



Original Article

## Feasibility and clinical utility of the critical pain observation tool among mechanically ventilated patients

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### ABSTRACT

**Background & Aim:** The Critical Pain Observational Tool (CPOT) is one of the most valid and reliable pain assessment tools to assess pain in mechanically ventilated patients. This study aimed to investigate the Critical Care Pain Observational tool feasibility and clinical utility from the nurses' perspective at a teaching hospital in Jordan.

**Methods & Materials:** Descriptive design was used to collect data from 74 nurses working in five critical care units in a teaching hospital in Jordan. The study was conducted in August 2019. The Feasibility and Clinical Utility of Critical Pain Observation Tool collected the data. Data were analyzed using SPSS software version 22.

**Results:** The mean feasibility score was 69.0/100 (SD=8.56) with a range of 18-33/36 (50.0-91.0/100), indicating a moderate category of feasibility. Also, the mean of the clinical utility scores was 68.53/100 (SD=9.78) with a range of 11-26/28 (39.29-92.8/100), indicating moderate clinical utility.

**Conclusion:** Nurses reported moderate feasibility and clinical utility of the CPOT; thus, it is important to promote education and training of nurses to ensure maximum utilization of the tool.

## Introduction

More than half of patients describe having moderate to severe pain during rest in critical care settings, and (80%) of critically ill patients' have pain during nursing and medical interventions (1, 2). Untreated pain leads to negative consequences for patients, such as multisystem complications and the development of chronic pain and death, mainly in critical care settings (3, 4). These complications result in serious impairment in the functioning of life and well-being (4). Also, untreated pain leads to many potential acute neuro-humoral changes, neural remodeling, lung collapse, infections,

respiratory distress, and increased myocardial workload. These complications will lead to myocardial ischemia (4, 5) and long-lasting psychological and emotional distress that may cause long-lasting chronic pain. Accordingly, pain assessment is needed to improve quality of care, thus, improving patients' quality of life (6).

Pain assessment can either be by self-report (if the patient can verbalize and be conscious) or behavioral pain assessment tools for unconscious patients (4). Patients' self-reports of pain are considered the most reliable. Tare is considered the most reliable



and the standard gold method to assess pain for patients who can self-report (1, 4). However, because critically ill patients are often unable to do self-reports for their pain due to changes in cognition or physiological status or because of the endotracheal tube (4, 7), the use of behavioral pain tools is highly recommended (8). Pain-associated behaviors are the only valid and reliable clues for the presence of pain among uncommunicable critically ill patients because there is no available valid and reliable physiological or biochemical measure for pain among these patients (9).

The Society of Critical Care Medicine indicated that the Critical Pain Observation Tool (CPOT) is the most valid and reliable behavioral pain scale for monitoring pain in adult patients in intensive care units (ICU) (4, 8). The CPOT was initially developed to include both behavioral and physiological indicators of pain. However, the final version of CPOT includes four behaviors (facial expression, body movement, muscle tension, and compliance with ventilator).

The CPOT reliability indices are 0.80 for the facial expression domain, which is the most reliable one. The physiological indicators were excluded because they received censure rather than behavioral ones (10). The CPOT was validated in many studies targeting different ICU patient populations (11, 12, 13). A more recent study validated the CPOT in 113 post-operative cardiac surgery ICU adults compared with patients' self-reported pain. The results supported the validity of CPOT scores with self-report of pain. Moreover, criterion validity was supported with CPOT scores correlated significantly with self-report of pain intensity ( $r = 0.419$ ,  $P < 0.01$ ) (14).

Feasibility and clinical utility are important characteristics to consider in developing or selecting a tool to implement in practice (15). Clinical utility is defined as "the ability to use the results of the tool in a useful or informative way within the clinical setting" (16, 17). At the same time, feasibility is defined as the extent to which an innovation can be successfully used within a

particular setting, given the resource or training requirements (17). In regard to the pain assessment tool, feasibility refers to how easily a pain measure can be scored and interpreted (18, 19).

Although examining the feasibility and clinical utility of the implemented pain assessment tools (such as the CPOT) in critical care units is important to ensure the quality of pain management and nurses' comfort with using the tool, only two studies investigated this issue globally (10, 19). Specifically, The CPOT is currently adopted in many clinical settings and hospitals in Jordan; however, no studies were conducted to explore the feasibility and clinical utility in Jordanian critical care settings, including the selected hospital in this study. Consequently, this study was conducted to investigate the Critical Care Pain Observational tool feasibility and clinical utility among nurses at a teaching hospital in Jordan. It also aims to examine if certain nurses' characteristics (years of experience as a nurse, years of experience in ICU, gender, education level, training courses/ education in pain management) associate with their perspectives of the feasibility and clinical utility of CPOT.

## **Methods**

The study utilized a cross-sectional descriptive design to assess the feasibility and clinical utility of CPOT among all critical care nurses in a teaching hospital using a convenience sampling technique. The sample included nurses working in ICUs in the selected hospital. The total number of nurses working in the five critical care units was 98, covering the three working shifts (morning, evening, and night).

Nurses were included in the study if they were registered nurses, working at one of the five critical care units in the selected hospital, and had a minimum experience in the ICU of three months. Nurses were excluded from the study if they did not conduct pain assessments for patients using the CPOT tool.

This study was conducted at a teaching hospital in Amman, the capital of Jordan. This hospital has a total capacity of 547 beds, with about 800 registered and practical nurses (nursing department). This hospital has been chosen to conduct this study because it is one of the hospitals in Jordan that utilizes the CPOT to assess critically ill patients' pain. This hospital has five critical care units (medical, surgical, neuro ICU, cardiac ICU, and cardiac care unit) with a total capacity of (46) ICUs' beds. The occupancy rate is 90 patients/ month. However, 10% of these patients require Mechanical Ventilation during the ICU stay (20).

The Feasibility and Clinical Utility of Critical Pain Observation Tool (FCU-CPOT) was originally developed by Gélinas (2010) and consisted of 16 questions with two subscales (21). The rating of the items of the tools on a Likert scale of 1-4 for relevancy and clarity of the items where (1= Not relevant, 2= somewhat relevant, 3= Quite relevant, and 4= highly relevant and the same scale for clarity). The first is the feasibility of utilizing the CPOT scale and consists of nine questions from (1-9). The panel of experts rated the items of the tools on a Likert scale of 1-4 for relevancy and clarity of the items where (1= Not relevant, 2= somewhat relevant, 3= Quite relevant, and 4= highly relevant and the same scale for clarity). Spaces were provided beside each item for additional comments. The feasibility questions cover the following aspects: the practicality of the CPOT, successful implementation of the CPOT in practice, the accuracy of the CPOT, clarity of the CPOT items, and CPOT structure and scoring method. The second subscale of the FCU-CPOT measures the clinical utility of the CPOT. It consists of seven questions from (10-16). This subscale covers the aspects of utilizing the CPOT is a useful and informative way, recommendations for utilizing the CPOT, and the helpfulness of the CPOT for the practice (22). Accordingly, the total scale for feasibility is 9-36 (25%-100%), and the total scale for clinical utility is 7- 28 (25%-100%).

The mean scores were calculated and further categorized into levels using the interquartile classification of the FCU-CPOT tool to determine its cutoff points. The Interquartile classification system categorizes the mean scores as follow:

- A mean score < 50.0 indicates a low feasibility/ low clinical utility.
- A mean score between (50.0 and 75.0) indicates moderate feasibility/ moderate clinical utility.
- A mean score above >75.0 indicates high feasibility/ high clinical utility.

After the education program and trained participants on the CPOT tool application, the data collection was done from the nurses who agreed to participate and signed the consent forms in August 2019. Nurses were given the required time of about 5-20 minutes to fill the questionnaire and were encouraged to ask any question. Hard copies of questionnaires were kept in a cabinet in a locked office, and no one, except the researcher accessed to study data. The computerized data were kept in the researcher's personal computer and secured by a password.

The results of nurses' responses to the FCU-CPOT questionnaire were analyzed utilizing mean as a central tendency, standard deviation as a measure of dispersion, and range. Frequencies were utilized to show the responses to each item of the FCU-CPOT. Data were analyzed by using the SPSS version 22. To investigate the association between participants' characteristics (years of experience and the nurse's and years of experience in ICU) and feasibility and clinical utility total scores, the researcher utilized the Pearson correlation coefficient between each comparable two variables (23, 24). The independent sample to t-test was utilized to assess if there were significant differences between genders (male's vs. females) receiving previous courses in pain assessment and management (yes vs. no).

Before conducting the study, ethical approvals were obtained from the academic Research Committee in the School of Nursing, The University of Jordan, and from the institutional review board at the selected

hospital [IRB number: 117/2018/10]. The autonomy for the participants has been ensured by clarifying to the participants that they have the choice to participate or not. Also, the cover letter ensured confidentiality and anonymity. In addition, consent forms were provided to participants to fully disclose the research title, purposes, the right to refuse participation, and the right to withdraw from the study. Also, they were insured that the data would be kept in a securely locked drawer, with no one able to see the information except the principal investigator and the supervisor.

## Results

A total of 86 nurses who met the inclusion criteria were invited to participate

in the study; however, 74 participated in this study, and 12 nurses refused to participate. Accordingly, the total number of 74 nurses who worked in the critical care units were enrolled in this study. The study participants (N=39, 52.7%) were females. The majority of the participants were staff nurses (N=69, 93.9%). In addition, the mean years of experience for the participants was 6.74 (SD=4.90) years.

The mean experience period in critical care units for the whole participants was 5.36 (SD=4.06). Most of the participants had a Bachelor's degree in Nursing (N=65, 87.8 %). Also, thirty-five (N=35, 47.3%) of the participants have received pain assessment and management courses. See (Table 1) for further details.

**Table 1.** Participants Characteristics (N=74)

Variable	N (%)	M (SD)	Range
<b>Years of experience as a nurse</b>			
Below & equal one year	6 (8.10)	6.74 (4.90)	(0.50-29.0)
Above one year	68 (91.9)		
<b>Years of experience in critical care units</b>		5.36 (4.06)	
Below & equal one year	7 (14.9)		(0.50-20.0)
Above one year	67 (85.10)		
<b>Gender</b>			
Male	35 (47.3)		
Female	39 (52.7)		
<b>Education level</b>			
Bachelor Degree	65 (87.8)		
Master Degree	8 (10.8)		
PhD	1 (1.4)		
<b>Training course/education in pain</b>			
Yes	35 (47.3)		
No	39 (52.7)		
<b>Position In ICU</b>			
Staff nurse	69 (93.2)		
Supervisor	5 (6.8)		

### *Critical care pain observation tool feasibility*

To assess the CPOT feasibility from the perspective of nurses working in the critical care units, an analysis of the nurses' scores on the FCU-CPOT has been done. The results of this study showed that the mean of the feasibility scores was 69.0 out of 100 (SD=8.56) with a range of 18-33/36 (50.0-91.0 out of 100).

Table 2 indicates the nurse's responses to feasibility items, the researcher considered responses 3 and 4 as the positive representation of each item and responses 1

and 2 as the negative representation of each item. The majority of participants (N=69, 93%) indicated that they understood the CPOT directions and how to score the CPOT for mechanically ventilated patients. Around two-third (N=66, 89%) of participants also implied that the scores of CPOT are easy to document. Most of the participants (N=62, 83%) indicated that they had received sufficient training about utilizing the CPOT. The lowest responses were the responses to items 5 "using the CPOT takes too much time from their work" (N=47, 63 %) and to number item 9, "they are using the CPOT just

**Feasibility and clinical utility of critical pain observation tool**

because the hospital administration requires it' (N=24, 32 %), respectively (Table 2).

As described in table three, no participants fall in the low feasibility category. 83.0% fall in the moderate category, and 16.2% fall in the high category.

Accordingly, the results of this study revealed that the mean feasibility score of the CPOT was (68.95) which was located among the moderate category of feasibility (Table 3).

**Table 2.** Participants responses to the feasibility of the CPOT (N=74)

Items	Strongly not Agree N (%)	Not Agree N (%)	Agree N (%)	Strongly Agree N (%)
I understand the CPOT directions	0 (0)	5 (6.8)	55(74.3)	14 (18.9)
I found the CPOT is easy to use	0 (0)	12 (16.2)	49(66.2)	13 (17.6)
The CPOT can successfully assess the level of pain for Mechanically ventilated patients	1(1.4)	21 (28.4)	39(52.7)	13 (17.6)
I received sufficient training about the use of CPOT	0 (0)	12 (16.2)	41(55.4)	21(28.4)
Using the CPOT takes too much time from my work	1 (1.4)	26 (35.1)	41(55.4)	6 (8.1)
The CPOT rating scores accurately reflect patients' pain level	0 (0%)	16 (21.6)	52(70.3)	6 (8.1)
The CPOT measurement is quick to use	2 (2.7)	15 (20.3)	52(70.3)	5 (6.8)
The score of CPOT is easy to document	0 (0)	8 (10.8)	56(75.7)	10 (13.5)
I use the CPOT just because it is required by the hospital administration	6 (8.1)	44 (59.5)	20(27.0)	4 (5.4)

**Table 3.** Cutoff points for the feasibility and the clinical utility of the CPOT

	Classification	The Range	N (%)		
Feasibility of the CPOT*	Mild	0.0-49.9	0 (0.0)		
	Moderate	50.0-75.0	62 (83.78)		
	High	>75.0	12 (16.22)		
	<b>Feasibility of CPOT*</b>	<b>M (%)</b>	<b>SD (%)</b>	<b>Range (%)</b>	
		24.82 (68.95)	3.08 ( 8.56)	18-33 (50.0-91.0)	
Clinical Utility of the CPOT	Mild	0.0-49.9	2 (2.7)		
	Moderate	50.0-75.0	58 (78.4)		
	High	>75.0	14 (18.9)		
	<b>Clinical utility of CPOT</b>	<b>M (%)</b>	<b>SD (%)</b>	<b>Range (%)</b>	
		19.19 (68.53)	2.74 (9.78)	11-26 (39.29-92.8)	

\*CPOT: Critical Pain Observation Tool

**The critical care pain observation tool clinical utility**

To assess the CPOT clinical utility from the perspective of nurses working in the critical care units, an analysis of the nurses' scores on the FCU-CPOT was done. The results of this study showed that the mean of the clinical utility scores was 68.53 out of 100 (SD=9.78) with a range of 11-26/28 (39.29-92.8 out of 100). The table shows the participants' responses to clinical utility items of CPOT. The majority of participants (N=70, 81%) indicated that the utilization of

CPOT makes the communication of patient's pain easy with the other nurses. Furthermore, the majority (N=57, 77%) of nurses implied that usage of CPOT makes communication of patients' pain easy with the physicians.

However, around (N=30, 40 %) of participants indicated that physicians asks frequently the nurses about the CPOT scores before managing mechanically ventilated patients' pain. However, the results indicated that (N=40, 54 %) of participants reported that CPOT is connected to pain

management guidelines and pain management policy in their hospital (Table 4).

As described in table five, two of the participants, 2.7%, fall in the low Clinical Utility category. 78.4 % falls in the moderate category, and 18.9% falls in the high category. Accordingly, the results of this study revealed that the mean clinical utility scores of the CPOT were (68.35) which was located among the moderate category of clinical utility (Table 3).

### *The association between the participants' characteristics, feasibility, and clinical utility of the CPOT*

To assess a significant relationship between feasibility items and participants' characteristics, the researcher set the significance level at the alpha of 0.05. Pearson correlation and independent-sample t-test were utilized. As indicated below, the Pearson correlation coefficient has examined the association between the years of experience as a nurse and the total feasibility scores (Table 5).

**Table 4.** Participants responses to the clinical utility of the CPOT (N=74)

Item number	Strongly not agree N (%)	Not agree N (%)	Agree N (%)
1 The use of CPOT makes communication of patients' pain easy with other nurses.	0 (0)	14 (18.9)	51(68.9)
2 The use of CPOT makes communication of patients' pain easy with physicians in the ICU.	3 (4.1)	14 (18.9)	51(68.9)
3 I recommend the use of CPOT in assessing MV patients' pain.	1 (1.4)	12 (16.2)	46(62.2)
4 Using the CPOT will enhance the nursing care of mechanically ventilated patients.	1 (1.4)	15 (20.3)	49(66.2)
5 The CPOT scores are often used to manage MV patients' pain in our ICU.	3 (4.1)	22 (29.7)	41(55.4)
6 Physicians ask nurses frequently about the CPOT scores for MV patients before managing pain.	21 (28.1)	23 (31.1)	26(35.1)
7 The CPOT is not connected to pain management guidelines and policy of pain management in our hospital.	4 (5.4)	30 (40.5)	29(39.2)

Note: CPOT, Critical Care Pain Observation Tool

**Table 5.** Comparison of feasibility and clinical utility total score based on demographic data of the sample

Variable	Feasibility score				
	N	M	SD	Test value	P
Years of experience as a nurse		6.740	4.897	r =0.081**	P = 0.493*
Years of experience in ICU		5.362	4.068	r =0.123**	P = 0.298*
Gender					
Male	35	67.22	7.97	t= -1.672**	P = 0.099*
Female	39	70.51	8.87		
Training course/education in pain					
Yes	35	71.66	8.19	t=2.69**	P = 0.009*
No	39	66.52	8.23		

\*Significance level at P< 0.05 \*\* Pearson correlation and independent-sample t-test

As observed from Table 5, this study found that the years of experience as a nurse were mildly positively associated with the feasibility of CPOT scores (r=0.081). However, there is no association between the years of experience as a nurse and the total feasibility scores (r=0.081, P=0.493). Furthermore, the study showed a mild positive association (r=0.123) between the

years of experience in critical care units and the feasibility scores. However, this association was also statistically insignificant (r=0.123, P=0.298).

An independent sample t-test was utilized to assess the differences between males and females in regard to the feasibility of CPOT total scores. The analysis revealed no statistically significant

difference ( $t=-1.672$ ,  $df=1$ ,  $P=0.099$ ) was found between males and females regarding the CPOT feasibility total scores. On the other hand, an independent sample t-test was conducted to assess the difference between nurses who received pain assessment and management courses and those who didn't receive them. The analysis revealed a statistically significant difference ( $t=2.69$ ,  $df=1$ ,  $P=0.009$ ) between those who received pain assessment and management courses and those who did not.

To assess if there is a significant relationship between the clinical utility of the CPOT and participants' characteristics, the researcher utilized Pearson correlation, and an independent-sample t-test was utilized. The results revealed that there was no association ( $r=0.017$ ,  $P=0.887$ ) between the years of experience as a nurse and the total clinical utility scores; also, there was no association ( $r=0.035$ ,  $P=0.765$ ) between nurses' years of experience in critical care units and the total clinical utility scores. In addition, the differences between nurses' gender have been examined using the independent sample t-test; the analysis revealed no statistically significant differences ( $t=-0.560$ ,  $df=1$ ,  $P=0.577$ ) between males and females regarding total clinical utility scores (Table 5).

As well as for the feasibility results, the examination of the difference between those who received pain assessment and management courses with the total clinical utility scores revealed statistically significant differences ( $t=2.030$ ,  $df=1$ ,  $P=0.046$ ) between those who received training courses or education in pain assessment and management, the participants who received the training courses were higher in their clinical utility scores by (4.60) degrees

## **Discussion**

The Critical Pain Observation Tool (CPOT) is one of the most valid, reliable, and recommended tools worldwide to assess pain in intensive care units (ICU) (4, 14). This study shows the (CPOT) tool is feasible. The findings of this study are similar to the results

of previous studies (10, 19, and 26). Gélinas et al. (2009) conducted a descriptive study to describe CPOT feasibility and clinical utility on 33 ICU nurses in Canada. The results revealed that nurses who were able to understand CPOT directives found it as quick to use, simple to understand, and easy to complete (10). Similarly, Maatouk et al. (2021) conducted a study to evaluate the feasibility and clinical utility of the critical-care pain observation tool among 30 critical care nurses in Lebanon. The authors found in their study that the nurses indicated that (CPOT) was quick and easy to complete, simple to understand, easy to understand, and (CPOT) as helpful for nursing practice (26). Furthermore, a study was conducted in the health department in Canada to assess the (CPOT) feasibility and clinical utility among 38 nurses who worked in intensive care units after (CPOT) 12-month implementation. The result showed that the CPOT feasible and clinical utile in the intensive care unit (19). The documentation process is considered a burden for the nurses' work and considered one of the most common nursing activities that nurses could not complete (25). ). The nurses found the CPOT easy to document; thus, they will be encouraged to use it in a busy environment such as the intensive care units where the workload is high, and patients need close monitoring.

The results revealed that -thirds of the nurses reported that they use (COPT) because the administration requires it. One possibility to this high percentage scores could be related to the nature of nurses following orders and performing interventions ordered by the physician or by the administrators. Thus, nurses are not accustomed to independent nursing actions and decision-making. Another explanation is that nurses in critical care units are overwhelmed with the workload that focuses on the required duties or the delegated responsibilities. Accordingly, the feasibility testing of the tool must be conducted at the organizational level that adapted the tool (17). Measuring feasibility by organizations and settings will help in a deep understanding of the implementation processes, which will of the

implementation processes which will enhance the efficiency and facilitate the path for conducting studies of comparative effectiveness of implementation strategies (17). The result showed that the feasibility of the tool falls in the moderate category. This indicates the need for continuous training by the local support team specializing in pain assessment and management. The local support team specializing in pain assessment and management uses a special training method such as videos showing real patients' behaviors. That was reflected in improved patients' symptom monitoring and management and health care quality. That proved by many studies and could explain the high rating for CPOT feasibility and clinical utility (4, 19, 27).

One of our study's confusing and contradictory results is that nurses reported that they received sufficient training. However, the hospital administration did not conduct any training courses specific to the use of CPOT. It seems that the nurses misunderstood what is intended by training and related to the teaching conducted at the bedside by the unit's senior nurses or by the feedback of the quality control team during the monitoring process.

According to CPOT clinical utility, the results of this study revealed that nurses viewed the CPOT as clinically utile. The findings of this study were in line with previous studies (18, 19, 23). The results of those studies found that the majority of nurses implied that CPOT helped them to communicate effectively pain intensity scores to other nurses and that utilizing CPOT for assessing pain for their patients has influenced their practice, and they recommended utilizing CPOT (19, 23, 26). Although the results of this study showed that nurses indicated that utilizing CPOT makes communication of patients' pain easy with physicians, they reported that physicians rarely ask about CPOT scores before managing mechanically ventilated patients' pain. This result is in accordance with Gélinas et al.'s (2014) study, which found that nearly <50% of the nurses acknowledged that CPOT provided

effective communication with the physicians about pain assessment findings and with other health care professionals (19).

The problem of the lack of means of communication between nurses and physicians can be related to many reasons. First, it seems that physicians do not depend on the nurses' assessment to plan for pain management (4, 31). Second, physicians were not involved in writing the policy regarding pain assessment. Thus, they do not work together when prescribing training courses that involve both nurses and physicians in educational programs regarding pain assessment and management, making communication about painless effective (4). Therefore, including the physicians in training sessions for using the CPOT could enhance their participation in pain relief and enhance their communication with nurses regarding the CPOT scores and pain episodes, which will increase CPOT feasibility and clinical utility.

Based on the results of our study, among the demographic variables, the receiving of education or training courses in pain was statistically significant for rating both the feasibility and clinical utility. This finding is expected since having previous courses will generally enhance the assessment and management techniques (4, 28, 29). However, it is worth highlighting that less than half of the participants in this study received pain educational courses, which may affect the feasibility and the clinical utility of the CPOT. The American association of critical Nursing (AACN) (2021) released a practice alert paper recommended that the health care institutions should include education and clinical support for the utilization of behavioral pain scales and the scoring system and interpretations for the scores feasibility and clinical utility total scores (30). Although it was expected that senior nurses view the CPOT as more feasible and have a higher clinical utility, the study revealed no association regarding this variable. This could be explained by the fact that CPOT is a new tool and has recently been



introduced to the hospital. Thus, this result is reasonable and justified.

### **Limitations**

The study was conducted in a single hospital in Jordan; this may limit the generalizability of the results. However, this hospital is considered one of the largest teaching hospitals in Jordan and includes five intensive care units. It also has a large capacity for patients. In the future, if many hospitals used the same tool, a larger sample and different settings could be included. Another limitation, although the clinical utility and feasibility were found to be high, the researcher did not conduct a psychometric property for the FCU-CPOT.

### **Conclusion**

The critical pain observation tool (CPOT) was found to be moderately feasible and has clinical utility in the selected hospital. Feasibility and clinical utility testing are important to be insured before administering any tool or innovation to any setting or institution. Furthermore, it is recommended to encourage all the health care providers in the critical care units to consider using the CPOT. It is also recommended for nurses to find means of communication with the physicians regarding pain assessment to improve pain management of critically ill patients. In addition, to ensure the maximum application of the CPOT in intensive care units, the health care professionals should be well educated and trained in using the CPOT tool. Thus, it is highly recommended to include pain assessment and management courses in the nursing curricula.

Finally, we recommend that hospitals adopt an efficient training program that aims to achieve the sustainability of any intervention related to pain assessment and management. Future studies are required to use qualitative approaches to deeply understand the barriers that nurses may face in utilizing pain assessment tools in critical care settings.

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### **Conflict of interests**

The authors declare no potential conflicts of interest with respect to the research, authorship, and publication of this study.

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