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Review Article

Beyond measurement: a deep dive into the commonly used pain scales for postoperative pain assessment

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ABSTRACT

This review explores the essential methodologies for effective postoperative pain management, focusing on the need for thorough pain assessment tools, as underscored in various existing guidelines. Herein, the strengths and weaknesses of commonly used pain scales for postoperative pain—the Visual Analog Scale, Numeric Rating Scale, Verbal Rating Scale, and Faces Pain Scale—are evaluated, highlighting the importance of selecting appropriate assessment tools based on factors influencing their effectiveness in surgical contexts. By emphasizing the need to comprehend the minimal clinically important difference (MCID) for these scales in evaluating new analgesic interventions and monitoring pain trajectories over time, this review advocates recognizing the limitations of common pain scales to improve pain assessment strategies, ultimately enhancing postoperative pain management. Finally, five recommendations for pain assessment in research on postoperative pain are provided: first, selecting an appropriate pain scale tailored to the patient group, considering the strengths and weaknesses of each scale; second, simultaneously assessing the intensity of postoperative pain at rest and during movement; third, conducting evaluations at specific time points and monitoring trends over time; fourth, extending the focus beyond the intensity of postoperative pain to include its impact on postoperative functional recovery; and lastly, interpreting the findings while considering the MCID, ensuring that it is clinically significant for the chosen pain scale. These recommendations broaden our understanding of postoperative pain and provide insights that contribute to more effective pain management strategies, thereby enhancing patient care outcomes.

Keywords: Pain Measurement; Pain, Postoperative; Perioperative Care; Postoperative Care; Postoperative Period; Visual Analog Scale.

INTRODUCTION

The effective control of postoperative pain is an important part of perioperative care and significantly influences the process of postoperative recovery [1,2]. Inadequate postoperative pain control causes discomfort to the patient, thereby reducing satisfaction [3] and greatly impedes functional recovery after surgery. This can lead to more postoperative complications and longer hospital stays [4]. Moreover, inadequate postoperative pain con-

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trol is a major risk factor for chronic postoperative pain and opioid use [5]. Consequently, efforts are ongoing to improve the management of postoperative pain.

Adequate pain assessment is an essential component of delivering optimal postoperative pain management and is crucial for determining the adequacy of pain management strategies. This allows for the adjustment of analgesic types or dosages when required and facilitates the modification of existing regimens or the implementation of additional interventions in postoperative pain management plans. Additionally, pain assessment is a critical step in identifying patients with inadequately managed postoperative pain, facilitating timely consultation with pain specialists, and initiating further interventions. Experts in perioperative medicine agree that pain intensity (both at rest and during movement) at 24 hours postoperatively is an essential endpoint for assessing patient comfort in perioperative medicine [6]. Therefore, a thorough understanding of how to effectively assess postoperative pain is crucial for healthcare professionals involved in perioperative care.

However, despite the acknowledged significance of pain assessment in perioperative care, it frequently receives little attention in healthcare education, resulting in inadequate training on this critical issue. Consequently, this shortcoming has led to reports of insufficient pain assessment in previous studies on postoperative pain. This review aims to bridge this gap by outlining the key factors that healthcare professionals should consider when assessing postoperative pain, reviewing commonly used assessment tools, and suggesting ways to improve the evaluation of postoperative pain in relevant research.

MAIN BODY

1. Considerations for postoperative pain assessment based on guidelines

Several guidelines for postoperative pain management emphasize the importance of pain assessment as a core component of effective care. Clinical practice guidelines for postoperative pain management, including those of the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine (ASRA), and the American Society of Anesthesiologists' Committee on Regional Anesthesia, advocate the use of validated pain assessment tools [7]. These tools help healthcare professionals monitor responses to postoperative pain treatments and facilitate adjustments to treatment plans. As recommended in these guidelines, essential elements for postoperative pain assessment include the onset, pattern, location, quality, intensity, and the aggravating and relieving factors of postoperative pain, as well as the effectiveness of previous treatments, and the effects of postoperative pain on physical function and emotional distress. The guidelines emphasize that assessing pain at rest alone is insufficient and that assessing pain during activity is crucial. However, according to recent meta-analyses, among 944 trials on postoperative pain, 53% did not measure movement-evoked pain, and 45% did not differentiate between pain at rest and movement-evoked pain, emphasizing the need for the assessment of movement-evoked pain in studies related to postoperative pain [8]. Pain during activity is more severe and functionally relevant than pain at rest, necessitating its assessment in postoperative pain management.

The guidelines on postoperative pain management released by the French Society of Anesthesia and Intensive Care Medicine in 2019 also include recommendations for assessing postoperative pain, specifically in patient groups that are difficult to evaluate [9]. These recommendations include self-assessment scales for those aged five years and older and the Face, Legs, Activity, Cry, and Consolability (FLACC) scale for children under seven years of age. For patients with communication difficulties, the guidelines suggest using a modified FLACC scale for children [10] and the ALGOPLUS scale for elderly patients [11].

The 5th edition of "Acute Pain Management: Scientific Evidence," published in 2020 by the Australian and New Zealand College of Anesthetists and Faculty of Pain Medicine, also addresses postoperative pain assessment [12], underscoring the significance of evaluating both pain scores and functional outcomes. This document recommends the Functional Activity Scale, which is divided into three levels (no limitation, mild limitation, and significant limitation), as an instrument for evaluating the functional impact of postoperative pain. This publication also advises that pain assessment should encompass both static (rest) and dynamic (sitting; coughing) pain.

The most recent clinical guidelines on postoperative pain management, published by the ASRA in 2021, also identify the use of a validated pain assessment tool as one of the seven key elements in postoperative pain management [13]. The guidelines underscore the role of preoperative education regarding pain scales in facilitating shared decision-making in postoperative pain management. These guidelines also outline the critical components of pain assessment, including intensity, location, temporal aspects, quality, and modifiers. Although the guidelines present commonly used pain assessment scales, such as the Visual Analog Scale (VAS), Numeric Rating Scale (NRS), Verbal Rating Scale (VRS), and Faces Pain Scale (FPS), their limitations are acknowledged and functional pain scales, such as the pain interference domain of the Patient-Reported Outcomes Measurement Information System (PROMIS) scale and the Defense and Veterans Pain Rating Scale (DVPRS), are recommended as alternatives for evaluating functional activity.

In summary, the use of validated assessment tools is crucial for the comprehensive evaluation of postoperative pain, including pain evaluated at rest and movement-evoked pain. Assessments should consider the broad impact of postoperative pain on recovery, which requires a detailed evaluation of the functional status of patients. Preoperative education regarding pain assessment is vital to prepare patients and their caregivers for active involvement in postoperative pain management.

2. Commonly used pain scales for postoperative pain management

The most commonly used assessment tools for postoperative pain, such as the VAS, NRS, VRS, and FPS, are unidimensional and assess only pain intensity [14]. In this section, we provide a brief introduction to these tools with their feasibility and limitations.

1) VAS

The VAS is the most frequently used pain assessment tool and has been validated in various clinical settings. Its validity and reliability have also been demonstrated for measuring acute pain [15,16]. Although the VAS was originally developed to evaluate mood disorders in psychology, its use was extended to include pain assessment in the 1960s [17]. It is composed of a horizontal or vertical 100-mm linear scale with anchor descriptors representing 0 (no pain) and 10 (the worst pain imaginable). The administration of the VAS and the scoring of pain using this scale are straightforward, making it well-received among patients [18]. Patients are instructed to place a mark on the linear scale to represent their pain, and the length from this mark to the left endpoint is measured [19]. Describing intermediate points is not recommended to prevent the concentration of scores around a favored numeric value [20].

The selection of the orientation of the linear scale can affect the statistical distribution of the resulting data. A previous study reported that the data were normally distributed when using the horizontal-scale VAS but not when using the vertical-scale VAS [21]. However, despite these differences, the results obtained from the horizontal and vertical VAS are strongly correlated [22]. The reading habits of individuals are also an important consideration when deciding between a horizontal or vertical linear scale, as familiarity with certain reading patterns can affect the failure rate when using the VAS [23].

In evaluating pain using the VAS, the point separating mild and moderate pain has generally been set at 30/100 mm [24]. Recently, a study conducted on a large number of surgical patients reported that the boundary values distinguishing mild, moderate, and severe pain were 35/100 and 80/100 mm, respectively [25]. In another study, postoperative pain at or below 33/100 mm on the VAS was considered within an acceptable range, while pain exceeding this level required intervention, such as the administration of rescue analgesics [26].

A major limitation of the VAS is its conceptual complexity, as this scale demands that patients express abstract sensory experiences using a linear measure [27]. These issues tend to be more pronounced in elderly patients with impaired cognitive function. Another notable limitation is the ceiling effect of the VAS, which impedes its ability to discern fine distinctions in the intensity of severe pain [28]. In addition, unlike the NRS or VRS, the VAS requires that patients possess adequate visual acuity because of its reliance on the visual component of the 100-mm line, thereby restricting its applicability in patients with visual impairments.

2) NRS

The NRS is a valid and reliable tool for pain assessment. Although the NRS has various forms, the most commonly used one is the 11-point NRS [29]. This 11-point numerical scale ranges from 0 to 10, where 0 represents no pain, and 10 represents the worst pain imaginable. It can include a segmented horizontal bar or line, and patients are asked to select the numerical value on the segmented scale that most accurately reflects their pain intensity [30,31].

When evaluating pain using the NRS, the interpretation of pain scores is generally categorized as follows: 0 for no pain, 1–3 for mild pain, 4–6 for moderate pain, and 7–10 for severe pain [32]. However, in a study involving surgical patients, the following alternative classification of pain levels has been suggested: 0–2 for mild pain, 3–4 for moderate pain, and 5–10 for severe pain [33]. Additionally, the study reported a threshold for additional analgesia at an NRS score of ≥ 4.

Despite its apparent simplicity, the NRS may present conceptual complexities in some patients, similar to those encountered with the VAS. The NRS requires a specific level of abstract thinking and cognitive effort, as patients are tasked with quantifying their pain intensity within a constrained numerical framework without any additional guidance beyond the endpoints of the scale.

3) VRS

The VRS (or verbal descriptor scale, *i.e.*, VDS) is made up of 4 (none, mild, moderate, and severe) to 15 descriptive statements about pain levels [32,34]. Patients are instructed to select the statement that best describes their pain intensity. The VRS is favored for its simplicity and high compliance, especially among the elderly, owing to its ease of use compared with the VAS or NRS [35]. However, its application in research is limited by its ordinal nature, which restricts analysis to non-parametric methods and may affect its sensitivity to treatment effects [27]. The effectiveness of the VRS is also influenced by the number of descriptive terms used; scales with more than 11 items can be as sensitive as the VAS, whereas those with fewer than five items may be less responsive. Additional limitations of the VRS include its reliance on patient literacy and the potential difficulty that patients may face in finding descriptors that precisely match their pain experience, as the fixed set of options may not entirely capture the intensity or quality of their pain.

4) FPS

The FPS is a pain assessment tool comprising a sequence of facial expression illustrations that delineate a spectrum of pain intensity. Patients are asked to select the facial depiction that most accurately corresponds to their experienced pain level, which is then quantified using a numerical score. The scale is reliable and valid for use in young children, owing to its minimal cognitive demands. Its nonverbal nature ensures applicability across a diverse range of linguistic, communicative, and developmental capabilities, making it an expedient and accessible measure for pediatric populations. Several versions of the FPS have been developed (**Fig. 1**), and a systematic review focusing on pediatric populations reported that no single version is superior [36].

The FPS can be used for the assessment of postoperative pain not only in pediatric patients but also adult patients [37]. Research focusing on adult patients undergoing orthopedic surgery has demonstrated the suitability of an 11-face version of the FPS for assessing acute postoperative pain [38]. This study confirmed the validity, sensitivity, and responsiveness of the scale to changes in pain levels in adult patients undergoing surgery. Additionally, a study involving adult patients who underwent gastrectomy showed that the FPS could effectively capture changes in pain over time postoperatively, further exemplifying its utility in assessing postoperative pain in adult patients [39].

A major limitation of the FPS is the subjectivity of interpretation inherent in its design. This scale employs facial expressions as proxies for the internal experience of pain,

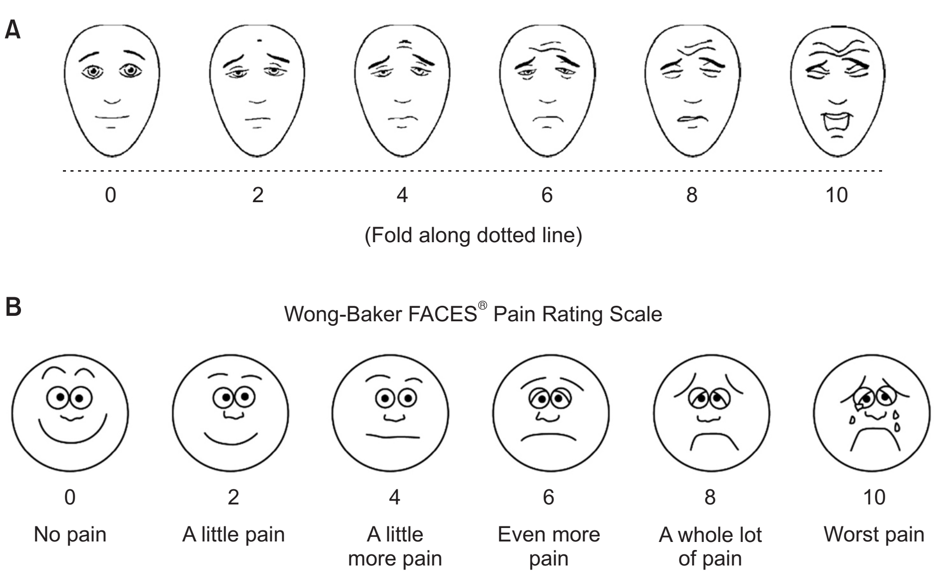

Fig. 1. Commonly used faces pain scales for postoperative pain management. (A) Faces Pain Scale–Revised (FPS-R). (B) Wong-Baker FACES® Pain Rating Scale. Permission to use the original illustration of the Wong-Baker FACES® Pain Rating Scale has been granted by the Wong-Baker FACES Foundation. Permission to use the original illustration of the FPS-R has been granted by the International Association for the Study of Pain.

a method that inherently invites subjective interpretations by both patients and clinicians [40]. These expressions are designed to encapsulate a range of pain intensities; however, the subjective nature of pain perception can result in inconsistencies in how individuals interpret and select the facial expressions that best represent their pain levels.

3. Factors influencing postoperative pain assessment

Understanding the influence of various patient-related factors is crucial for the assessment of postoperative pain because these factors can significantly impact both the experience and the assessment of postoperative pain. This underscores the importance of considering these influences in postoperative pain assessment.

Although the scales commonly used for postoperative pain assessment, such as the VAS, NRS, and VRS, are straightforward, they require abstract thinking for patients to accurately express their pain levels. Therefore, cognitive function can influence the outcomes of such assessments; consequently, assessing postoperative pain in elderly patients with diminished cognitive function presents unique challenges [41,42]. A previous study indicated that the effectiveness of pain scales, especially that of the VAS, diminishes with increasing age [35]. At advanced ages, the ability of patients to understand and communicate their pain levels using conventional pain scales can be significantly compromised, necessitating careful consideration during pain evaluation. Comparative studies on the utility and accuracy of various pain scales among different age cohorts have favored the NRS owing to its lower incidence of errors among both young and elderly populations [43]. Conversely, the VAS was found to be problematic for elderly patients and was characterized by a high failure rate and limited validity. An investigation comparing multiple scales, including a numerically calibrated VAS (0–20) as well as the NRS, VRS, and FPS, across young and elderly demographics revealed a preference for the numerically calibrated VAS in both groups, with the VRS being the second choice [35]. However, the standard VAS had the highest failure rate. Considering various criteria for an overall ranking, the VRS emerged as the top choice among both cohorts. Another publication regarding postoperative pain assessment in elderly patients stated that various scales, including the VAS, NRS, VRS, and FPS, can be employed for patients who are cognitively intact, with a preference indicated for the NRS and VRS. For patients experiencing mild to moderate cognitive impairment, the VRS was recommended [42]. For individuals with severe cognitive impairment, Doloplus-2 [44] and ALGOPLUS [11] were suggested as options [42]. In addition, a study targeting elderly patients with mild to moderate cognitive impairment reported that a horizontal 21-point (0–100) box scale demonstrated superior performance compared to other pain scales (FPS, vertical 21-point box scale, and 5-point VRS), indicating its effectiveness in elderly patients [45]. This structured approach ensures that pain assessment is tailored to the cognitive capabilities of elderly patients, thereby enhancing its accuracy and effectiveness.

Cognitive impairment can arise temporarily in patients with previously normal cognitive function following general anesthesia, potentially affecting the accuracy of pain assessment. Furthermore, temporary blurred vision post-anesthesia may hinder the effectiveness of scales requiring visual interpretation, such as the VAS. A study on patients in the immediate postoperative period highlighted the lack of precision of the VAS, noting a variability of ± 20 mm [46]. Consequently, there has been a push towards the adoption of simpler pain assessment methods during this critical period. One study reported that a pain scale utilizing facial emoticons with various colors yielded more consistent values over time and exhibited less variability than the standard VAS for patients in the immediate postoperative period [47]. Another study reported a higher response rate for the VRS than for the NRS in the immediate postoperative setting. Specifically, in the initial evaluation conducted five minutes after entering the recovery room, the NRS achieved a response rate of 77.5%, whereas the VRS reached a significantly higher rate of 96% [48]. Thus, assessing pain immediately after surgery is challenging, even in patients with intact preoperative cognitive function. Considering the potential for intense pain during this period, pain assessment methods tailored to the unique needs of this period must be employed to ensure effective pain management.

Cultural differences can also significantly affect pain assessment. The perception and expression of pain are strongly influenced by an individual's cultural and ethnic background [49,50]. These cultural factors contribute to a range of beliefs, behaviors, perceptions, and emotions regarding pain, leading to disparities in pain outcomes among different ethnic groups. For instance, certain cultures may promote a stoic attitude towards pain, potentially resulting in the underestimation of pain severity. Conversely, other cultures may harbor specific beliefs about the origins and significance of pain, which can affect the expression of pain and the responsiveness to treatment modalities [51]. A systematic review investigating these influences found that postoperative pain scores varied according to race and ethnicity, with African American and Hispanic patients reporting higher pain scores than non-Hispanic white patients, without significant differences in opioid requirements [52]. This finding underscores the importance of cultural sensitivity in pain management and shows that healthcare professionals must understand the impact of race and ethnicity on pain perception and expression. Consequently, to provide tailored pain management for patients with diverse cultural backgrounds, healthcare professionals must recognize these differences and consider each patient's cultural background and its influence on their pain experience.

Sex is also an important factor to consider in the evaluation of pain. The manner in which pain is perceived and expressed may differ between the sexes because of biological and psychosocial factors [53]. The differences in pain sensitivity between women and men stem from differences in sex hormone levels and cerebral activation in response to painful stimuli [54,55]. In addition, societal expectations regarding sex roles affect pain expression. Women are more socially permitted to express pain than men, resulting in sex-based differences in pain expression [56]. Therefore, the possibility of sex-based differences must be considered in pain assessment.

Finally, preoperative education regarding the pain scale can affect its accuracy and patient adherence. Studies involving patients admitted to postoperative recovery rooms reported that patients with prior experience or education regarding pain scales responded more effectively to pain assessments than those without such a background [57]. Additionally, semi-structured interviews on healthcare professionals' perceptions of the pain scale in postoperative pain assessment have highlighted the importance of patients' understanding of the pain scale [58]. Although research on this subject is limited to this study alone, preoperative assessment using the pain scale could enhance the quality of postoperative pain evaluation. This concept has also been included in one of the aforementioned recent guidelines for postoperative pain management [13].

These factors can influence the accuracy and adherence to pain assessments, highlighting the importance of applying an appropriate pain scale tailored to the specific patient population.

4. Minimal clinically important difference of commonly used postoperative pain assessment tools

The minimal clinically important difference (MCID) is defined as the smallest change in a treatment outcome that is perceived as beneficial by a patient or clinician, warranting modification of the patient's care strategy [59]. This concept is pivotal in research on postoperative pain management, underscoring the importance of evaluating treatment efficacy from the patient's viewpoint beyond mere statistical significance [60]. Recent studies have emphasized the clinical relevance of the MCID, particularly in tailoring pain management approaches to reflect perceptible improvements in surgical patients [60].

Meta-analyses targeting patients with various etiologies of acute pain, including postoperative conditions, have documented a broad spectrum of absolute MCID values, ranging from 8 to 40 mm on a 100-mm VAS [61]. This variation is attributed to factors such as baseline pain intensity and study design. In addition, the MCID for pain indicators varies significantly across different populations; in chronic pain conditions, the reported MCID values varied greatly, ranging from as low as 8 mm to as high as 82 mm, depending on the specific population [60]. However, research dedicated to identifying the MCID values for postoperative pain remains scarce.

In a study involving 700 surgical patients in the post-anesthesia care unit, the MCID on an 11-point NRS was identified as 1.3 for patients with moderate pain and 1.8 for those with severe pain, illustrating the influence of baseline pain severity on MCID values [62]. Similarly, a study examining 139 total hip arthroplasty (THA) and 165 total knee arthroplasty (TKA) patients reported MCID values of 18.6 mm for THA and 22.6 mm for TKA recipients on a 100-mm VAS, highlighting the variability of MCID values for postoperative pain based on the surgical procedure [63]. Furthermore, a meta-analysis addressing the MCID in postoperative pain after total joint arthroplasty revealed values of 15 mm for resting pain and 18 mm for movement-related pain on a 100-mm VAS, indicating that MCID values can differ according to the context of the pain in surgical patients [64]. Another study involving 224 surgical participants reported an MCID of 9.9 mm on a 100-mm VAS [26]. To date, there is no universally applicable MCID for the pain scale for all surgical patients, as this value can be influenced by various factors. Therefore, further research across different surgical patient populations is required.

5. Changes in postoperative pain intensity over time: postoperative pain trajectory

Traditional methods of assessing postoperative pain have predominantly focused on quantifying the pain intensity at predetermined isolated time points. Although such practices yield instantaneous insight into pain levels, they do not adequately reflect the complex and evolving nature of postoperative pain, which is subject to fluctuations driven by an array of biological, psychological, and environmental factors. This approach is limited by its inability to capture the full spectrum of pain experiences, which are inherently dynamic and influenced by multiple factors over time. Recently, expert panels on pain medicine have recognized the individual acute pain trajectory as an important component of pain assessment and have offered expert opinions on its analysis [65].

Recent research has underscored the diversity and complexity of postoperative pain trajectories. For instance, a comprehensive study involving 360 surgical patients identified five distinct pain trajectories within a seven-day postoperative period: high, moderate to high, moderate to low, decreasing, and low [66]. Similarly, another extensive analysis involving approximately 210,000 patients undergoing general, vascular, and orthopedic surgeries revealed six postoperative pain trajectories: consistently low, consistently moderate, consistently moderate/high, moderate decreasing to low, moderate/high decreasing to low, and consistently high. Additionally, to our knowledge, there has only been one systematic review to date focusing on the acute postoperative pain trajectory [67]. This review analyzed 71 analgesic trials comprising 5,973 patients undergoing elective THA. This study reported substantial variability in postoperative pain trajectories, even among patients receiving similar analgesic regimens, and showed differences in pain trajectories depending on the type of anesthesia and analgesia used. These findings further validate the premise that postoperative pain patterns are not uniform but exhibit significant variability across individuals and surgical contexts.

The significance of focusing on pain trajectories rather than static pain assessments lies in the rich insights elucidated by temporal patterns. First, understanding how pain intensity evolves can help identify patients who do not follow expected pain resolution pathways, thereby flagging those at risk of developing persistent postoperative pain or other complications. For instance, a trajectory characterized by sustained high levels of pain or unexpected increases in pain intensity may signal inadequate pain control, surgical complications, or the onset of chronic pain conditions [68]. Second, temporal trends in pain intensity can inform the optimization of pain management strategies. By identifying critical periods of heightened pain vulnerability, healthcare providers can tailor analgesic interventions more effectively, ensuring that pain relief measures are most intensive when patients are most in need. This dynamic approach to pain management not only enhances patient comfort but may also expedite recovery by facilitating earlier mobilization and reducing the risk of pain-related complications.

Moreover, the analysis of pain trajectories can contribute to personalized pain management [69]. Recognizing that patients exhibit distinct pain patterns suggests that a one-size-fits-all approach to pain control is inadequate. Instead, a patient-centered approach informed by an individual's specific pain trajectory can lead to more effective and satisfactory pain management outcomes.

In summary, the shift towards monitoring temporal trends in pain intensity underscores the need for a more sophisticated and responsive approach to postoperative pain management. This perspective enhances the understanding of postoperative pain dynamics and aligns pain management practices with the principles of personalized medicine, ultimately improving patient care and outcomes.

6. Limitations of the aforementioned commonly used pain scales for postoperative pain management

A recent systematic review highlighted the limitations of unidimensional pain scales in assessing postoperative pain in adult patients and questioned their validity and reliability [14]. It also found no evidence suggesting that any unidimensional tool is superior for the evaluation of postoperative pain. Moreover, the review pointed out a critical drawback of such unidimensional tools in that they fail to reflect the degree of functional recovery, which is the ultimate goal of postoperative pain management. To address these shortcomings, several multidimensional pain assessment tools, encompassing various aspects of postoperative pain, have been developed. A recent systematic review reported that the Brief Pain Inventory (BPI) and the American Pain Society Pain Outcomes Questionnaire–Revised were the most commonly used multidimensional pain assessment tools [70]. Furthermore, among the five tools introduced in this review, the BPI was the most recommended, with strong evidence of psychometric validity. The BPI is a self-reporting tool initially developed for cancer pain assessment. It evaluates pain intensity and its effect on daily activities using a 0–10 NRS. However, its 24-hour focus and 15-question format may not suit acute postoperative pain requiring frequent assessment, especially for patients who are not fully alert or have impaired cognitive function. In response, we suggest the DVPRS, a simpler and more recent multidimensional tool developed by the Pain Management Task Force of the U.S. Department of Defense, to address the shortcomings of previous unidimensional pain scales [71,72]. The DVPRS uses a 0–10 scale with color-coded pain intensities and includes a faces rating scale for more intuitive pain expression, complemented by word descriptors to contextualize pain levels (**Fig. 2A**). It also evaluates the impact of pain on activities, sleep, mood, and stress, addressing both functional and emotional effects (**Fig. 2B**). This approach goes beyond merely quantifying pain intensity; it also encompasses the emotional and functional dimensions of the patient's experience. Consequently, this holistic perspective supports more effective interventions for postoperative pain relief and promotes more targeted strategies for postoperative recovery. However, the evidence for the use of multidimensional tools in postoperative pain management remains weak, necessitating further research.

Additionally, although we have introduced boundaries for mild, moderate, and severe pain using the VAS and NRS, these classifications are arbitrary, and various

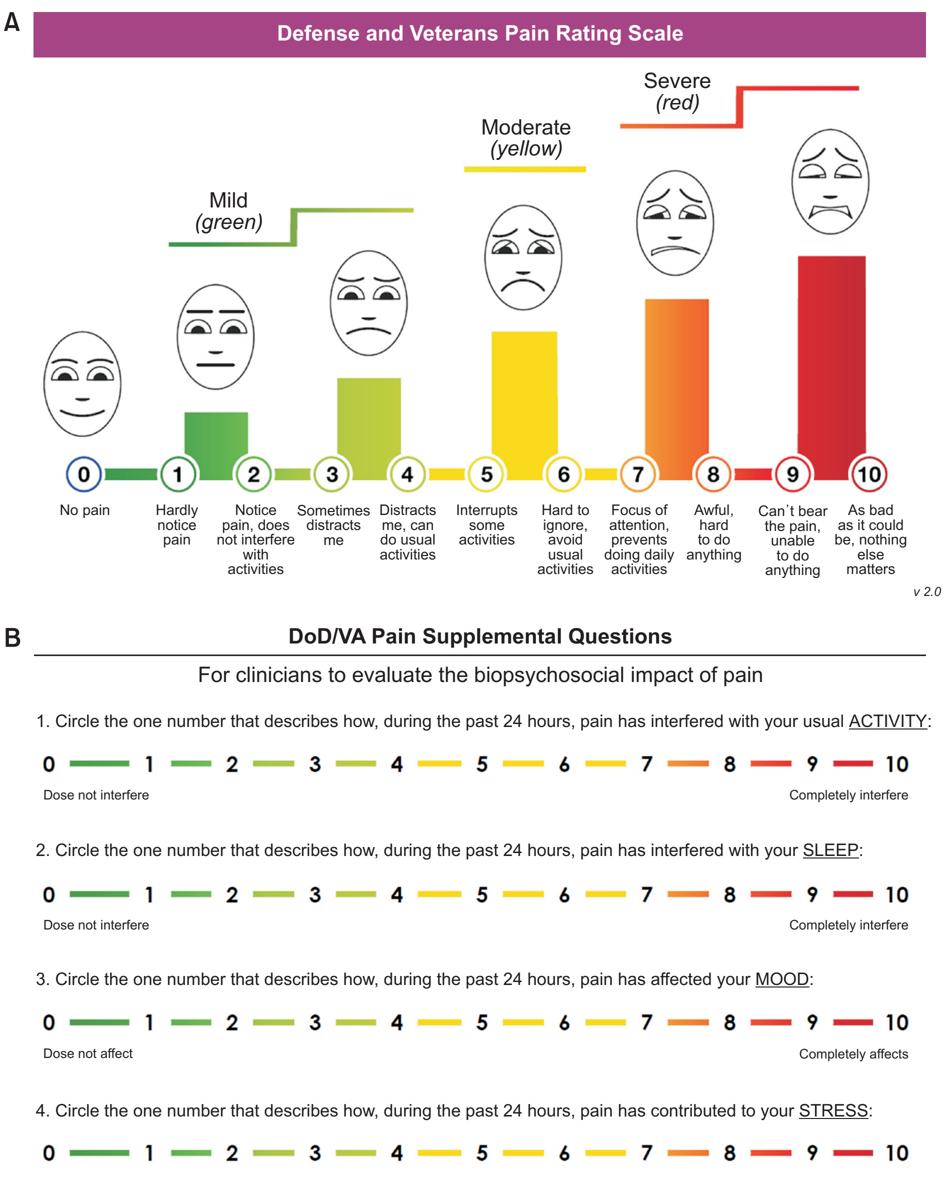

Fig. 2. The Defense and Veterans Pain Rating Scale. (A) Pain intensity item. (B) The supplemental questions of the Defense and Veterans Pain Rating Scale. Permission to use this original illustration has been obtained from the Defense & Veterans Center for Integrative Pain Management.

categorizations have been proposed in the literature [14]. Moreover, discrepancies have been reported between healthcare providers and patients regarding the interpretation of pain intensity. Previously, we described the boundary between mild and moderate pain as 30–35 mm on the VAS and 2 or 3 on the NRS, with pain considered moderate or higher generally indicating the need for additional analgesia. However, a recent study reported that patients requested additional pain relief at pain intensities above 5.5 on the VAS and 6 on the NRS [73]. Another study found that 65% of surgical patients considered a pain level of 4–6 on the NRS tolerable [74]. Therefore, although the classification of pain into mild, moderate, and severe categories and the cutoff points for additional analgesia are commonly used variables in research related to postoperative pain, these concepts have not been validated.

CONCLUSIONS

Effective perioperative pain management necessitates precise and comprehensive pain assessment. Commonly employed metrics for evaluating postoperative pain, although straightforward and intuitive, are influenced by multiple factors that can affect their overall effectiveness. Furthermore, insights into the temporal changes in these scales and their MCID is invaluable for healthcare professionals involved in perioperative care. This knowledge is instrumental in providing a meaningful context for the selection and application of postoperative pain control strategies.

Within this context, we propose five recommendations for pain evaluation in studies concerning postoperative pain (**Fig. 3**): (1) selecting an appropriate pain scale tailored to the patient group, considering the strengths and weaknesses of each scale; (2) simultaneously assessing the intensity of postoperative pain at rest and during movement; (3) conducting evaluations not only at specific time points but also monitoring trends over time; (4) extending the focus beyond the intensity of postoperative pain to include its impact on postoperative functional recovery; and finally, (5) interpreting the findings while considering the MCID, ensuring that it holds clinical significance for the chosen pain scale.

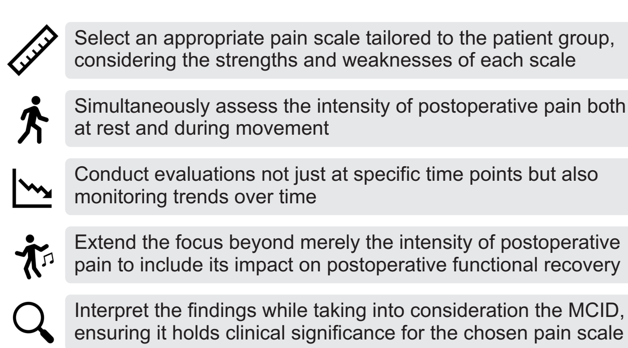

Fig. 3. Recommendations for pain evaluation in studies concerning postoperative pain. MCID: minimal clinically important difference.

In summary, it is imperative that healthcare professionals involved in perioperative pain management possess a thorough understanding of pain assessment tools and their implications. This enhanced understanding will facilitate the formulation of superior strategies for perioperative pain management and ultimately improve patient outcomes.

DATA AVAILABILITY

Data sharing is not applicable to this article as no datasets were generated or analyzed for this paper.

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CONFLICT OF INTEREST

Ho-Jin Lee is a section editor for the Korean Journal of Pain; however, he has not been involved in the peer reviewer selection, evaluation, or decision process for this article. No other potential conflict of interest relevant to this article was reported.

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AUTHOR CONTRIBUTIONS

Seungeun Choi: Writing/manuscript preparation; Soo-Hyuk Yoon: Writing/manuscript preparation; Ho-Jin Lee: Supervision.

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