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PAIN INTENSITY SCALES AND STUDIES COMPARING NUMARICAL RATING SCALE AND VISUAL ANALOGUE SCALE

***Sarala Kumari, Chandana Jaya, Prakash Reddy and Gopi Reddy**

V[th] Pharm D Students, Siddhartha Institute of Pharmaceuticals Sciencesn Narasaraopeta, Guntur (Dist), Andhra Pradesh, India, 522601.

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***Corresponding Author**
Sarala Kumari
V[th] Pharm D Students, Siddhartha Institute of Pharmaceuticals Sciencesn Narasaraopeta, Guntur (Dist), Andhra Pradesh, India, 522601.

ABSTRACT

The assessment and management of post operative pain (POP) is an important part is surgical medical practice. Pain can be assessed accurately both at rest (comfort) and during movement by using various pain assessment tools. However they were different assessment techniques used to visualize or Analyse the different kinds of pain. For instance., the assessment of functional disability was well noted by using sophisticated scales (eg;- oswestry disability index. DASH questionnaire). The pain was assessed accurately by patients Biophysiological data. we currently used the Numeric rating scale (NRS) and visual analogous scale (VAS) as pain assessment tools in post operative patients (POP). The effective management was given to the patient depending on the data that was collected was by using tools. Post operative patients(POP) is both distressing and harmful to the patients. Post operative patients (POP) can be a major reason for delayed discharge, increase morbidity and reduced patients satisfaction.

KEYWORDS: Post operative pain (POP), pain assessment tools, Numeric Rating scale (NRS), visual Analogue scale (VAS).

INTRODUCTION

According to IASP (International association for the study of pain) pain is defined as" an Unpleasant sensory and emotional experience associated with Actual or Potential tissue damage".[1]

The pain intensity (either mild, moderate or severe) can be assessed by using pain assessment tools or pain scale.

- In general the possible way to assess the pain is subjective using self report. There are various validated tools to assess pain.[2]
- Untreated pain can cause physiological and emotional stress that can worsen critical medical conditions.[3]
- Post operative pain (POP) management intervention are available to assess the pain intensity, location, duration by using pain assessment tools.[4]
- Special attention should be taken in critical care unit to minimize sedation and for early mobility and further assessment and treatment of pain should be continued.[5]
- They are different approaches to manage post operative pain including opioids and /or Non opioids.
- Post operative pain (POP) can leads to delaying of normal gastric Bowel moments.[6]
- In most of the cases the effective pain management in geriatrics can be complicated due to difficultly in determining whether their pain is acute or chronic and quite more challenging in the patients who are unable to communicate.[7]
- In majority of the patients the post operative pain is preventable with adequate Analgesics.

Pain assessment

- It is challenging to assess the pain in clinical practice due to its complex and subjective nature.[8]
- Pain assessment Should be an ongoing process for effective pain control and appropriate treatment.[9]
- Since pain is subjective so that the Intensity of pain is examined by self report in pop.[10]
- However, different aspects of pain is accurately evaluated by Behavioral, psychology and physiological measures.[11]
- It is difficult to assess the pain in Intensive care unit because maximum number of patients were unable to self report or non communicative.[12]
- They are several pain assessment tools used to grade the level of pain. Among all tools the Numeric rating scale(NRS) and visual Analog scale (VAS) and visual rating scale (VRS) are the most valid and reliable scales used in the clinical practice.[13]

- Accurate assessment and treatment of a pain can have effects on both short term and long term outcomes.[14]
- The pain assessment tools used to assess the intensity of pain were the following.

1. Won –Baker face pain rating scale[WBFPS]
2. Comfort scale
3. CRIES scale
4. FLACC scale
5. MC Gill pain Questionnaire.
6. Brief pain inventory scale [BPT]
7. Color analogue pain scale [CAS]
8. Mankoski pain scale
9. Visual analog scale[VAS]
10. Numerical rating scale[NRS]

1) Won –Baker face pain Rating scale (WBFPS)

- The WBFPS scale is a reliable and valid tool measure pain Intensity combines pictures and numbers for rating.[15]
- This scale consists of six different facial expressions that shows degree of pain from left to right ranging from happy to extremely upset. Each face was attributed from 0 to 10.[16]
- The WBFPS scale was developed for children who were 3 years old and above.[17]
- Children would be able to understand the faces and emotions in the scale and point one that best matches their pain level.
- In this scale the first face represent the pain score '0' that indicates "no hurt ".The 2nd face represent the pain score "2"and indicates "Hurt a little bit "The 3rd face represents a pain score of "4" and indicates "Hurt a little more. The 4th face represent the pain score of "6" that indicates " hurts even more ".The 5th face represents the pain score of "8"and indicates "hurts a whole lot". The sixth face represents a pain score of 10, and indicates "hurts worst".

2) Comfort scale:- The scale was developed in **1992** by Ambuel.

- These scale is used to measure the level of pain in critically ill Patients and also to the children under 18 yrs of age and elders whore are in sedation or uncommunicative.[19]
- The comfort scale has both physiological and as well as Behavioral indicator to assess the patients behavior as assigns of pain.[20]
- Pain assessment is difficult to measure and manage in unconscious patients because of the direct reports from patients are important in assessment. pain assessment in the patients with decreased consciousness can use comfort scale.[21]
- The comfort scale has different parameters in which each was noted from 1-5 out of between 9-45.

Table 1: Check list of non verbal indicators.[22]

Alertness	1-Deeply asleep (eye closed, no response to change in environment) 2- lightly sleep 3-drowsy 4-awake and alert 5-Awake and hyper alert
Calm/ Agitation	1-calm 2-slightly anxious 3-anxious 4- very anxious 5-panicky
Respiratory response (Intubated and ventilated)	1-Quit breathing, no crying sound. 2-Occational sobbing or moaning 3- Whining or monotonus sound 4- Crying 5-Screaming and shrieking.
Physical moment	1-No moment 2-Occasional (3 or fewer) slight moments 3-frequent, (>3)slight movements 4-Vigorous moments limited to extremities 5-Vigorous moments include torso and head
Muscle tone	1-Muscles totally relaxed :no muscle tone

	2-Reduced muscle tone :less than normal 3-Normal muscle tone 4-Incresed muscle tone ,increased flexion of fingers and toes 5-Extreme muscle rigidity and flexion of fingers and toes
Facial muscle	1-Facial muscle totally relaxed 2-Normal facial tone 3-Tenctin evident in some muscle (not sustained) 4-Tension evident throughout muscles sustained 5-Facial muscle contorted and grimacing.

3) CRIES scale

The cries [crying, requires oxygen, increase vital signs, expression sleeplessness] is a tool for measuring post operative pain [POP] in the neonates.[23]

- This scale assess pain in neonates, infants 6 month old & younger based on 5 observations i.e, crying, oxygenation vital sign, facial expression sleeplessness.
- This assessment tool is based on 5 observations and objective measurement.
- Two points are designed to each parameter. If the point '0' means there is no signs of pain and if the point '2' means there is a sign of pain which is inconsolable.

Table 2: Child revised impact of Events scale.[24]

Crying	NO	High-pitched	Inconsolable
Required Spo2>95%	No	F_1O_2<30%	F $_1O_2$<30%
Increase vital signs	Heart rate and blood pressure equal to (or) less than preoperative values	Less than 20% of preoperative values	Greater than 20% of preoperative values
Expression	None	Grimace	Grimace /grant
Sleeplessness	No	Awakens frequently	Awakens constantly

This scale should be taken regularly to monitor the recovery and response to monitor the therapy. The higher the score the greater the expression of pain.

4) FLACC scale

The [face, activity, crying and consolability] pain scale was developed to help health care professionals to measure the level of pain in children between 2 months and 7 years and individuals who are unable to communicate verbally or unable to self –report.(25)

- It is consistent method for physicians and nurses to identitfy, collect, document and evaluate the pain.

- The flacc tool consists of 5 category each category score on 0-2 scale out of total score between 0 to 10.

Table 3: Face legs arms cry consolability scale.[26]

Category	Scoring		
	0	**1**	**2**
Face	No particular expression or smile disinterested	Occasional grimace or frown withdraw	Frequent to constant frown, clenchedjaw, quivering chin
Legs	No position or relaxed	Uneasy restlessness tense	Kicking or legs drawn up
Activity	Lying quietly, normal position moves easily	Squirming, shifting back and forth, tense	Arched rigid or jerking
Cry	No crying[awake or asleep]	Moans or whimpers occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured occasional touching hugging or being taking distractible	Difficult to console

5) Mc gill pain questionnaire scale [MPQ]

- It is the most valid, reliable, multi dimensional scale used worldwide with various languages.[27]
- The joint commission on accreditation of health care organizations [JCAHO] of United States of America also recommended the multi dimensional scale.
- The MPQ consists of 3 word description.

1. Sensory –what pain feels physically [burning, throbbing]

2. Affective- what pain feels emotional [frightening, worring]

3. Evaluative- subjective overall intensity of pain

- The Questionnaire provides a quantitative measurement of clinical pain that can be treated by statistically analyzing the pain score.
- This scale is useful and valid for Acute, Chronic, musculoskeletal, post surgical and Neuropathic pain.
- This questionnaire has the following 3 sections.

1. What does your pain feel like?
2. How does your pain change with time?
3. How strong is your pain?

- MC Gill questionnaire is also applied for the diagnosis of cancer pain as well.

Mc GILL PAIN QUESTIONNAIRE

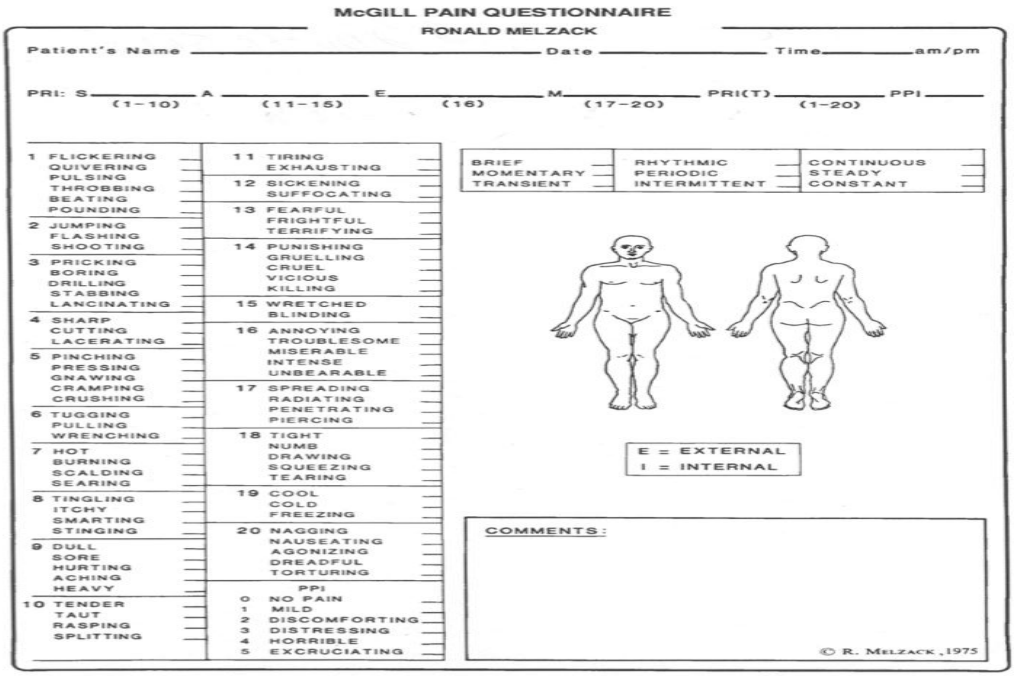


Table 4: MC Gill pain questionnaire.[28]

6) Brief pain inventory scale [BPI].

- It was first developed in the year 1984 by Cleland.
- BPI is the most powerful multidimensional with high reliability and validity.
- This scale is the self-administered Questionnaire which assess the severe pain mainly in cancer patients and also it is widely used to assess pain in AIDS patients and as well as bone metastasis patients.[30]
- It has been used throughout the world with various different languages.
- The BPI assess the main clinical characteristics of pain and its impact on patients daily activities.[31]
- In these scale the patients was provided with front and as well as Back view of a Human Body so the patients used to point out or shade the location of pain exactly at which area she/he suffers with pain.[32]

7) Color Analog pain scale:- (CAS)

1. The color analog pain scale (CAS) is a powerful tool used to assess the pain in children who are 5 yrs and older.[33]

2. CAS was very effective at defining whether the pain is mild, moderate, or severe.
3. Pain assessment in children is quite challenging because they are unable to verbalize their pain.
4. The child was asked to mark or slide the mark at which their pain intensity level matches.
5. The CAS is shaped like a thermometer with numbers include with colors that starts with blue colour which indicate mild pain and end with red colour which is severe.

8) Mankoski pain scale

These scale ranging from 0 to 10 where the "0" indicates "no pain "and "10" represent "severe pain".[34]

-The pain score describes the patients level of pain.

0- Pain free.

1 - Very minor Annoyance – occasional minor twinges. No medication needed.

2 - Minor annoyance – occasional strong twinges. No medication needed.

3 - Annoying enough to be distraction. Mild painkillers take care of it.(Aspirin Ibuprofen)

4 - Can be ignored if you are involved in your work, but still distracting. Mild pain killer remove pain for 3-4 hrs.

5 - Cannot be ignored for more than 30 min. Mild painkiller ameliorate pain for 3-4 hrs.

6 -cannot be ignored for any length of time, but you can still go to work and participate in social activities. Strong painkiller (Codeine, Narcotics) reduce pain for 3-4 hours.

7 - Makes it difficult to concentrate, Interferes with sleep. You can still Function with effort. Stronger pain killer are only practically effective.

8 - Physical activity several limited. You can read and convex with effort. Nausea and dizziness set in as factors of pain.

9 - Unable to speak. Crying out or moaning Uncontrollable – near delirium.

10-Unconscious pain makes you pass out.

The total score for severity of pain was "10".The patients response were given on a scale ranging from 1 to 10 and the total scores was categorizes into three levels of pain

Mild pain = 1 – 3

Moderate pain = 4 – 6

Severe pain = >7 score

Patient Name: _____ DOB _____ Date _____

Mankoski Pain Scale

The typical numeric scale to gauge pain is from 0 (no pain) to 10 (very severe/intolerable). The scale below explains the numbers.

0	Pain Free	No medication needed
1	Very minor annoyance-occasional minor twinges	No medication needed
2	Minor annoyance-occasional strong twinges	No medication needed
3	Annoying enough to be distracting	Mild painkillers (aspirin,ibuprofen) are effective
4	Can be ignored if you are really involved in your work, but still distracting	Mild painkillers relieve pain for 3 to 4 hours
5	Can not be ignored for more than 30 minutes	Mild painkillers relieve pain for 3 to 4 hours
6	Can not be ignored for any length of time, but you can still go to work and participate in social activities	Strong painkillers (Codeine, Tramadol) reduce pain for 3 to 4 hours
7	Makes it difficult to concentrate, interferes with sleep. You can still function with effort	Stronger painkillers are only partially effective. Requires strongest (Oxycontin/Morphine) for relief.
8	Physical activity severely limited. You can read and converse with effort. Nausea and dizziness may occur as factors of pain	Stronger painkillers are minimally effective. Strongest painkillers reduce pain 3 to 4 hours
9	Unable to speak, Crying out or moaning uncontrollably- near delirium	Strongest painkillers are only partially effective.
10	Unconscious. Pain makes you pass out.	Strongest painkillers are only partially effective.

If pain is present, indicate your degree of pain in past 2 weeks:
Highest _____ Lowest_____ Average_____

If pain is present, indicate where on your body it occurs: _____

9) Visual Analog scale :- (VAS). 1st used by Hayes and Patterson in 1921.

- The VAS is one of the most commonly used pain rating scale to evaluate the pain intensity and record the pain progression and to know whether the pain is mild, moderate or severe.[35]
- This scale consists of a line, which is a 100 mm long with two descriptors starting with “no pain“and ending with "severe pain" or "extreme pain".
- It is also used for the hematology patients who were in the midest of their recovery by using pharmacologic therapy.
- In VAS has been widely used in various adults population :patients with rheumatic disease patients with chronic pain such as cancer or allergic.[36]
- In VAS rating are based on self reported symptom measurement recorded with a single hand writing mark place at a point along a 10 cm line representing a continuum between the two ends of the scale ‘no pain’ at the left ends (0 cm) of the scale and worst pain at the right end of the scale (10 cm).[37]
- However there is conflicting evidence for the benefit of VAS compared to alter method of pain assessment.[38]

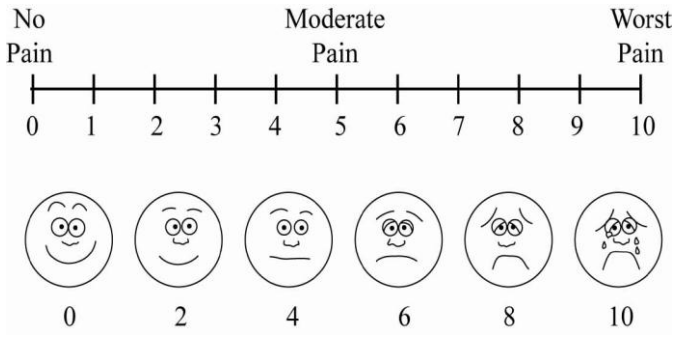
- It is still commonly used in clinical and home settings.[39]
- The increasing used of electronic medical records makes moving from a paper format to a digital format for VAS testing move convenient to track and analyze patients data.[40]
- VAS can present it self in a number of ways including.
- The simplest VAS is a straight horizontal line of fixed length, typically 100 mm. the extremes are defined as the outermost limits of the parameters to be measured symptoms, pain health.
- The VAS is commonly used to study many types of subjective experience including pain.
- The technique has also been applied to post bed time alertness, quality of life, anxiety, dyspnea, nausea and attitude toward the environment.[41]
- The VAS is a simple on frequently used for assessment of pain intensity.
- Visual analogue scale (VAS) are used in most studies for individual comparisons i.e reported measurement at different times and as a part of the therapy follow up.[42]
- The visual analogue scale (VAS) extensively used due to its simplicity and adaptability to a variety of populations and environment.[43]

Advantages

- The visual analogue scale (VAS) is more sensitive to small charge than simple description ordinal scales which classify symptoms as, for example, mild, moderate (or) severe to distressing.[44]
- The visual analogue scale (VAS) take <1 minute to complete.
- The data obtained from VAS can be parametrically converted to on interval scale level.

Disadvantage

- How ever the rating is clearly very highly subjective.
- Thay have less value to compare between a group of people at any given time.



10) Numerical rating scale :-(NRS) The NRS was developed by downie in the year 1979.

- The NRS is the most commonly used pain intensity scale by most of the patients.
- In NRS the common format is a Horizontal Bar or line with the options that were given depending on the patients level of pain.[45]
- NRS is not only used clinical practice but also used in research purpose. However the NRS only show the pain intensity but doesn't show complete pain experience.[46]
- The NRS can be used to evaluate pain in post surgical patients who can communicate verbally to self report their pain.
- Although there was a limited information on the use of NRS in children and Adolescents.[47]
- Recently Hirschfeld and zernikow has done a cohort studies in a sample of children and adolescents who were exposed with chronic pain.[48]
- Childrens who can self- report and have the cognitive skills of Numericals are included to note an appropriate score and they are several physiological or psychometric parameters to the children who doesn't have understanding skills of numbers.[49]
- It has been reported that presenting of NRS pain score either verbally or in the printed form has an error in the pain intensity scores. So research suggests the best way to note the pain score is in written form.
- The NRS is a wide spread and well acceptable tool to the patients because of its features like.
- Simplicity and Rapidly of pain scoring.
- Different in its mode of administration.[50]
- In recent international Delphi survey, Researchers, clinicians, and patients clearly preferred the NRS over VAS to measure pain intensity. Several Delphi participants choose NRS over VAS because of less understandable capability (especially to the elder patients) and time consuming to note the score.[51]
- It is also used for hematologic patients who were in the midist of their recovery by using pharmacological therapy.
- Patients who show high pain rating score are the patients with comorbidities such as mental health disorders and for the management if we prescribe opoids frequently that may furthur leads to subsequent addiction.[52]

Advantages

- Numerical rating scale (NRS) is preferable due to easy of use.
- Reliably and validly use.
- Most responsive for current pain.
- More appropriate for clinical application

Comparision of NRS and VAS

NRS	VAS
➢ Most responsive ➢ No time is needed ➢ Easily understandable ➢ It takes time for the people who are illiterate ➢ It is a unidimensional ➢ It is used in research purpose also ➢ Easy to rate the pain score ➢ Reliably and validly used	➢ Requires time to respond ➢ Time consuming ➢ It easily understand to the people who lack their reading kills ➢ It is unidimensional ➢ It was used in multiple setting ➢ Easy to score but somewhat takes time when compared to NRS ➢ Reliable and validly used

CONCLUOSION

In conclusion, appropriate pain assessment using validated tools appropriate to the population or individual is an essential-requisite for successful pain management. However both NRS and VRS are unidimensional scale and are failed to describe the patients complete pain experience. Unidimensional scales doesn't completely suits to the patients who are suffering with chronic pain. In many countries the adequate pain assessment has been shown to be wide spread leading to failure of pain management. Only by assessing and measuring pain regularly as routinely as other vital signs convey hope to make pain sufficiently visible to the people who cares for patients and improve treatment. This is especially true for the patients who consult anesthesiologist daily with acute pain, following surgery trauma and the ICU. The NRS are applicable to the one -dimensional assessment of pain intensity in most settings. In our local area most commonly used pain assessment scales are numerical rating scale and visual analogue scale. These pain rating scales have shown good validity and reliability.

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