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Pain rating scales – practical approach

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ABSTRACT

Pain management is the responsibility of doctors in every specialty. It should be noted that without a good pain assessment, there is no proper pain treatment. Therefore, the authors of this work attempted to organize pain assessment tools according to the clinical situation. Databases such as PubMed and Google Scholar were used to source articles for this review. Literature related to pain measurement was searched without an age limit. Although there are a lot of reports regarding pain intensity measurement tools, in this article, they are sorted out, and we present a breakdown of these tools in terms of clinical practice. A brief description of the most commonly used scales used to measure pain intensity is also provided.

Key words: pain rating scales, elderly patients, pain management, post-operative pain, pediatrics

1. INTRODUCTION

In clinical practice, physicians of nearly all specialties experience pain in patients and pain management. Assessing the severity of pain is crucial to the diagnostic process and appropriate treatment. Self-reporting is the gold standard for evaluating pain, and the perception of pain is subjective. Therefore, pain assessment may be complicated, especially among pediatric, elderly, unconscious, or mentally disturbed patients. The availability of several tools for assessing pain in children is an example, but there is no accepted criterion standard (Garra et al., 2010). Patients in the over-65 population who often undergo surgical procedures also present an additional challenge. Surgical procedures often result in post-operative pain, and medical professionals are expected to adequately but also safely relieve this pain. Pain assessment in older patients might be limited due to concomitant illnesses, among other factors (van Dijk et al., 2012).

Purpose of the work

This paper aims to sort out the scales used to assess pain severity and organize them according to the classification of the various patient groups, and also by the type of pain.

2. METHOD

We selected 21 studies from PubMed and Google Scholar. The search terms initially included Pain ranting scales, Pain rating scales used in pediatrics, The Wong-Baker FACES Pain Rating Scale (WBS), Visual analog scale (VAS), NRS, PHHPS, BPS, pain rating scales used in adults' patients, pain rating scales used in elderly patient, newborns and infants pain assessment. Inclusion criteria were: no restriction on the age of papers retrieved, only English language papers. Non-English articles, highly selected studies, single case reports, commentaries, and editorials were excluded. References to lists of the articles searched were used to find thematically related articles in certain searches. Custom graphics were created using Canva.

3. RESULTS & DISCUSSION

Numerical Rating Scale (NRS)

One of the commonly used scales to assess pain is the numerical rating scale (NRS) (Bijur et al., 2003). The NRS involves measuring pain and its perception by the patient from 0 to 10, where 0 means no pain and 10 is the worst possible pain (Figure 1).



Figure 1. The Numerical Rating Scale

Visual Analog Scale (VAS)

The visual analog scale (VAS) is often used to range the severity of pain (Garra et al., 2010). The VAS scale has been used here to measure pain intensity since the mid-1960s (Heller et al., 2016). Assessment of pain severity is based on the patient marking on a line usually 10 cm (100 mm) long, with descriptions of the extreme points: on the left - "no pain" and on the right - "the worst pain imaginable," (Figure 2).

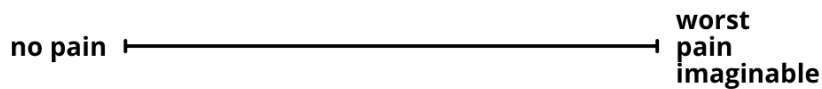


Figure 2. The Visual Analogue Scale

Verbal Rating Scale VRS

VRS is used to describe pain in terms of increasing pain intensity. Typically, the terms used are: no pain, mild pain, moderate pain, and severe/intense pain, and for easier recording, the words have a numerical notation. However, the VRS scale is an ordinal scale introduced with the verbal description may lead to the misconception that the intervals between each descriptor are equal.

The Wong-Baker FACES Pain Rating Scale (WBS)

The WBS scale is designed with facial expressions intended to represent the level of pain. Each face has an annotation with a number describing the pain intensity (from 0 to 10, increasing the value by 2). The "facial scale" is shown in Figure 3.



Figure 3. Own-design example of facial scale based on the original version of WBS.

Behavioral Pain Scale (BPS)

The BPS scale is designed to assess pain in unconscious mechanically ventilated patients. The total score of the scale ranges from 3 (no pain) to 12 (maximum pain). Scoring is based on rating facial expressions, upper limb movements, and compliance with ventilation (Kotfis et al., 2017).

Brief Pain Inventory, Pain Severity (BPI-PS)

The BPI-PS assesses pain in four categories: worst, least and average severity in the past 24 hours, and current pain. Each of the categories tested includes an 11-point NRS, and NRS verbal descriptions of the scale's range are no pain and pain as severe as can be imagined. The BPI-PS questionnaire is usually part of the BPI tool, which contains 11 other pain-related questions (seven are part of the pain interference sub-scale) (Chiarotto et al., 2019).

Prince Henry Hospital Pain Scores (PHHPS)

The Prince Henry Hospital Pain Score assesses pain symptoms by considering pain during coughing and at rest. The scoring is as follows: 0 = no pain during coughing, 1 = pain during coughing, no pain during deep breathing, 2 = pain during deep breathing, no pain at rest, 3 = pain at rest, and 4 = severe pain at rest (Zubrzycki et al., 2018).

The familiarity of medics with scales for measuring pain severity is sometimes insufficient, because the type of scale should be individually matched to the patient, depending on various factors such as age or condition. An example would be patients with blindness or visual impairment in whom “facial scales” and other graphical ranges will not be applicable, and voice scales should be used in these cases. Pediatric patients, in particular, are an additional challenge in pain assessment due to the age span of this patient group.

Pain rating scales used in pediatrics

First of all, in pediatrics, special attention should be paid to the division in relation to the age of patients. It evaluates pain differently in an infant, a pre-primary-aged child, and an adolescent. Generally, this is particularly due to the development of speech functions and the different degrees of communication depending on age. This article divides pediatric patients into the following groups: NICU patients, infants, and children. A special role of caregivers should be emphasized for this group of patients, who may point out abnormal activity and behavioral changes.

One of the original and flagship scales used to assess pain for younger patients is the WBS scale, used for chronic pain mainly (Garra et al., 2010). The example of an alternative version of VAS and “facial scale” could be the Emoji-Based Visual Analog Scale (Moisset et al., 2022). Nevertheless, despite the fact that “facial scales” are the recommended method of testing pain in young children, it has been shown that in the age range of 4 to 16 years facial scales show a linear correlation of results with the results of the VAS scale, while in the group of children older than 8 years the NRS scale from 0 to 10 is applicable (Moisset et al., 2022). In children under 6 years of age, the recommended scale is behavioral pain assessment (Beltramini et al., 2017).

Another important issue to be addressed is the assessment of pain among newborns and infants. Neonatal Infant Pain Scale (NIPS) is used to assess pain in newborns' facial expressions, crying, breathing pattern, arms, legs, arousal status, heart rate, and O2 saturation (Table 1).

Table 1. Neonatal Infant Pain Scale

Parameter	0 point	1 point	2 points
Facial expression	Relaxed	Grimace	-
Cry	Absent	Mumbling/whimper	Vigorous
Breathing pattern	Relaxed	Different than basal	-
Arms	Relaxed	Flexed/extended	-
Legs	Relaxed	Flexed/extended	-
State of arousal	Sleeping/awake	Fussy	-
Heart rate	Within 10% of baseline	Within 10% of baseline	Within 10% of baseline
O ₂ saturation	No additional O ₂ needed	Additional O ₂ required to maintain O ₂ saturation	-
Scores: 0 to 3 – absence/mild pain, 4-6 – moderate, 7-10 – severe			

Pain assessment in patients in the neonatal intensive care unit may be more complicated because typical pain behaviors are disrupted by mechanical ventilation, physical immobilization, and pharmacological therapy (Maxwell et al., 2019). This issue will be discussed in the unconscious and patients and post-operative pain chapter. Another group of children in whom the assessment of pain might be problematic is those who are non-communicative or have impaired communication. Suggestions for the use of pain assessment scales in these patients are shown in Figure 4.

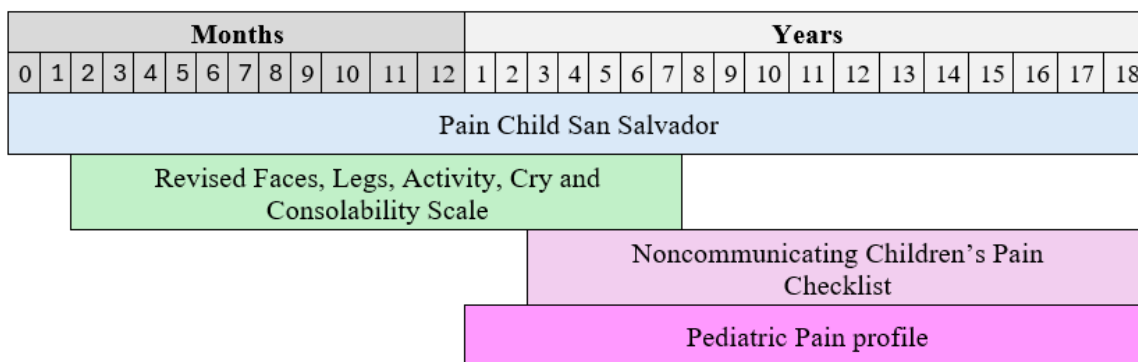


Figure 4. Scales' preferred rating of pain in noncommunicating children – age distribution.

It seems principal that the pain assessment of children should involve caregivers who are best able to communicate with their child and point out abnormalities in behavior.

Pain rating scales used in adult patients

The use of pain rating scales in adult patients is mostly dependent on cognitive response and the type of disorder. For example, the scales most commonly used to measure the severity of lower back pain are VAS, NRS, and BPI-PS (Chiarotto et al., 2019). The Emoji-Based Visual Analog Scale is also applicable to the adult patient population. According to some reports, the Emoji-Based Visual Analog Scale on mobile devices is even preferred among adults compared to the Wong-Baker FACES, NRS, and VAS scales (Li et al., 2023). However, according to some researchers, there is no need to use a scale with emoticons in adult patients who are able to use the NRS (Moisset et al., 2022). However, depending on the patient's condition, any of the scales presented in this work, e.g., NRS, VAS, PHHPS, or even “facial scales,” can be used. It should be mentioned, nevertheless, that the Adult Nonverbal Pain Scale (aNVPS) tool is designed for patients who cannot verbalize their pain, e.g., as a result of intubation or dementia.

Pain rating scales used in elderly patients

The management of pain in geriatric patients should become one of the elementary from the issues explored by physicians, due to the increase in the elder because of the growth of the elderly population. According to current data, there are about 830 million people 65 and older in the world. Communication with the patient is sometimes difficult due to cognitive impairment or other conditions resulting from advanced age. However, one of the common disease entities found in older patients is dementia and cognitive impairment, and measuring the severity of pain in this case could potentially be a challenge.

Scales for assessing pain, such as Verbal Descriptor Scales (VDS), Face Pain Scale (FPS), Visual Analogue Scales (VAS), and Numerical Rating Scales (NRS), frequently, though not always, prove accurate and are acceptable for use in the elderly (Jones et al., 2016; Kim et al., 2017). However, some of these scales are applicable to patients with mild to moderate cognitive impairment.

The NRS scale may be presented horizontally or vertically, however, the vertical option may often be easier and preferred by the elderly. In contrast, the VAS scale has a higher failure rate among the geriatric population. "Facial scales" have the potential to be a diagnostic tool for pain severity in patients with mild to moderate cognitive impairment. An important advantage of this scale is that it is usable by persons with limited literacy and dyslexia (Kim et al., 2017). However, among the tools for assessing pain in older adults with cognitive impairment most commonly mentioned in the literature are: Doloplus-2, Pain, Abbey Pain Scale, Assessment in Advanced Dementia (PAINAD), Checklist of Nonverbal Pain Indicators (CNPI), Pain Assessment Checklist for Seniors with Limited Ability to Communicate (PACSLAC), Clinical Utility of the CNA Pain Assessment Tool (CPAT) and Pain Assessment for the Dementing Elderly (PADE) scale For elders suffering from late-stage dementia, the scales are particularly recommended: Abbey Pain Scale, PAINAD Scale.

In geriatric patients who do not communicate or communicate to a limited extent, a scale designed for caregivers - The PACSLAC - may be used to assess pain severity (Kim et al., 2017). In each case, the scale should be individually selected for the patient and their current state of consciousness and condition.

Unconscious patients

Among patients who are unconscious and unable to communicate with medical personnel, the Behavioral Pain Scale (BPS) and Critical Care Pain Observation Tool (CCPOT) are considered the most reliable and accurate ways to measure pain (Wojnar-Gruszka et al., 2022).

In the group of sedated and unconscious pediatric patients, the COMFORT Behavior Scale would be used at the age till 3 years old according to (Dmytriiev, 2018) or from birth event to adolescence (Beltramini et al., 2017). This scale is based on 2 physiological criteria (heart rate and mean arterial blood pressure) and 6 behavioral parameters (alertness, calmness, muscle tone, movement, facial tension, for ventilated: respiratory response, and for non-ventilated: crying). Any evaluation of a patient's pain should also include an assessment of hemodynamic and ventilation parameters.

Pain rating scales used in oncology

In oncology, various groups of patients with different health conditions may be encountered. According to the stage, patients may express the sensation of pain in a slightly different way. The severity of pain may be difficult, and it may be impossible for patients to verbalize their pain sensation.

Post-operative pain

It is difficult to establish a single standard scale for assessing postoperative pain. Accordingly, this is due, among other things, to the various specificities of surgical procedures and the response to anesthesia. In this group of patients, the pain assessment scale should be chosen with special care. For example, PHHPS may be useful in thoracic surgery due to the assessment of pain during coughing and deep breathing (Copik et al., 2024). The most popular scales are NRS, VRS, and VAS.

Also in this section, the group of pediatric patients should be highlighted. In the 0 to 5 age group, the Children and Infants Postoperative Pain Scale (CHIPPS) will find application in the assessment of postoperative pain (Beltramini et al., 2017; Dmytriiev, 2018). The scale being discussed includes the parameters as follows: crying, facial expression, posture of the trunk, posture of legs, motor restlessness, and for each category, you can get from 0 to 2 points.

However, in the under-5 age group, we can distinguish subgroups to further select the appropriate pain screening tool. In children from birth to 6 months of age, the CRIES scale appears to be the most appropriate tool to use in managing postoperative pain (Dmytriiev, 2018). It contains parameters such as crying, requires oxygen, increased vital signs, facial expression and insomnia. Details of the scale are shown in Table 2.

Table 2. CRIES scales details using in postoperative pain based on Dmytriiev, 2018 and European Pain Federation.

Points	Parameters				
	Crying	Requires O ₂ for SpO ₂ >95%	Increased vital signs	Expression	Sleeplessness
0	None	None	Normal BP and HR	Normal	None
1	High pitched	<30% FiO ₂ needed	HR or BP increased < 20% than preoperative	Grimace	Wakes frequently
2	Inconsolable	>30% FiO ₂ needed	HR or BP increased >20% than preoperative	Grimace and grunt	Awake constantly

In the postoperative period in neonatal patients, NIPS could also be used. Instruments such as VRS, VAS, NRS and, facial scales may be successfully used in children over the age of 6 (Beltramini et al., 2017). The detailed age-specific use of scales in children in the postoperative period is shown in Figure 5. In the postoperative period, scales used in elderly patients may be useful, even in patients who do not have cognitive impairment on a daily basis.

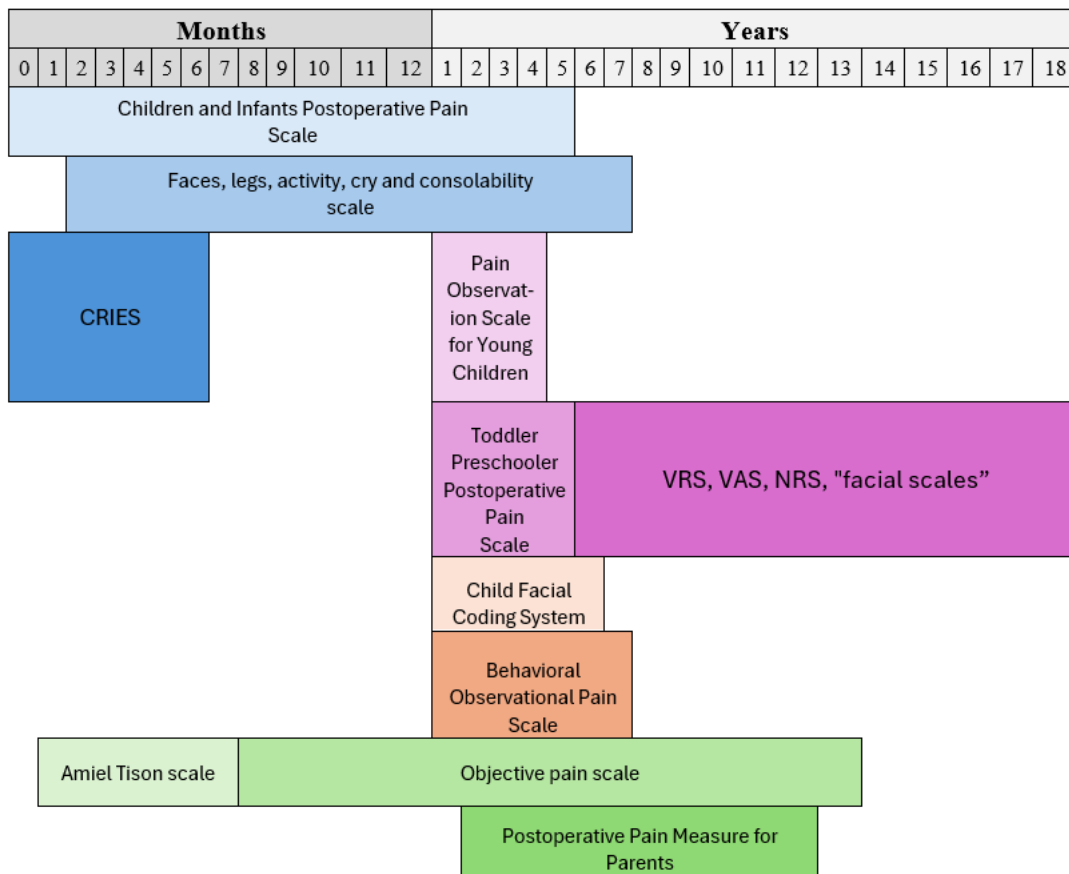


Figure 5. Scales preferred to rating pain after surgery – age distribution.

4. CONCLUSION

Pain management could be encountered by a doctor of any specialty, so it is essential to be familiar with pain assessment scales and to be able to choose the right one according to the case and the patient. Each time, even in the same patient, the scale should be selected according to the circumstances and overall condition. The paper does not present all the scales and their examples, since this is not the subject of this discussion, and due to limitations. Particular emphasis has been placed on indicating the use of appropriate scales in practice in specific clinical cases. Thus, the authors of this publication encourage you to conduct your own searches for the scales mentioned in the text.

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Author's Contribution

Dagmara Skowrońska: Conceptualization, methodology, investigation, writing

Katarzyna Cierpiszewska: Resources, methodology, investigation, writing

Jakub Klamecki: Resources, investigation, data curation, writing

Dominika Kuc: Visualization, data curation, writing

Aleksandra Garczyk: Resources, visualization, writing

Informed Consent

Not applicable.

Ethical approval

Not applicable.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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