Brief Methodological Report

Pain Assessment Using the Critical-Care Pain Observation Tool in Chinese Critically Ill Ventilated Adults

Qingdong Li, MM, Xianyao Wan, MM, Chunmei Gu, BSN, Yang Yu, MM, Wei Huang, MM, Suwei Li, MD, and Yongli Zhang, MM

Department of Critical Care Medicine (Q.L., X.W., C.G., W.H., S.L., Y.Z.) and Nursing Department (C.G.), The First Affiliated Hospital of Dalian Medical University; and Critical Care Medical Research Institute (Q.L., X.W., W.H., S.L., Y.Z.) and Department of English Education (Y.Y.), Dalian Medical University, Dalian, People's Republic of China

Abstract

Context. The psychometric properties of the Critical-Care Pain Observation Tool (CPOT) need to be tested in general intensive care unit patient populations in China.

Objectives. To further evaluate the psychometric properties of the CPOT and provide a pain assessment method for Chinese critically ill ventilated adults by validating a translation of the CPOT.

Methods. A total of 63 conscious ventilated Chinese adults were repeatedly assessed by two independent raters using the CPOT at rest as well as before and during the two procedures: 1) nociceptive procedure (turning) and 2) non-nociceptive procedure (taking noninvasive blood pressure). A total of 12 assessments were included.

Results. The principal component factor analysis revealed that the domain structure of the CPOT was acceptable. Cronbach's α coefficient as a measure for the internal consistency ranged from 0.57 to 0.86; intraclass correlation coefficients as a measure for inter-rater reliability ranged from 0.80 to 0.91; Spearman nonparametric coefficients as a measure for test-retest reliability ranged from 0.81 to 0.93. The CPOT total score was significantly higher during the nociceptive procedure, indicating that its discriminant validity was good. Self-reported pain was obtained as the gold standard; the receiver operating characteristic curve analysis determined the best cutoff value of the CPOT (>2) with the specificity (73.3–81.8%) and sensitivity (80.8–89.4%) as well as the area under the curve (range 0.849–0.902).

Conclusion. The CPOT has good psychometric properties and can be used as a reliable and valid instrument for pain assessment in Chinese critically ill ventilated adults. J Pain Symptom Manage 2014;48:975–982.

Address correspondence to: Qingdong Li, MM, Department of Critical Care Medicine and ICU, First Affiliated Hospital of Dalian Medical University, 222 Zhongshan Road, Dalian, Liao Ning Province, People's Republic of China 116011. E-mail: liqingdong2@163.com

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Key Words
Pain assessment, ventilation, intensive care unit, critical care, psychometrics

Introduction

Critically ill patients frequently experience a variety of pain in the intensive care unit (ICU). Unrelieved pain gives rise to negative physiological and psychological events that can be detrimental to the prognosis of critically ill patients.[1–4] Appropriate pain-relieving interventions occur only where reliable and valid assessment has been achieved.[5,6] It is generally accepted that a patient's self-report is the most reliable indicator of the existence and severity of pain.[7] However, a substantial number of critically ill patients may not be able to report their pain because of mechanical ventilation.[4,7] Nurses' estimates of these patients' pain levels often understate actual levels.[8] Thus far, pain assessment in nonverbal ventilated ICU patients remains challenging for critical care nurses and clinicians.

Recently, a pain assessment tool, the Critical-Care Pain Observation Tool (CPOT), has been developed for a standardized assessment of pain in nonverbal ventilated patients.[9,10] In 2013, the new clinical practice guideline about pain recommended using the CPOT for ICU patients who are unable to self-report pain.[4] However, the guideline also pointed out that the CPOT should be translated into foreign languages other than English and French as well as further tested in other general ICU patient populations.[4]

Because the CPOT was not available in Chinese, we adapted the English version of the CPOT to Chinese and then performed a validation study of this tool in mechanically ventilated ICU patients. As the domain structure and test-retest reliability of the CPOT were never evaluated, this study also aimed to further evaluate the psychometric properties of the CPOT in these patient populations.[4,5]

Methods

Translation and Back Translation of the CPOT

The original published version of the CPOT in English was translated into simplified Chinese characters after obtaining written permission from the author (Céline Gélinas). A systematic approach to translation and adaptation was conducted as recommended by the World Health Organization,[11] which includes four steps: expert panel forward translation, backward translation, a pretest, and cognitive interviewing and a consensus on the final version.

Study Sample

The study was conducted over an eight-month period in a 19-bed general ICU at a tertiary referral academic teaching hospital. The sample size required for validating the CPOT was established using the precision of intraclass correlation coefficient (ICC). Thus, with a precision of ICC of 0.85 ± 0.10 as an objective, and for a scale with four subscales, 55 to 65 patients were required for the study.[5,12] All consecutive patients 18 years of age or older in the ICU were eligible if they were undergoing mechanical ventilation with endotracheal tubes for more than 48 hours, able to listen and understand Mandarin Chinese, in stable condition (without any extra invasive procedure for at least 24 hours), and had a Glasgow Coma Scale score of 8 or greater. Exclusion criteria were paralysis, cerebral injury, facial injury, arm injuries, those receiving muscular blocking agents, or those with muscular dysfunction. This study was approved by the ethics committee of our hospital, and informed consent was obtained.

Measures

The instrument tested in this study was the CPOT. Physiological indicators, including mean artery pressure (MAP), heart rate (HR), and respiration rate (RR), also were observed because they may be a cue of pain. The physiological indicators were examined using the present ICU monitoring equipment (Hewlett Packard, Palo Alto, CA). Other demographic data documented were age, gender, primary ICU diagnosis, administration of analgesia and sedation, and Acute Physiology and Chronic Health Evaluation score.

ICU nurses who volunteered to participate in the study were trained to use the CPOT. The