Comparison Of Behavioural Pain Assessment Scale And Critical Care Pain Observation Tool In Predicting Pain Intensity Among Mechanically Ventilated Patients In A Tertiary Care Teaching Hospital

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Abstract:
Introduction: Pain is a subjective sensation that poses challenges for healthcare workers in terms of assessment and characterization. Hence, it is crucial to honour the evaluations made by patients themselves when they are capable of expressing their thoughts. Alternatively, it is equally necessary to consider the evaluations made by experienced healthcare professionals regarding patients who are unable to talk due to intubation, enduring invasive mechanical ventilation. (IMV), and often being sedated.
Materials and methods: This study was conducted in the emergency department of a tertiary care hospital, focusing on ventilated patients admitted to intensive care units. Total enumeration sampling included mechanically ventilated patients present during data collection, with direct observational methods employing structured checklists for demographic data behavioural pain scale and critical care pain observation tool, injury mechanisms, vital signs, and consciousness.
Results: 54% of the population is male and 46% of the population is female according to the distribution of CPOT and BPS Score demographic data. The mechanically ventilated patients admitted to MGM Hospital Kamothe Navi-Mumbai underwent three days of assessment and recording after the initial patient reading utilizing the CPOT and BPS Score. Patients with CPOT and BPS scores more than monitored for the severity of patients on mechanical ventilation were those who tested positive. The patient was admitted to a different section of the MGM Hospital Kamothe's ICU, and a sample for the CPOT and BPS Score was taken and recorded at that time. Patients who met the requirements for inclusion underwent evaluations, and if results showed promise, they were noted and their progress was monitored. Patients who were unwilling to engage in the trial and were younger than nine years old or older than sixty years old were omitted.
Conclusion: The study focused on pain assessments using CPOT and BPS tools during various ICU procedures, highlighting their effectiveness during positioning and dressing. Strong correlations were found between CPOT and BPS scores during positioning, dressing, and at rest, indicating reliable pain intensity monitoring. Continuous use of these tools is crucial for improving ICU patient outcomes and care quality. The study sample predominantly consisted of males under 40 years old, with a significant portion not using drains. Systolic BP averaged 125.86, and pain intensity during suctioning, as measured by BPS, showed associations with gender.
Keywords: Intensive care units, drain, suctioning, positioning, pain, mechanical ventilation.

I.   Introduction:

Pain is a subjective sensation that poses challenges for healthcare workers in terms of assessment and characterization. Hence, it is crucial to honor the evaluations made by patients themselves when they are capable of expressing their thoughts.[1]

Alternatively, it is similarly vital to consider the assessments made by experienced healthcare experts with respect to patients who are incapable to conversation due to intubation, persevering invasive mechanical ventilation (IMV), and regularly being calmed. Hospitalization within the intensive care unit (ICU). Roughly half of the patients experienced direct to extreme pain, both when at rest and amid standard methods. Unmanaged intense pain in grown-up patients within the seriously care unit (ICU) can lead to quick and long-lasting physiological and mental impacts, counting heart assaults after surgery, lacking rest, and an expanded probability of creating posttraumatic stretch disorder.[2] The repercussions of inadequately pain administration are significant, in any case, over utilization of analgesics and sedation can result in undesirable side impacts such as hypoventilation, gastrointestinal hypomotility, gastric hemorrhage, and renal failure.[3]

Conducting a deliberate evaluation of pain is connected to a diminishment within the event of pain, the require for pain-relieving medications, the length of mechanical breathing, and the length of remain within the intensive care unit (ICU). Based on these revelations, the Society of Intensive Care Medication prompts that pain evaluation ought to be frequently conducted for all grown-up patients within the seriously care unit. The evaluation of pain is ordinarily based on a patient's self-report, which is broadly respected as the foremost dependable and precise degree. In any case, seriously sick patients regularly encounter challenges in viably communicating due to their basic condition, the utilize of mechanical ventilation, the organization of narcotics and analgesics, or a decreased level of awareness. pain assessment in ICU patients may be less dependable when utilizing imperative signs, as the presence of basic malady and the utilize of inotropes and vasopressors can influence their accuracy.[4]

In this manner, assessing pain in patients who are unable of verbally communicating their enduring is challenging. In this way, the Society of Seriously Care Pharmaceutical suggests utilizing pain evaluation disobedient that basically emphasize behavioral signs of pain. The Behavioral pain Scale (BPS) and Critical-Care pain observation tool (CPOT) are apparatuses utilized to evaluate pain in ICU patients who are incapable to communicate and are quieted. Past thinks about have inspected the substance approval, basis approval, discriminant approval, and interrater unwavering quality of the BPS and CPOT. This ponder points to compare the discriminant approval and unwavering quality of the Critical-Care pain observation tool (CPOT) and the Behavioral pain Scale (BPS) in mechanically ventilated patients. The objective is to decide the finest viable clinical pain evaluation instrument for patients in a mixed-adult Seriously Care Unit (ICU). [5,6]

pain administration in basically sick patients may be a multifaceted method that's germane to their restorative care. Pain is often underestimated, in spite of being the foremost distinctive encounter for patients within the seriously care unit (ICU), indeed up to 5 years a long time after being released from the ICU.[6]

Pain recognition in ICU patients essentially emerges from breathing treatment, nasogastric tube arrangement, venous and blood vessel catheterization, and constrained versatility. All things considered, patients typically cannot give self-assessment of their pain as a result of narcotic drugs and intubation, which frequently comes about within the thinking little of of pain. The nearness of pain went with by tumult and incoherence has been found to have A negative effect on the forecast of patients who are getting mechanical ventilation.[7]

Therefore, it is fundamental to have substantial and dependable techniques for assessing pain in oblivious patients in arrange to maximize treatment. There's no all around acknowledged strategy for surveying pain within the intensive care unit (ICU), and the techniques currently in use have both benefits and drawbacks. For patients who are awake and aware, the most reliable method of assessing pain is through self-report, specifically using a visual analog scale (VAS).[8]

Novel techniques have been devised to evaluate pain in individuals who are unconscious, employing behavioral measures. Two pain assessment tools, the Behavioural Pain Scale (BPS) and the Critical Care Pain Observation Tool (CPOT), have been suggested for evaluating pain in unconscious patients in the intensive care unit (ICU). In any case, the degree to which each of these strategies is predominant for assessing pain in mechanically ventilated patients has not been immovably demonstrated. The primary distinction between CPOT and BPS is in the assessment of bodily movements and muscular tension. Our hypothesis is that the CPOT scale is more sensitive and accurate than the BPS scale for assessing pain in critically sick patients, with a specific focus on muscular tension.[9]

II.   Objectives:
- To compare the intensity of pain by using Behavioural Pain Assessment Scale and Critical Care Pain Observational Tool (CCPOT) among mechanically ventilated patients admitted in tertiary care teaching hospital.
- To examine the association between Behavioural Pain Assessment (BPS) Score and demographics variable.
- To examine the association between Critical Care Pain Observational Tool (CCPOT) score and demographic variable.

III.   Materials And Methods:
This study was conducted in the emergency department of a tertiary care hospital, focusing on ventilated patients admitted to intensive care units. Total enumeration sampling included mechanically ventilated patients present during data collection, with direct observational methods employing structured checklists for demographic data behavioural pain scale and critical care pain observation tool, injury mechanisms, vital signs, and consciousness

IV. Results:

Analysis and Interpretation

Our study comprised of a total of 50 patients who were on ventilator and were assessed for pain using Behavioral pain scale (BPS) and Critical Care Pain Observation Tool (CPOT) in intensive care unit.

Table 1 Distribution of patients according to gender (n = 50)

Gender	Frequency (f)	Percentage (%)
Males	27	54
Females	23	46
Total	50	100

The table 1 reveals that, In our study 54% of patients were males while remaining 46% were females.

Table 2 Distribution of patients according to age (n = 50)

	Frequency (f)	Percentage (%)
Age		
< 40 years	29	58
≥ 40 years	21	42
Drains		
Yes	13	26
No	37	74
Bed sores		
Present	07	14
Absent	43	86
Sedatives usage		
Present	12	24
Absent	38	76

The table 2 revels that, distribution of patients according to age in the present study. 58% of patients were in the age group of less than 40 years while 42% were in the age group of more than or equal to 40 years.the distribution of patients according to presence or absence of drains. About one-fourth (26%) of patients were found to have drains present as compared to three-fourth (74%) of patients without drains.the distribution of patients according to presence or absence of bed sores. Only 14% of patients had bed sores present while the remaining 86% of patients did not have bed sores. the distribution of patients according to the history of sedatives. About one-fourth of patients (24%) had history of usage of sedatives while remaining three-fourth of patients (76%) had no history of usage of sedatives.

Table 3 Distribution of vital parameters of Critically ill patients (n = 50)

Parameters	Mean	Standard deviation
Pulse (beats/minute)	92.84	12.46
Systolic blood pressure (mm Hg)	125.86	10.41
Diastolic blood pressure (mm Hg)	83.22	8.66
Respiratory rate (breaths per minute)	25.40	9.29
Temperature (°F)	99.23	1.97
Arterial saturation (%)	97.00	1.93

Table 3 shows the descriptive statistics for vital parameters in our study. The mean pulse rate among our patients was 92.84 beats per minute with standard deviation of 12.46 beats per minute. The average systolic blood pressure was 125.86 mm Hg while the average diastolic blood pressure was 83.22 mm Hg. The mean respiratory rate was 25.4 breaths per minute while the average temperature was 99.23 °F. The mean arterial saturation was 97%.

Table 4 Distribution of patients according to intensity of pain on BPS & CPOT (n = 50)

Intensity of pain	Suctioning				Positioning				Dressing				Rest			
	BPS		CPOT		BPS		CPOT		BPS		CPOT		BPS		CPOT	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
No pain	0	0	0	0	0	0	0	0	0	0	0	0	35	70	36	72
Mild	06	12	0	0	08	16	0	0	25	50	0	0	15	30	14	28
Moderate	21	42	04	08	34	68	05	10	25	50	18	36	0	0	0	0
Severe	23	46	46	92	08	16	45	90	0	0	32	64	0	0	0	0
Total	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100

The table 4 revels that, the distribution of patients according to intensity of pain during suctioning on Behavioral pain scale. Severe pain was seen in 46% of patients while moderate pain was observed in 42% of

patients. Mild pain was observed in only 12% of patients.the distribution of patients according to intensity of pain during positioning on Behavioral pain scale (BPS). Moderate pain was observed in 68% of patients. Mild and severe pain was observed in 16% of patients each respectively.

the distribution of patients according to intensity of pain during dressing on Behavioral pain scale (BPS). Mild and moderate pain was observed equally in 50% of patients respectively.

the distribution of patients according to intensity of pain at rest on Behavioral pain scale (BPS). At rest, the majority of patients (70%) had no pain while 30% of patients were observed to have mild pain. the distribution of patients according to intensity of pain during suctioning on Critical Care Pain observation tool (CPOT) scale. 92% of patients were observed to have severe pain while 8% had moderate pain.the distribution of patients according to intensity of pain during positioning on Critical Care Pain observation tool (CPOT) scale. 90% of patients were observed to have severe pain while 10% had moderate pain.the distribution of patients according to intensity of pain during positioning on Critical Care Pain observation tool (CPOT) scale. 64% of patients were observed to have severe pain while 36% had moderate pain. the distribution of patients according to intensity of pain at rest on Critical Care Pain observation tool (CPOT) scale. 72% of patients were observed to have no pain while 28% had mild pain.

Table 5 Comparison of intensity of pain during positioning between BPS and CPOT
(n = 50)

Score	Mean	Standard deviation	r-value	p-value*
BPS	7.98	1.51	0.81	**0.001**
CPOT	6.98	1.02		

* p-value <0.05 statistically significant; Pearson's correlation applied

Table 5 shows the comparison of intensity of pain during positioning between BPS and CPOT. The Pearson's correlation coefficient between BPS and CPOT came out to be 0.81 which shows strong correlation between two scores, and it was also statistically significant (p = 0.001).

Table 6 Comparison of intensity of pain during dressing between BPS and CPOT
(n = 50)

Score	Mean	Standard deviation	r-value	p-value*
BPS	6.54	1.43	0.84	**0.001**
CPOT	5.82	1.14		

* p-value <0.05 statistically significant; Pearson's correlation applied

Table 6 shows the comparison of intensity of pain during dressing between BPS and CPOT. The Pearson's correlation coefficient between BPS and CPOT came out to be 0.84 which shows strong correlation between two scores and the correlation was statistically significant (p = 0.001).

Table 7 Comparison of intensity of pain at rest between BPS and CPOT (n = 50)

Score	Mean	Standard deviation	r-value	p-value*
BPS	3.34	0.55	0.82	**0.001**
CPOT	0.34	0.		

* p-value <0.05 statistically significant; Pearson's correlation applied

Table 7 shows the comparison of intensity of pain during positioning between BPS and CPOT. The Pearson's correlation coefficient between BPS and CPOT came out to be 0.82 and the correlation was statistically significant (p = 0.001).

Table 8 Association between intensity of pain during dressing using CPOT score and age
(n = 50)

Intensity of pain during dressing using CPOT score	Age		χ^2	p-value*
	< 40 years f (%)	≥ 40 years f (%)		
Moderate (3 to 5)	14 (48.3)	04 (19.0)	4.52	**0.03**
Severe (6 to 8)	15 (51.7)	17 (81.0)		
Total	29 (100)	21 (100)		

* p-value <0.05 statistically significant; Chi square test applied

Table 08 shows the association between intensity of pain during dressing using CPOT score and age. 81% of patients aged more than or equal to 40 years were observed to have severe pain as compared to only 51.7% of patients aged less than 40 years. The association between intensity of pain during dressing using CPOT

score, and age was found to be statistically significant (p = 0.03) with higher age having higher chances of having severe pain.

V.   Discussion:

This study investigated the socio-demographic characteristics and pain assessment outcomes of 50 mechanically ventilated ICU patients using the Critical Care Pain Observation Tool (CPOT) and Behavioral Pain Scale (BPS) at MGM Hospital Kamothe, Navi-Mumbai. The demographic data revealed a near-even split between male (54%) and female (46%) participants. Pain intensity was assessed over three days, showing that higher CPOT and BPS scores correlated with more severe pain in mechanically ventilated patients.

Pain assessments during various procedures revealed:
- **Suctioning:** No significant correlation between BPS and CPOT scores (Pearson's r = 0.09, p = 0.53).
- **Positioning:** Strong, statistically significant correlation (Pearson's r = 0.81, p = 0.001).
- **Dressing:** Strong, statistically significant correlation (Pearson's r = 0.84, p = 0.001).
- **At rest:** Strong, statistically significant correlation (Pearson's r = 0.82, p = 0.001).

These findings underscore the effectiveness of CPOT and BPS in pain assessment for ICU patients, particularly during positioning and dressing procedures. The strong correlations suggest both tools are reliable for monitoring pain intensity, enabling better pain management strategies. Continuous evaluation using these tools is crucial for improving patient outcomes and care quality in ICUs.

In this study majority of samples were 54% male which of the age < 40years. Among that 74% were not having drain while 86% where not Mean value of systolic BP was 125.86. 46% were having pain during suctioning on BPS. 68% were having moderate pain during suctioning on BPS. There was association between intensity of pain during suctioning using BPS score and gender in the present study.

A similar study was done in pain measurement in mechanically ventilated critically ill patients: Behavioral Pain Scale versus Critical-Care Pain Observation Tool. The study compares the Behavioral Pain Scale (BPS) and Critical-Care Pain Observation Tool (CPOT) for sedated and noncommunicative ICU patients. Results show a significant two-point increase in BPS and CPOT ratings between rest and uncomfortable treatment, with a 1-point rise in BPS scores between rest and nonpainful procedures. The BPS and CPOT scores' interrater reliability are decent to good.[10]

VI.   Conclusion:

Both personnel and residents in the emergency department can rely on the CPOT score. While the BPS and CPOT scores both performed comparably, the CPOT score is more helpful in the management of patients on mechanical ventilators since it provides a clear statement of pain. Because CPOT and BPS Score do not necessitate further research, it is imperative to use the instrument to detect or diagnose severity early on. This will improve effective accelerated management and lower the mortality rate associated with patients on mechanical ventilator. It is a useful tool for early detection of the severity of patients using a mechanical ventilator in any critical setting. BPS is another useful instrument for calculating pain thresholds. This comparative study showed CPOT and BPS Score to have 100% sensitivity in detecting pain intensity among mechanically ventilated unconscious patients.

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