

PAIN ASSESSMENT USING CPOT TO PATIENTS WITH VENTILATOR

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ABSTRACT

Background: Patients on a ventilator often experience pain. Pain experienced by patients can be minimized by proper assessment of pain. The appropriate wound assessment instrument for ventilated patients is the Critical Care Pain Observational Tool (CPOT). CPOT is one of the coding instruments for adult patients that is mounted on a ventilator and is used for patients who cannot report complaints verbally. The purpose of this study was to describe the assessment of pain using CPOT in ventilator mounted patients. **Materials & Methods:** The design used a literature review with 10 article participants using the Pubmed, Proquest, Google Scholar search system. Journal analysis Literature Review on 10 journals was carried out using PICO analysis. **Results:** The results obtained CPOT instrument has a high enough value. CPOT measurement results have a good level of conformity from BPS measurement results. CPOT is a measuring tool that is more relevant, valid, and responsive than the Wong-Baker scale to assess comfort in ventilated patients. **Conclusion:** CPOT is easier to use because it has clear operational resolutions on each item of observation.

Keywords: Assessment of Pain, CPOT, and Ventilator

1. INTRODUCTION

A ventilator is a life support system designed to replace or support normal respiratory function. The main purpose of providing mechanical ventilator support is to restore the normal function of air exchange and improve respiratory function back to normal¹ while according to Muslika² mechanical ventilation or ventilator is a breathing device with negative or positive pressure that can maintain ventilation and giving oxygen for a long time. The criteria for ventilator installation are: Frequency > 35 x / minute, PaO₂ <70 mmHg, PaCO₂ > 60 mmHg, AaDO₂ with 100% O₂ > 350 mmHg, and vital capacity <15 ml / kg BW³. Based on the journal Armiyati et al⁴, the insertion of an endotracheal tube and a mechanical ventilator causes injury to the larynx and causes pain. Pain in patients on a ventilator can be minimized by assessing pain using CPOT. According to the researchers, conducting a pain assessment is very important in patients who are on a ventilator to determine the level of pain experienced by the patient so that they can determine both pharmacological and non-pharmacological interventions.

World Health Organization in 2001 - 2009 in the United States the number of hospitalizations due to respiratory failure increased from 1,007,549 to 1,917,910, the death rate was 27.6% in 2001 to 20.6% in 2009. Based on data, the rankings of 10 diseases were not infection which is fatal causes death. In hospitalization in 2010, the incidence of respiratory failure was in the second place, namely 20.98%⁵. The results showed that out of five hundred critically ill patients each year, 71% of patients experienced pain on a ventilator⁶. The results of the literature review study found 7 journals that said that men were 65.2% more dominant than women by 34.8% in responding to pain.

Patients with a ventilator need to be assessed for pain because of the patient's inability to convey pain verbally⁶. The pain experienced by a patient on a ventilator is not only due to the disease but also because of the installation of a device, one of which is the installation of an endotracheal tube and the installation of a mechanical ventilator causing injury to the larynx and causing pain. Based on the journal Bastian⁷, which was obtained from interviews with critical patients who were put on a ventilator, they had physical, psychosocial, and spiritual problems and patients who were put on a ventilator would feel pain and discomfort caused by endotracheal and some devices installed in the patient's body felt helpless. Pain in a patient on a ventilator can cause psychological and physiological changes. The psychological changes shown by patients who were put on a ventilator during the assessment included grimacing, stiff facial expressions, closed eyes, and the expression of clenched hands⁸.

Efforts to find out which patients are on a ventilator are experiencing pain by observing the Critical Care Pain Observational Tool (CPOT). Patients on a ventilator who experience pain can cause psychological and physiological changes. The changes that were shown by patients who were put on a ventilator during the assessment included facial expressions, body movements, compliance with the ventilator, muscle tension, and vaccination⁹. Patients on a ventilator were, on average, unable to report pain verbally. With the inability of the patient to report pain verbally, it is necessary to observe pain behavior and physiological symptoms as an important indicator to assess pain in patients. With this, it is necessary to carry out adequate pain management. The pain experienced by a patient on a ventilator should be observed using the Critical Care Pain Observational Tool (CPOT) to determine the pain experienced by the patient. From the background described above, the researcher was interested in researching "Overview of Pain Assessment using CPOT in Patients on a Ventilator".

2. METHOD

This research method used a Literature Review which aims to describe the assessment of pain using CPOT in patients on a ventilator. The population in this study is the latest research journal published in the last 7 years, from 2010 to 2020. The online database sources used come from repositories either from Indonesia or from other countries that use international languages. The number of references used in this literature review is 10 full-text main articles. This study uses a Literature Review design analysis method and is under specific inclusion indicators in document selection

through a comprehensive search system (Comprehensive literature search). Researchers conducted a review so the results of the research using various research designs, namely quasi-experimental, pre-experimental, correlational, and computational. Eligibility Criteria in this study was carried out based on inclusion criteria to eliminate and select data. The research results reviewed are research with the characteristics of a PICO study. This research was conducted by identifying from searching electronic databases and searching reference list articles, there is no language limitation on articles. This research was taken from the electronic database MEDLINE, PubMed, Scopus, EBSCO, and Google Scholar, through database scanning, and article screening was carried out independently by researchers. Researchers used a Search String with keywords: Assessment of Pain, CPOT; and Ventilators and in Indonesian: Pain Assessment; CPOT; and Ventilators.

3. RESULT

The results of the Synthesis of results found that from 10 journals obtained, 5 journals described pain assessment using the Critical Care Pain Observational Tool (CPOT) in patients who were on ventilators. 3 journals describing pain assessment using the Critical Care Pain Observational describes pain assessment using the Critical Care Pain Observational Tool (CPOT) and the Behavioral Pain Scale (BPS) in patients on a ventilator. 1 journal describes pain assessment using the Critical Care Pain Observational Tool (CPOT) and Wong Beker in patients on ventilators. 1 journal describes pain assessment using the Critical Care Pain Observational Tool (CPOT) and the Comfort Scale in patients on ventilators. Researchers obtained heterogeneity in the pain assessment variables using CPOT in patients with ventilators installed with a descriptive study design with a CPOT measuring instrument.

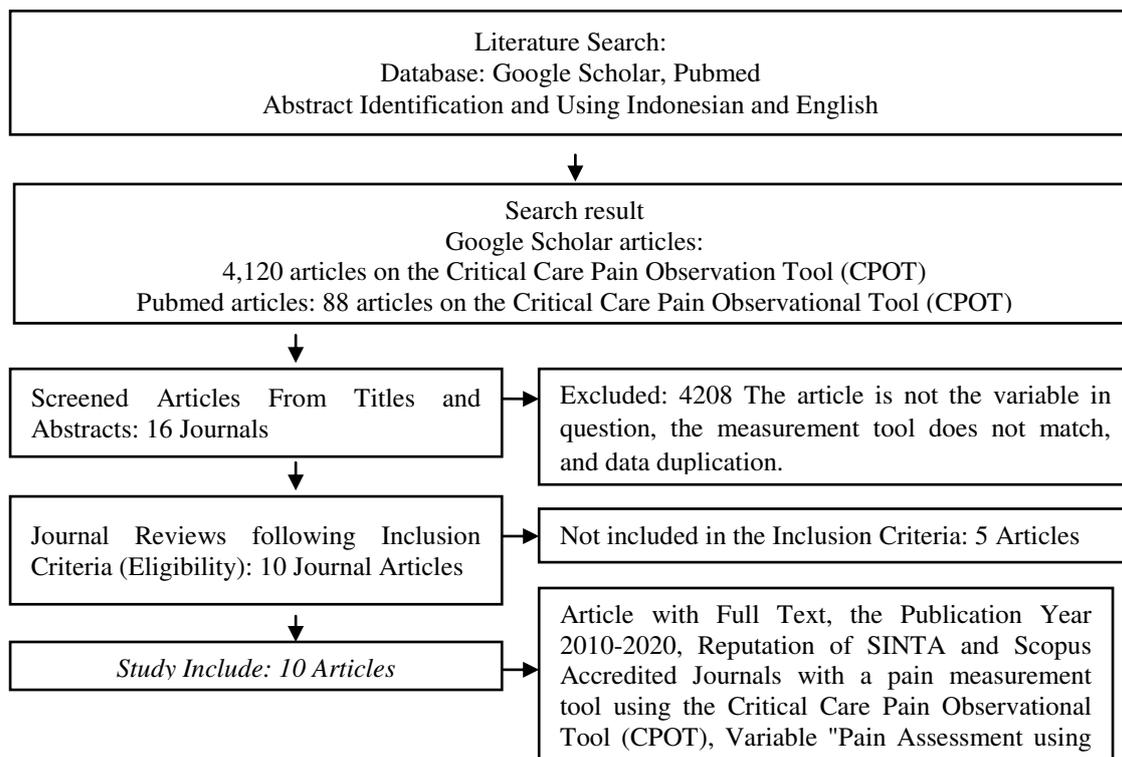


Figure 1: Literature review Synthesis Flow Chart Diagram

Table 1 Data Extraction using the PICO Approach

Author	Title	Objective / Number of samples and method	Results
Wahyunin gsh (2019)	Sensitivity and Specificity of the Critical Care Pain Observational Tool (CPOT) as a Pain Instrument in Adult Critical Patients Post-Surgery on a Ventilator	This was to determine the sensitivity and specificity of the CPOT instrument for assessing pain in critical adult patients after surgery. Several samples of 40 patients. Design and cross-sectional method.	The results showed that the CPOT instrument had a sensitivity value of 77% and a specificity of 40% with an AUC value of 55%.
Priambodo, et al (2016)	Pain Assessment in Critical Patients Using the Critical Pain Observation Tool (CPOT) in the Intensive Care Unit (ICU)	To see the suitability of the CPOT measuring instrument with the BPS measuring instrument. Total sample was 48 patients. Analytical observational design with cross sectional design	The BPS and CPOT results can measure the difference in pain intensity at rest and when positioning. The results of the conformity test (kappa) of BPS-CPOT measurements with the BPS-CPOT conformity value (kappa) at resting conditions are 0.937, while the BPS-CPOT suitability value (Kappa) in positioning conditions is 0.265.
Arsyawina et al, 2014	The Critical-Care Pain Observation Tool (CPOT) Scale and the Wong-Baker Faces Rating Scale in assessing the Degree of Pain in Patients on Mechanical Ventilators	To compare the CPOT and Wong-Baker scales by testing the psychometric values including reliability, validity and responsiveness. The number of samples was 31 patients. Design Quantitative study with iterative measurement design	The CPOT scale is a more reliable, valid and responsive measuring tool in assessing pain in patients with mechanical ventilation

Author	Title	Objective / Number of samples and method	Results
Wahyuningsih, 2017	Demographic profile of critically ill ventilated adult patients	To determine the demographics of critically ill adult patients on ventilators. Number of samples 66 patients. Quantitative non-experimental design with non-probability sampling design	Adult critically ill patients aged 41-60 years were 38.3%, more than 60 years were 38.8%, most of them were male as much as 66.7% with medical diagnoses mostly were respiratory problems as much as 45% and did not get sedation as much as 83.3 %.
Vazques et al, 2011	Pain Assessment In Turning Procedures For Patients With Invasive Mechanical Ventilation	To compare behavioral responses to pain, it was measured on the Critical-Care Pain Observation Tool (CPOT) scale, and physiological. Number of Samples 96 Patients. Prospective descriptive design.	The mean total score on the CPOT scale before the positioning procedure was 0.27; during the turn were 1.93 and 0, 10 after the procedure (p <0.05). Facial expression is the most improved indicator with reference to the basic situation, followed by body movements; compliance with the ventilator, and ultimately, muscle tension. There was also slight variation in these physiological variables during the twisting procedure (p <0.05).
Kotfis et al, 2017	<i>Methods Of Pain Assessment In Adult Intensive Care Unit Patients - Polish Version Of The CPOT (Critical Care Pain Observation</i>	To see the suitability of the CPOT measuring instrument with the BPS measuring instrument. Sample of 43 patients. Prospective observational cohort	Routine assessment of pain intensity leads to better outcomes and better quality of life for patients in the ICU and after discharge from the ICU. The gold standard

Author	Title	Objective / Number of samples and method	Results
	<i>Tool) And BPS (Behavioral Pain Scale)</i>	design	in pain evaluation is patient self-reporting, which is not always possible. Current research indicates that the two most validated tools for patients who are unable to self-report pain are the Behavioral Pain Scale (BPS) and the Critical Care Pain Observation Tool (CPOT).
Marpaung et al, 2013	Comparison of Study Proportions and Rehabilitation on the COMFORT and CPOT scales in assessing the intensity of pain in patients using mechanical ventilation in the Intensive Care Installation of RSUP H. Adam Malik Medan	Compared the proportion of ratings and the reliability of the COMFORT and CPOT scales in assessing pain intensity in mechanically ventilated patients	Critical-care pain observation tool (CPOT) is a pain assessment instrument that is more precise and accurate in assessing pain intensity than the COMFORT scale. The critical-care pain observation tool (CPOT) has the same reliability as the COMFORT scale in assessing pain intensity in patients who are mechanically ventilated at rest and subjected to noxious stimuli.
Rijkenberg et al, 2014	Pain measurement in mechanically ventilated critically ill patients: Behavioral Pain Scale versus Critical-Care Pain Observation Tool	Comparing the discriminant validation and reliability of CPOT and BPS, simultaneously, in mechanical ventilation	CPOT and BPS have good interrater reliability. However, CPOT is superior to BPS in assessing pain, according to discriminant validation. The use of behavioral pain scales in daily

Author	Title	Objective / Number of samples and method	Results
			intensive care exercise can optimize pain care and use of analgesics and sedatives in critically ill patients.
Dale et al, 2018	Validation of The Critical-care Pain Observation Tool (CPOT) for the detection of oral-pharyngeal pain in critically ill adults	To test the reliability and validity of the Critical-Care Pain Observation Tool (CPOT)	A total of 98 patients, especially those who were intubated (92.9%) and men (63.3%) participated. The validation of the criteria was supported by the patient's own reports of pain during tooth brushing (AUC = 0.80; Pb0.5) and oral suction (AUC = 0.72; Pb0.3) but not for oral swabbing (AUC = 0.68; P = 0.16). Discriminatory validation was shown for all oral care procedures as compared to rest (Pb.001). The inter-class correlation coefficient between raters ranged from 0.78 to 0.91 (Pb.001) for the total CPOT score, indicating excellent inter-rater reliability.
Kotfis et al, 2018	Validation of the Polish version of the <i>Critical Care Pain Observation Tool (CPOT)</i> to assess pain intensity in adult, intubated intensive care unit	To validate the Polish version of the Critical Care Pain Observation Tool (CPOT). The number of samples is 71 patients. The design used was a prospective observational cohort	Results: A total of 71 patients were included in the study (mean age: 66 years), mostly male (50/71, 70%), meaning an APACHE II score of 26.04 ± 10.56. The results showed an

Author	Title	Objective / Number of samples and method	Results
	patients: the POL-CPOT study		excellent inter-rater correlation (ICC) between raters (ICC score > 0.97). NRS self-report scores (numerical grading scale) were available for 58/71 patients (82%). Patient self-reported pain and CPOT showed a very strong correlation (Spearman's R > 0.85, p < 0.0001). CPOT has a high diagnostic value for detecting the presence of self-reported pain by patients (ROC AUC = 0.938 for assessor A and 0.951 for assessor B, p < 0.0001). A CPOT score ≥ 2 is the optimal limit for detecting pain during nociceptive procedures.

The researcher carried out a literature search strategy using a search system using Indonesian using electronic database sources Pubmed and Google scholar. Researchers used the search method using Google scholar by searching journal literature based on the specific objective of "Pain assessment using CPOT in patients on a ventilator based on literature review" with the keyword "CPOT", obtained 4120 data search results and searches on the Pubmed database obtained 88 data results. The article was identified and checked for the journal's reputation using the Pubmed and Google scholar database systems, the data was also identified for possible duplication of data and an abstract review was carried out to whether it met the inclusion criteria. After identification, 10 journals were obtained. After that, the Eligibility and identification with the supervisor are done, the literature used is obtained. Researchers carry out in-depth identification of the articles of the journal obtained. 10 research studies that match the criteria include^{8,10,11,6,12,13,14,15,16,17}

4. DISCUSSION

The results of the literature review study showed that four journals conducted pain assessments using the CPOT instrument. In the Wahyuningsih⁶ journal, the sensitivity and specificity values of CPOT are obtained, namely 77% sensitivity and 40% specificity with an AUC value of 55%. 27; during turn were 1.93 and 0.10 after the procedure ($p < 0.05$). In the journal Dale et al¹⁶ obtained criteria validation results supported by the patient's reports of pain during tooth brushing (AUC = 0.80) and oral suction (AUC = 0.72) but not for oral swabbing (AUC = 0, 68; P = 0.16). Discriminatory validation was shown for all oral care procedures as compared to rest. The inter-class correlation coefficients between raters ranged from 0.78 to 0.91 for the total CPOT score, indicating excellent inter-rater reliability. In the journal Kotfis et al¹⁷, it was found that a total of 71 patients were included in the study (mean age: 66 years), mostly men (70%). The results showed an excellent inter-rater correlation (ICC) between raters (ICC score > 0.97). CPOT has a high diagnostic value for detecting the presence of self-reported pain by patients (ROC AUC = 0.938 for assessor A and 0.951 for assessor B, $p < 0.0001$). Significantly higher mean CPOT scores during nociceptive procedures compared to non-nociceptive procedures or at rest were found ($p < 0.0001$). The Critical-care Pain observation tool (CPOT) has four behavioral indicators, namely facial expressions, body movements, compatibility with the ventilator, and muscle tension. The parameters for each indicator have a value of 0-2, with a total value ranging from 0 to 8¹⁸. Pain experienced by critically ill patients in the ICU must be identified early to apply the appropriate treatment¹³. The CPOT pain assessment instrument has an assessment capability that focuses on psychological indicators in critical patients. Pain assessment instruments should have good sensitivity and specificity values for assessing pain. If the pain assessment instrument used does not have good sensitivity and specificity values, the patient's pain will not be handled properly. Sensitive pain assessment instruments are needed to detect the presence of pain that affects decreasing the duration of use of the ventilator and the length of stay in the ICU.

The results of the literature review study showed that three journals conducted pain assessments using the CPOT and BPS instruments. Nearly 30% of patients experience pain at rest, while the percentage increases to 50% during nursing procedures¹³. Priambodo journal et al¹⁰ found that the two pain measuring instruments, namely BPS and CPOT, have reliability in assessing pain in critical patients, for patients who are unable to report their pain verbally. This is shown in the results of the analysis of the difference in the pain response score at rest and the pain response score when positioning on the BPS and CPOT measuring instruments is significant ($p < 0, 05$). Both BPS and CPOT gauges can measure the difference in the level of pain response at rest to pain response when positioning in critical patients. BPS and CPOT measuring instruments are considered to have many similarities, namely measuring instruments with one dimension and have been tested in many critical nursing areas. In the journal

Rijkenberg et al¹⁵, the results of the BPS and CPOT scores showed a significant 2 point increase between rest and procedure pain (spinning). The median BPS score between rest and painless procedures (oral care) showed a significant 1 point improvement, while the median CPOT score remained unchanged. The inter-rater reliability of the BPS and CPOT scores indicates fair agreement to the good (0.74 and 0.75, respectively). In BPS and CPOT all pain evaluations are based on signs of behavior (behavior). The focus of BPS and CPOT is on changes resulting from an increase in pain intensity in both parameters based on the study¹⁹. Assessment using BPS is not appropriate because it lacks operational definitions and is not easy to understand from several points on each indicator. Unlike the case with BPS, CPOT has an operational definition that is clearer and easier to understand, making it easier to apply in pain assessment, especially in patients on a ventilator.

The CPOT instrument scale has a better ability than the Wong-Baker scale to detect pain. The reliability of the instrument was indicated by the ICC value and the comparison of the measurement results of the three teams (morning, afternoon, and evening). The ICC score on the CPOT scale has a very good agreement between examiners, which is 0.965 and the Wong-Baker scale has a not very good agreement between examiners, namely 0.423. The responsiveness of the instrument is seen from the large value, for the CPOT scale it has a very satisfying effect on the large value, while for the Wong-Baker scale. CPOT is a pain gauge recommended for measuring pain in patients with mechanical ventilation¹⁶. Wong-Baker is an alternative pain measurement tool that is still often used in some intensive care units, where a patient with mechanical ventilation is analogous to a child who has not been able to convey the pain that is felt verbally¹¹. CPOT is a measure that is highly recommended for assessing pain in patients who are put on a ventilator, both conscious and unconscious.

Comparison of the pain intensity assessment on the COMFORT scale compared with the CPOT when the stimulus was noxious, 57 subjects were rated as pain, while 53 subjects were assessed as pain, and 4 subjects were rated as painless by the COMFORT scale. The results of the analysis with the chi-square test showed a significant difference in the proportion of pain assessments at the time of the noxious stimulus. The critical care pain observation tool (CPOT) has four behavioral indicators, namely facial expressions, body movements, muscle tension, and synchronization with mechanical ventilation for intubated patients or vocalization for non-intubated patients. The parameter for each indicator is 0-2, with a total value ranging from 0 to 8. This assessment instrument is an instrument used in the adult patient population. The COMFORT scale is a multidimensional pain assessment instrument, and there are six behavioral indicators and two physiological indicators (alertness, calmness, respiratory response, body movement, muscle tone, facial tension, heart rate, and blood pressure), each indicator has a value of 1– 5 with a total value of 8 - 40. This scale is generally used in the PICU population¹⁴. CPOT is a valid and reliable instrument in assessing the intensity of pain in patients who cannot communicate (verbally). CPOT was also positively evaluated for feasibility and clinical utility.

5. CONCLUSION

The appropriate assessment of pain in patients on a ventilator is the Critical Care Pain Observational Tool (CPOT). The Critical Care Pain Observational Tool (CPOT) is an assessment tool that can be used to assess pain and improve pain management in critically ill patients. CPOT is easier to use because it has a clear operational definition of each item of observation. CPOT also has a pain observation domain in patients who can report pain. The Critical Care Pain Observational Tool (CPOT) instrument can be used for patients who are unable to independently report pain and have a high pain sensitivity.

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