Commentary

Can the critical-care pain observation tool (CPOT) be used to assess pain in delirious ICU patients?

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Critically ill patients frequently experience both procedural pain and pain at rest. Chest tube removal, tracheal suctioning, wound care, turning and arterial line insertion have been shown to be the most painful procedures (1,2).

Untreated acute pain in adult ICU patients can lead to short- and long-term physiological and psychological complications such as postoperative myocardial infarction, insufficient sleep and posttraumatic stress disorder (3-6). Practice guidelines recommend an individualized and goal directed pain management. This includes a systematic assessment of pain with a validated pain scale appropriate to the patient's level of consciousness. Pain assessment in critically ill patients is a challenge due to mechanical ventilation, severe illness, administration of sedatives and analgesics or a decreased level of consciousness. When a patient's self-report is unachievable, validated behavioral pain scores are advised for the assessment of pain in this particular group of patients (6,7).

Two independent systematic reviews compared the psychometric proportions of pain assessment scores for intensive care patients who are unable to self-report pain (8,9). The critical-care pain observation tool (CPOT) and behavioral pain scale (BPS) received the best scores in their quality assessments and both scores are recommended in recent clinical practice guidelines for the assessment of pain in nonverbal critically ill adults (7,10,11). The CPOT was developed for the assessment of pain in critically ill patients. The scale consists of four behavioral domains: facial expression, body movements, muscle tension and compliance with the ventilation for intubated patients or vocalization for extubated patients. Patient's behavior in each domain is scored between 0 and 2. The possible total score ranges from 0 (no pain) to 8 (maximum pain). The CPOT cutoff score was >2 during nociceptive procedures (7,12).

A limitation of the CPOT is the lack of sufficient research in delirious critically ill patients. Delirium is a common complication in ICU patients and the incidence of delirium after cardiac surgery varies between 3–55% (13). The overall incidence in critically ill patients is on average 30–50% (14). Self-report of pain in this vulnerable group of patients is complicated because of the limited communication, the variable level of consciousness and a potential different presentation of pain. As a consequence, validation of a behavioral pain score like the CPOT in delirious critically ill patients is warranted (8). Kanji *et al*. addressed this problem and investigated the validity and reliability of the CPOT in adult critically ill patients with a delirium (15). They included 40 ICU patients in which delirium was positively assessed with the confusion assessment method-ICU (CAM-ICU) and excluded patients who were unable to show a reliable physical response to pain. The authors thoroughly evaluated several important psychometric proportions of the CPOT like the discriminant validation, the interrater reliability, and the internal consistency. Discriminant validation is the assessment of the ability of a scale to discriminate between different conditions or groups. Pain scales are often tested by comparing the score between a painful and non-painful procedure. The interrater reliability is the degree of agreement between different raters on different occasions (8,16). The authors choose a non-invasive blood pressure

measurement as a non-painful procedure and repositioning, endotracheal suctioning or a dressing change as the painful procedures. The mean difference between baseline and painful procedures was 3.13±1.56 (P<0.001). The interrater reliability was based on 120 paired assessments between one of two members of the study team and an independent nurse who was not familiar with the patient. The authors tested the interrater reliability by the calculation of weighted kappa coefficients, spearman correlation coefficients and intraclass correlation coefficients (ICC) for the individual domains and the overall CPOT score. All coefficients had substantial to almost perfect agreement for the individual domains and the overall CPOT score. Kanji *et al*. concluded that their study indicates that the CPOT is a valid and reliable tool for the detection of pain in non-comatose, delirious adult ICU patients.

Although this study was meticulously designed and executed, a firm conclusion on the use of CPOT in delirious patients cannot be made yet. In this study a point of concern is the lack of data about the severity of delirium, the subtype of delirium and the relation between the Richmond Agitation-Sedation Scale (RASS) and CPOT score. The DSM-V subdivides delirium in three subtypes: (I) hyperactive form; (II) hypoactive form; and (III) mixed form. The hyperactive form is characterized by increased vigilance, restlessness, aggression and intense emotions, such as anger or anxiety. The hypoactive form is characterized by reduced alertness, sparse speech and apathy. In patients suffering from the mixed form, hyperactive and hypo - active periods alternate with each other. Peterson *et al*. defined the three subtypes according to the RASS scores (17). A hyperactive delirium was present when the RASS was persistently positive (+1 to +4). Pain and agitation may interfere in delirious patients resulting in a higher CPOT due to agitation instead of pain. In addition, the interference of sedation needs further investigation (9). Kanji *et al*. reported a median RASS of 0 with a range from –3 to +3 which shows that they included a number of patients with anxious or apprehensive movements (RASS +1), patients with frequent non-purposeful movements or patient-ventilator dyssynchrony (RASS +2) or patients pulled on tube(s) and had aggressive behavior toward staff (RASS +3). All four domains of the CPOT may potentially have been affected by high RASS scores, which might result in inappropriate high CPOT scores. These high CPOT scores may lead to additional use of analgesics were anti-delirium medication would be more appropriate. A recent study about the validity of the CPOT and BPS showed in a subgroup of seven agitated patients (RASS +1) non-significant increases in CPOT scores between rest and the painful procedure but no difference at all between the non-painful procedure and the painful procedure. The baseline CPOT score in this small subgroup was also higher than patients with RASS < +1 (18). Although this was a very small sample it is a signal that the validity of the CPOT in patients with a hyperactive delirium and/or RASS > +1 requires further investigation.

In contrast to previously performed research, Kanji *et al*. reported the interrater reliability of the four domains of the CPOT instead of the interrater reliability of the different procedures (painful *vs*. non-painful or rest). A drawback of this method is that it does not comply with daily ICU practice since the CPOT is used as the sum of four domains during different occasions like tracheal suctioning or rest. The interrater reliability of the CPOT in delirious patients during different procedures is therefore still unknown.

In this study and several previous studies, either one of the investigators or the physicians participated in the assessments. However, in daily practice a large group of nurses assess pain in the intensive care. In addition, the bedside nurse potentially interprets the patient's reactions better because of a longer contact time. Hence, more raters should be used in the assessment of interrater reliability in future studies (10). Finally, there are at least six versions of the ICC and they can give different results when applied in the same data (16,19). The authors did not report which model of ICC was used in the analysis and thus it is unclear whether they used the appropriate ICC model.

In conclusion, the study of Kanji *et al*. is an important first step in the validation of the CPOT in critically ill patients with a delirium. However, assessment of the interrater reliability of the CPOT should reflect daily practice in IC. Studies with a larger sample of delirious patients, and sufficient subsets of the three subtypes of delirium and RASS > +1, are obligatory before we can conclude that the CPOT is a valid and reliable pain assessment tool in ventilated critically ill patients suffering from a delirium.

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Footnote

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