

Pain Assessment in Intensive Care Unit: A Forgotten Entity or a Quality Indicator?

Amarja A Havaladar 

Keywords: Behavioral Pain Scale, Critical care pain observation tool, Intensive care unit, Pain assessment.
Indian Journal of Critical Care Medicine (2022): 10.5005/jp-journals-10071-24191

Pain assessment in critically ill patients is a challenging task. During intensive care unit (ICU) admission, patients can experience pain during various procedures. Self-reporting of pain is possible in nonventilated patients, but it is difficult in ventilated patients.¹

When patients are admitted to the ICU, the focus of monitoring remains on the vital parameters that include hemodynamics, respiratory mechanics, ventilator settings, and other organ systems. Pain is a fifth vital sign and is therefore easily missed. Tachycardia and hypertension as surrogate measures of pain are not reliable as multiple factors affect them.^{2,3}

Various scales are available for pain assessment. In patients where self-reporting of pain is possible, a visual analog scale (VAS) or numerator rating scale (NRS) and a behavioral pain scale—Non-intubated patients (BPS—NI) can be used. For patients who are unable to self-report, a behavioral pain scale (BPS) and a critical care pain observation tool (CPOT) can be used.^{2,4} Payen et al. introduced the BPS, and the CPOT scale was introduced by Gelin et al.¹⁻³ These two pain scales are commonly used and have been shown as robust tools for pain assessment in several studies.¹⁻⁴

To understand different scales used for pain assessment, the following terminologies are important to know. Any assessment tool, e.g., pain scales, will be evaluated for various parameters before being implemented in the clinical practice. Parameters used are validity (it measures what it is supposed to measure), reliability (gives same results after repeated measurements), construct validity (it actually measures pain), and criteria validity (when compared with the gold standard tool, how it performs). The interrater reliability and discriminant validation of any scale are equally important. Interrater reliability evaluates agreement between the two or more assessors. For discriminant validation of pain scales, evaluation is done in the same patient with assessment at the baseline and after a nociceptive stimulus.^{2,5}

While analyzing the available evidence, the PICO model (Patient, Intervention, Comparison, and Outcome), can be useful, e.g. patient population, in which group of patients, the study was performed, intubated, not intubated, comatose, or patients with traumatic brain injury (TBI). The type of nociceptive stimulus or intervention used, such as response to various procedures like endotracheal tube suctioning, blood sampling for arterial blood gas (ABG), or placing vascular access. Comparison between the different pain scales. The type of outcome refers to discriminant validation or interrater reliability evaluated in a study. Apart from these parameters, perception of pain and acceptable level of pain may vary among different subgroups of patients or different patients in the same predefined group, as a result, the performance of these scales may vary.

Department of Critical Care Medicine, St Johns Medical College Hospital, Bengaluru, Karnataka, India

Corresponding Author: Amarja A Havaladar, Department of Critical Care Medicine, St Johns Medical College Hospital, Bengaluru, Karnataka, India, Phone: +91 9036082112, e-mail: amarjahavaladar@rediffmail.com

How to cite this article: Havaladar AA. Pain Assessment in Intensive Care Unit: A Forgotten Entity or a Quality Indicator? *Indian J Crit Care Med* 2022;26(4):419–420.

Source of support: Nil

Conflict of interest: None

One of the barriers to the use of pain scales is language. These pain scales are available in English and several other languages.⁴ In countries where English is not the primary language, forward translation of pain scales into the local language and back-translation into English is required. After this, checking for any discrepancies and corrections followed by a pilot study and validation of the tool is necessary. A similar difficulty is seen in implementing delirium assessment scales across various ICUs.

Studies comparing simultaneous evaluation of different pain scales are done in ICU settings. Chanques et al. studied a psychometric comparison of three pain scales BPS, CPOT, and nonverbal pain scale (NVPS). BPS and CPOT had shown similar psychometric properties (validity and reliability) in the cohort of intubated patients and had better interrater reliability and internal consistency than NVPS.⁶

The study by Rijkenberg et al. was designed to evaluate discriminant validation among BPS and CPOT scales. This study done in intubated patients showed that both the pain scales are valid and reliable tools and discriminant validation of CPOT was better than BPS.⁷

There is limited data on the use of BPS and CPOT in unconscious patients. The study by Nazari et al., published in this issue of *IJCCM*, was designed to evaluate the psychometric properties of two pain scales in unconscious patients due to surgery, trauma, or medical illness.⁸ Sixty percent of the patients were mechanically ventilated. The same set of patients was evaluated by BPS and CPOT simultaneously by two different assessors. The non-nociceptive stimulus was a noninvasive blood pressure measurement and the nociceptive stimulus was a position change. The study showed that the overall effect size was lower, and among two pain scales, the effect size for CPOT was lower than BPS for discriminant validation.⁸ Similar findings were reported by Zhai et al., in their

meta-analysis of 25 studies.⁹ Nazari et al. did not find any difference in compliance with the ventilator during the nociceptive and non-nociceptive stimulus; this was possibly affected by the level of sedation or use of muscle relaxants.⁸ One of the limitations of this study could be using the same pain scale in a heterogeneous population, especially if patients are on muscle relaxants, there won't be any change in the various components of the pain scale from the baseline.

The 2018 update to the Pain, Agitation/Sedation, Delirium, Immobility and Sleep Disruption (PADIS) guidelines described risk factors for pain, tools available for assessment, and limitations of these scales in special populations like patients on sedatives and paralytics and cases of TBI.¹⁰ It also discussed the possible role of involving family members as proxy reporters in pain assessment for ICU patients.

There are limitations in using existing pain scales in patients who are sedated with RASS ≤ -4 and paralyzed. We do not have a reliable tool for the evaluation of pain in this group of patients. The initial study on the use of pupillary dilatation reflex in anesthetized patients for pain assessment showed promising results.¹¹ But its utility in a larger ICU cohort needs to be determined.

Also, the analgesia nociception index (ANI) based on heart rate variability and Nociception level index (NOL), comprised of various parameters such as heart rate, heart rate variability, the amplitude of the photoplethysmographic waveform and skin conductance with fluctuations there-in, and their time derivatives are the possible options for pain assessment.¹²⁻¹⁴ There is a scope for future research to develop an ideal pain assessment tool that can address the evidence gaps.

ORCID

Amarja A Havaladar  <https://orcid.org/0000-0002-8763-3585>

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