Original Article

Pain Assessment: Validation of the Physiologic Indicators in the Ventilated Adult Patient

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Abstract:

Pain is one of the major stressors for critically ill patients. The first step for effective pain management is pain assessment. Due to the availability of physiologic monitoring devices in intensive care units, observing changes in vital signs provides a fast, simple, and objective method. However, the validity of physiologic indicators in pain assessment is still debatable. The aim of this study was to validate the discriminant and criterion validity of physiologic indicators for pain assessment in nonverbal patients. The study included 120 patients from the intensive care unit of a medical center of Taiwan. Patients were observed under two nursing procedures to examine the discriminant validity of physiologic indicators: 1) a nociceptive procedure: suctioning; 2) a non-nociceptive procedure: taking noninvasive blood pressure. Forty-four consciously ventilated patients were also asked to provide self-reported pain intensity. Discriminant validity was supported with higher heart rate and blood pressure during suctioning than the values before and after suctioning. Moreover, the heart rate and blood pressure during suctioning were significantly higher than the values during noninvasive blood pressure measurement. In terms of criterion-related validity, there was no significant correlation between patient's self-report of pain intensity and heart rate and blood pressure. As recommended by other scholars and researchers, heart rate and blood pressure can only be used as a cue for pain assessment. If pain is suspected, further appropriate assessment is necessary to provide accurate judgment.

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BACKGROUND

Pain is one of the major stressors for critically ill patients (Soh, Soh, Ahmad, Raman, & Japar, 2008), and is also a common symptom for most of them

(Nelson et al., 2001). Critically ill patients experience moderate to severe pain (Nelson et al., 2001; Rotondi et al., 2002). Diseases, traumas, endotracheal intubations, surgeries, examinations, and even routine medical procedures such as suctioning and turning can cause pain (Rotondi et al., 2002; Siffleet, Young, Nikoletti, & Shaw, 2007). If pain is not dealt with in a proper and timely manner, both the physiologic and psychological comfort of a patient will be negatively affected (Bair, Wu, Damush, Sutherland, & Kroenke, 2008; Barr et al., 2013; Blakely & Page, 2001; Dunwoody, Krenzischek, Pasero, Rathmell, & Polomano, 2008; Jänig, 2012; McWilliams, Goodwin, & Cox, 2004). Being free from pain is a patient's basic human right. Patient comfort and pain management are also of major concern to patients and their families (Mularski, Heine, Osborne, Ganzini, & Curtis, 2005).

The first step for effective pain management is pain assessment. However, the pain of critically ill patients often is not correctly assessed or controlled (Payen et al., 2007). If pain can be closely assessed in the way that vital signs such as body temperature, respiratory rate (RR), heart rate (HR), and blood pressure (BP) are, then it can be better and more intensively managed. Accordingly, pain has been designated as "the fifth vital sign" (American Pain Society, 2003).

Pain management can improve patient care quality, but inappropriate pain control may result in an increase in adverse events, including death, oversedation, and respiratory inhibition (Cashman & Dolin, 2004; Zornow, 2009). Therefore, it is necessary to have effective pain assessment tools to avoid the risk for medication overdose as a result of incorrect pain management. However, implementing effective pain assessment in intensive care units (ICUs) is complex and difficult due to factors relating to patient conditions and assessment tools.

Pain is a subjective experience. As McCaffery (1968) emphasized, "Pain is whatever the experiencing person says it is, existing whenever he says it does" (p. 95). If someone perceives and expresses pain, then it must be considered to be pain. Therefore, the gold standard for pain assessment is a patient's self-report (Barr et al., 2013). However, because patients in the ICU are often intubated, may have a tracheostomy, or may be unconsciousness, they are unable to communicate verbally or even express a sensation of pain. Furthermore, the complexity and variety of pain responses in critically ill patients increase the difficulty of pain assessment. Pain causes different responses, including physiologic, psychological, and behavioral. Also, pain thresholds and tolerance, as well as ways of expressing pain, differ among patients. Therefore, most critical care nurses do not know how to effectively and objectively assess pain (Aslan, Badir, & Selimen, 2003).

Some pain assessment tools have been developed for clinical use. However, few critical care nurses use these tools to assess patients' pain (Rose et al., 2011). When they attempt to use the tools, nurses often do not feel confident in the pain assessment results. This shortcoming stems from the lack of reliable and valid pain assessment tools specifically designed for critically ill patients. Current pain assessment tools can be divided into two categories: multidimensional and unidimensional. A multidimensional pain assessment tool often includes sensory, cognitive, and affective dimensions of pain. It takes time to conduct multidimensional pain scales to comprehensively assess a patient's pain. Therefore, these tools are not generally applicable to critically ill patients whose medical conditions may change at any moment.

A unidimensional pain scale mainly focuses on a patient's self-evaluated pain intensity. The visual analog scale (VAS) and the numerical rating scale (NRS), common tools for clinical application, both provide direct and prompt assessment results. However, they do not fit the characteristics of many critically ill patients, which can include an inability to communicate verbally, an inability to read or write, and even unconsciousness. Due to the difficulties in pain assessment, the clinical practice guidelines developed by the American College of Critical Care Medicine (ACCM) suggest observing behavioral reactions for assessing the pain of patients who are unable to self-report (Barr et al., 2013).

When patients are unable to report pain, behavioral observation can be a helpful approach (Herr, Coyne, McCaffery, Manworren, & Merkel, 2011). Several studies support the use of observing patient pain behaviors as an effective assessment method (Gélinas, Fillion, Puntillo, Viens, & Fortier, 2006; Mateo & Krenzischek, 1992; Odhner, Wegman, Freeland, Steinmetz, & Ingersoll, 2003; Payen et al., 2001). Although the tools used for pain observation have good validity, they do not have high interrater reliability, especially when the patients are in pain (Marmo & Fowler, 2010). Additionally, a patient's level of consciousness and the degree of sedation also affect the scoring of the patient's pain behaviors. For example, patients with clear consciousness score higher on pain assessment scales than those who are unconscious (Gélinas et al., 2006; Gélinas & Johnston, 2007; Payen et al., 2001). Similarly, patients who are sedated more deeply score lower on pain assessment scales (Gélinas & Johnston, 2007; Payen et al., 2001).