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Original article

The Critical care Pain Observation Tool is reliable in non-agitated but not in agitated intubated patients

Hoda Chookalayia [a], Mehdi Heidarzadeh [b,*], Mohammad Hassanpour-Darghah [c], Masoomeh Aghamohammadi-Kalkhoran [b], Mansoreh Karimollahi [b]

[a] Student Research Committee of Ardabil University of Medical Sciences, Ardabil, Iran
[b] Nursing and Midwifery School, Ardabil University of Medical Sciences, Ardabil, Iran
[c] Department of Cardiothoracic, Imam Khomeini Hospital, Ardabil University of Medical Sciences, Ardabil, Iran

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ABSTRACT

Objective: The Critical-Care Pain.
Observation: Tool is one of the instruments developed to assess pain in patients who are unable to communicate verbally. The study aimed to survey the psychometric properties of Critical-Care Pain.

Observation: Tool in four groups of non-verbal patients according to their Richmond Agitation Sedation Score (RASS).
Study design and methodology: 65 critically ill patients (medical, surgical, trauma) were assessed using the critical care pain observation tool on six occasions (before, during and after nociceptive and non-nociceptive procedures). Patients were divided into four groups according to their RASS score: 1. All patients (RASS −3 to +2), 2. Sedated patients (RASS −3 to −1), 3. Restless patients (RASS +1), 4. Agitated patients (RASS +2).
Results: Discriminant and criterion validity, confirmatory factor analysis and internal reliability showed good validity and reliability in the critical care pain observation tool in all groups except agitated patients. The results showed that, in general, the CPOT has good version of the critical care pain observation tool has good psychometric properties to evaluate pain in non-verbal patients admitted to intensive care units who have a RASS score ranging from −3 to +1, but it is not a good tool to evaluate pain in patients who are agitated according to RASS.

Implications for clinical practice

- Unrelieved pain may have serious acute and long-term implications and can be detrimental to the prognosis of critically ill patients.
- The CPOT can help to nurses and clinicians to assess pain in non-verbal patients admitted to intensive care units.
- When using this scale, consider differentiating pain-related behaviours in agitated patients.
- CPOT is valid and reliable in sedated patients, but it is not a good tool to evaluate pain in patients who are agitated according to the RASS.

Introduction

There are few tools that assess pain in non-verbal patients admitted to intensive care units (ICU). The critical care pain observation tool (CPOT) is one of the tools developed to assess pain in ICU patients. The CPOT was developed by Gelinas et al. (2006) based on behavioural and physiological changes (Gelinas et al., 2006). The items in the CPOT include facial expression, body movement, muscle tension and compliance with the ventilator for mechanically ventilated or vocalisation in extubated patients. Each item in the CPOT has three options and is scored from 0 to 2, the total score ranges from 0 to 8. Gelinas and Johnston (2007) demonstrated the scale's construct validity by the increasing CPOT during

* Corresponding author at: Nursing Department, School of Nursing and Midwifery, Saadi Ave, Shohada Highway, Ardabil, Iran.
E-mail address: m.mahda@gmail.com (M. Heidarzadeh).

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change in position, and criterion-related validity with higher pain scores in people who reported pain compared to those who did not, Also they reported good inter-rater reliability, (κ = 0.62–0.88). The CPOT has been verified in various studies in ICU patients (medical, trauma and post-surgery) and its validity and reliability have been confirmed (Arbour et al., 2011; Rijkenberg et al., 2015; Topolovec-Vranic et al., 2013; Keane, 2013; Chanques et al., 2014; Echegaray-Benites et al., 2014; Li et al., 2014; Nurnberg Damström et al., 2011).

The diagnosis of pain in people who are agitated is one of the challenges for behavioural tools (Rijkenberg et al., 2015; Topolovec-Vranic et al., 2013; Husebo et al., 2014). Agitated patients show behaviours that may not be distinguishable from observed behaviours of pain (Rijkenberg and Van Der Voort, 2016). Although the validity and reliability of CPOT in patients admitted to ICU have been confirmed in various studies (Arbour et al., 2011; Rijkenberg et al., 2015; Topolovec-Vranic et al., 2013; Keane, 2013; Echegaray-Benites et al., 2014; Li et al., 2014; Nurnberg Damström et al., 2011; Liu et al., 2015), one of its weaknesses is that its psychometric evaluation has been studied less in agitated patients admitted to ICU. Kanji et al. (2016) evaluated the psychometrics of CPOT for patients admitted to ICU, with varying degrees of delirium. They enrolled 40 patients diagnosed with delirium using the Confusion Assessment Method for ICU (CAM-ICU). Given the approved discriminant validation, the inter-rater reliability and the internal consistency, Kanji et al. (2016) stated that the CPOT is a reliable and valid scale in the evaluation of pain in non-comatose and delirious adult ICU patients. Although Kanji et al. (2016) confirmed the psychometric properties of CPOT in delirious patients, CPOT was not tested separately for hyperactive and hypoactive delirium and the relationship between CPOT and the Richmond Agitation Sedation Score (RASS) (Ely et al., 2003) was not determined; therefore, more studies need to be conducted in this field.

Methods

Study aim and objectives

Given the importance of pain management in non-verbal patients admitted to ICU, routinely assessing pain with a valid tool is an important. This study aimed to evaluate the psychometrics of the CPOT. Furthermore, most recent studies enrolled patients with in a narrow RASS score (e.g. without inclusion of agitated patients) (Rijkenberg et al., 2015; Chanques et al., 2014; Echegaray-Benites et al., 2014; Li et al., 2014; Nurnberg Damström et al., 2011; Arbour et al., 2014; Linde et al., 2013), but in this study patients with a RASS score of −3 to +2 were enrolled. In the first step psychometric properties of CPOT regardless of the RASS score was evaluated in patients admitted to ICU and then validity and reliability indexes were examined in different groups according to RASS score (Ely et al., 2003; Sessler et al., 2002; Tadrisi et al., 2009)

Design and sample

The present cross-sectional study evaluated the psychometric properties of CPOT. The study population included all patients admitted to ICUs in three hospitals in Ardabil (35 beds). Through convenience sampling 65 eligible patients were entered to the study. Inclusion criteria included a minimum age of 18 years, being mechanically ventilated for more than 24 hours; the ability to hear and respond by moving the head, eyes or eyebrows and a minimum score of 6T out of 10T for consciousness based on Glasgow Coma Scale (GCS) Teasdale and Jennett, 1974; Li et al., 2014; Topolovec-Vranic et al., 2013). Exclusion criteria included quadriplegia, extensive damage to the face and arms, muscle function disorders, receiving neuromuscular blockers and drug and alcohol addiction (according to medical history taken from the patient's family and medical records).

During the seven months, 202 patients were evaluated with a RASS score ranging from −3 to +2 and 97 eligible patients were identified, 32 of whom were excluded from the study for various reasons such as extubation, lack of trustworthiness (the trustworthiness of all patients specially with RASS +2 were confirmed by the anesthesiologist and the nurses that took care of the patients directly), loss of consciousness and death. Finally the data of 65 patients were analysed. All patients received routine procedures, however, after explaining the purposes and the method of the study and also any other ethical considerations by the researcher, written consent was obtained from the first degree relatives of patients (e.g. Father, mother, wife or husband, and children). This study was approved by the Ethics Committee of the University with the code number of IR.Arums.REC.94.90.

Based on the participants' RASS score, the psychometric properties of CPOT were evaluated in four groups: In group one, psychometric properties of CPOT were evaluated in all 65 patients (total study population). Then, the reliability and validity of CPOT were evaluated again based on RASS score in three groups separately, including sedated patients (RASS −3 to −1n = 33) as group 2, restless patients (RASS +1; n = 17) as group 3 and agitated patients (RASS +2; n = 15) as group 4. In the study the calm patients (RASS 0) were excluded because of very few eligible participants (n = 2) during the study.

Procedures

After obtaining permission from prof Gélinas and American Association of Critical-Care Nurses, translation and back-translation of the CPOT was conducted by four English experts. Before data collection, two raters received six hours of theoretical training and eight hours of practical training by the researcher about the research objectives and how to complete the scale. During morning shifts, the two raters stood on the two sides of the beds and observed the patients. They simultaneously but independently completed the CPOT in different situations and they didn't inform each other of their score before finishing scoring. Changing position was used as a painful procedure and washing the eyes with cotton soaked in saline 0.9% was used as a non-painful procedure. CPOT was completed for each patient six times at 5 to 15minutes intervals: T_1 = before non-painful procedure, T_2 = during on-painful procedure, T_3 = after non-painful procedure, T_4 = before painful procedure, T_5 = during painful procedure, T_6 = after painful procedure.

Data analysis

Discriminant validity, criterion validity and factor structure were used to determine the validity of CPOT. Confirmatory factor analysis was used by LISREL 8.8 to investigate the factor structure of the scale. For this purpose, one-factor and four items model of CPOT was studied in four groups. At this stage, the data from six times (T1-T6) were used, such that data of n = 6*65 in the total study population, n = 6*33 in sedated patients, n = 6*17 in restless patients, and n = 6*15 in agitated patients were analyzed.

To perform test-retest, 25 patients whose RASS score ranged from −3 to +1 at the time of testing were evaluated again after 6–8 hours by one of the raters. In addition, the Cronbach's alpha coefficient was used to determine scale's internal consistency. To determine the inter-rater reliability, the correlation obtained from the observations of raters for each scale was investigated by intra class correlation coefficient (ICC). Finally, the cut-off point was also determined for all four groups to determine pain using Receiver

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