain in PCCs. In situations where the patient is sedated, verbal communication may be unfeasible, which is why it is necessary to use simple and reliable instruments that allow health professionals to carry out an adequate assessment of pain (Koftis, Baranska, Szydlowski, Zukowski, & Ely, 2017).

Both scales proved to be sensitive during procedures, allowing the intensity of pain to be inferred. Many of the routine procedures of hospitalization in this context, whether invasive or not, cause pain to the patient, including oral hygiene, alternating positions, respiratory rehabilitation, and aspiration of secretions, the latter being procedure proved to be the most painful, thus highlighting the importance of assessing pain during these procedures. Thus, it was possible to verify that there are nursing procedures that are sources of pain in patients, even under sedation and analgesia, which is why the CPOT and BPS scales proved to be adequate to assess the existence of pain in these patients and made it possible to distinguish between painful and not painful procedures.

The importance of nurses being attentive to non-verbal signs of pain during the application of the scales is highlighted. Cunha, Ribeiro and Pereira (2020) analyzed the potential for using pain assessment instruments in sedated patients in clinical practice, with the application of seven scales, namely FLACC (Face, Legs, Activity, Cry, Consolability), BPAS (Behavioral Pain Assessment Scale), BPS, NVPS (Nonverbal Pain Scale), CPOT, BPS-NI (Behavioural Pain Scale - Non-intubated patients) and NCS (Nociception Coma Scale). According to their results, the BPS obtained the best score (15 points out of a total of 16), which indicates that this scale is highly viable.

Agitation may be associated with the presence of pain and not with an error in sedation titration. In this sense, the assessment of pain through behavioral scales, including the CPOT and BPS, studied in this ILR, enable health professionals to carry out the assessment and management of pain, allowing a more reliable assessment of the RASS scale and titration of the sedation, resulting in a decrease in the administration of analgesia and sedatives (Chookalayia, Heidarzadeh, HassanpourDarghah, Aghamohammadi-Kalkhoran, & Karimollahi, 2018; Pinheiro & Marques, 2019; Wojnar-Gruszka et al., 2022).

In this sense, some studies justify this

correlation by the fact that pain can influence the patient's level of sedation/agitation. Therefore, if a patient does not have their pain controlled effectively, it can be manifested through agitation. Taking this into account, the assessment of pain using behavioral scales, namely CPOT and BPS, can help healthcare professionals in the assessment and management of pain, and, subsequently, allow for a more reliable assessment of the RASS scale and titration of sedation, to maintain the safety and comfort of patients (Payen, Bosson, Chanques, Mantz, & Labarere, 2009; Teixeira & Durão, 2016; Pande, 2020).

Contrary to the conclusions previously presented regarding the B2 study, the study by Birkedal, Larsen, Steindal and Solberg (2021) showed, through the comparison of the discriminant validation of several studies between the BPS and the CPOT, that the CPOT allows to better distinguish pain from discomfort, and should therefore be the scale of choice for assessing pain in sedated patients. Nevertheless, the BPS is considered to be easier to apply in clinical practice, as, since it has only three domains (one less than the CPOT), it allows the nurse to remember it more easily.

Pinheiro and Marques (2019) examined the BPS and CPOT, having proven the reliability of both in assessing pain in ICU patients. In clinical practice, health professionals recognize these scales are useful for assessing pain in the context of intensive care. The use of these instruments contributes to increasing the frequency of pain assessment, leading to a reduction in the administration of analgesia and sedatives. Through this study, it was concluded that to carry out a more accurate and rigorous assessment of pain, it would be ideal to apply two scales simultaneously. The results of Severgnini et al. (2016) corroborate the information that the combination of BPS and CPOT would be advantageous, since in this study, the combination of the two instruments proved to be more effective and efficient in assessing pain.

Some authors defend BPS as the first-choice option, due to the ease of memorizing it, as well as the ease of application, while others claim that CPOT offers more reliable results. Both the BPS and the CPOT have proven to be valid, reliable tools that have adequate psychometric parameters. Although there are authors who advocate the preference of one scale over the other, there are also authors who recommend the application of two scales simultaneously, providing a more rigorous and precise assessment of pain.

As already mentioned, the CPOT was considered a valid and reliable tool for assessing pain in ICU patients, namely the Portuguese version, as reported by study B3. The CPOT constitutes an alternative to the BPS scale, as this was the only validated scale to assess pain in Portuguese ICU patients until then. In this study, the associations between CPOT scores and vital signs were evaluated, and it was possible to verify a significant correlation between the scores and heart and respiratory rates. Therefore, vital signs alone are not a pain assessment tool, and nurses must use appropriate pain assessment tools, as is the case of CPOT.

Considering the results obtained, the Clinical Practice Guidelines for the Prevention and Management of Pain stated that the BPS and CPOT scales are the most appropriate for evaluating pain in sedated PCCs. Both scales were demonstrated to be valid, reliable, and with adequate psychometric parameters for the assessment of pain (Devlin et al., 2018). At the end of this discussion, some limitations of the studies are highlighted, which condition the results of this ILR. Article B3 mentioned that, due to the difficulties in reconciling the presence of three observers at all assessment moments, they chose to use only two, which

has already been done in other studies, but the presence of more than two observers is recommended. Study B4 mentioned as a limitation that the study was carried out in only one hospital, which makes it difficult to extrapolate the results, and it is advisable to carry out further studies in other hospitals to validate them. Regarding the limitations of the E1 study, the sample of patients was small. These limitations, mentioned by the authors of each study, should be interpreted as suggestions for improvements for future studies.

CONCLUSION

This ILR made it possible to carry out a critical analysis of the results of the selected studies, delving deeper into the topic under study – Assessment of pain in sedated patients in the ICU. The results achieved allowed us to determine that pain assessment in these patients provides a better quality of life; and contributes to better quality nursing care practice, based on scientific evidence.

The application of the BPS and CPOT scales allows for an accurate and standardized assessment of pain, as it provides important data to assist nurses' decision-making before certain procedures, adopting measures that do not intensify the development of pain, also avoiding complications resulting from them, which can have a positive impact on its stability and treatment effectiveness. Besides that, it contributes to a better and faster recovery of the patient, reducing hospitalization time and, consequently, resulting in lower costs for healthcare institutions.

Moreover, the articles analyzed responded to the previously stipulated objectives, since it was possible to examine pain assessment instruments, such as the BPS and CPOT; some authors defend the BPS as a first-choice option, due to the ease of memorizing it, as well as its applicability in the application, while others claim that CPOT offers more reliable results. Both the BPS and the CPOT have proven to be valid, reliable tools that have adequate psychometric parameters. Although there are authors who advocate the preference of one scale over the other, there are also authors who recommend the application of two scales simultaneously, providing a more rigorous and precise assessment of pain.

Consequently, as a suggestion, for future scientific evidence, we propose investment in studies that address the use of both scales simultaneously or even the development of a single scale that encompasses the dimensions present in both, which will allow restricting the assessment of PSC pain to a single instrument. In conclusion, both scales are effective for assessing pain in sedated patients in the ICU.

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