Comparison of Two Pain Assessment Tools in the Nonverbal Critical Care Patient Who Cannot Self Report: A Descriptive, Observational Study

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**BACKGROUND**

- A patient’s self-report of pain – gold standard (ASMNP/ AACN)

- Many patients in ICU, are nonverbal, unable to self report pain. E.g., altered level of consciousness, aphasia, receiving sedation or analgesia, or placed on a mechanical ventilator.

- Pain assessment in these patients poses a challenge – many may not have good pain control.
STUDY PURPOSE/AIMS

Purpose:

- To compare the Pain Assessment in Advanced Dementia (PAINAD) (standard care) Tool vs the Critical-Care Pain Observation Tool (CPOT) scores for assessment in nonverbal ICU patients.

Primary Aim/Hypotheses

1. Examine the comparative efficacy of the use of CPOT vs. PAINAD screening tools, as measured by improved pain assessment frequency and quality.
   1a. Hypothesis: The CPOT provides more accurate pain assessment for the nonverbal critically ill patient.

Secondary Aim

- Examine the nurse’s perception of the use of the CPOT in their clinical practice (Feasibility and Clinical Utility of CPOT Questionnaire) (2-Items - Likert scale 0-4), Online via survey monkey.
Methods

• A prospective, descriptive, comparative design guided this study.
• A convenience sample of (N=67) ICU/CCU non-verbal, adult patients of varying medical diagnoses, requiring pain evaluation, were included.

### STUDY CLINICAL OUTCOMES
- Improved pain assessments & reassessments
- Increased appropriate pain management

Secondary Outcomes
- Decreased LOS and Mortality

• Repeated measures were used to examine behavioral responses, using within-subjects and crossover techniques.

<table>
<thead>
<tr>
<th>First Testing Period</th>
<th>Second Testing Period</th>
<th>Third Testing Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>T2</td>
<td>T3</td>
</tr>
<tr>
<td>R</td>
<td>P/PR</td>
<td>REC</td>
</tr>
<tr>
<td>T4</td>
<td>T5</td>
<td>T6</td>
</tr>
<tr>
<td>R</td>
<td>P/PR</td>
<td>REC</td>
</tr>
<tr>
<td>T7</td>
<td>T8</td>
<td>T9</td>
</tr>
<tr>
<td>R</td>
<td>P/PR</td>
<td>REC</td>
</tr>
</tbody>
</table>

Abbreviations: R, rest (1 minute), P, repositioning/tuning; PR, procedure (suctioning, insertion of vascular access device or tube); REC, recovery (20 minutes after position change or suctioning or vascular access device or tube insertion).
**Patient Instrument(s):**
**PAIN IN ADVANCED DEMENTIA (PAINAD)**

- **PAINAD** looks at five behaviors: **Breathing; Facial Expression; Verbalization/Vocalization; Body Language; Consolability.**
- Used in advanced dementia patients that cannot verbally communicate levels of pain. Found to be valid and reliable in LTC and in other hospitalized patients.

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**Pain Assessment in Advanced Dementia (PAINAD) Scale**

<table>
<thead>
<tr>
<th>Items*</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative vocalization</td>
<td>None</td>
<td>Occasional moan or groan. Low-level speech with a negative or disapproving quality.</td>
<td>Repeated troubled calling out. Loud moaning or groaning. Crying.</td>
<td></td>
</tr>
<tr>
<td>Consolability</td>
<td>No need to console</td>
<td>Distracted or reassured by voice or touch.</td>
<td>Unable to console, distract or reassure.</td>
<td></td>
</tr>
</tbody>
</table>

**Total scores range from 0 to 10 (based on a scale of 0 to 2 for five items), with a higher score indicating more severe pain. (0='no pain' to 10='severe pain').**
Patient Instrument(s): Critical Care Pain Observation Tool (CPOT)

**Based on Four domains (Range 0-8) cutoff >2)**
Facial expressions, body movements, muscle tension, compliance with ventilation for intubated patients and vocalization for extubated patients.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Facial expression</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No muscular tension observed</td>
<td>Relaxed, neutral</td>
</tr>
<tr>
<td></td>
<td>Presence of frowning, brow lowering, orbit tightening, and levator contraction</td>
<td>Tense</td>
</tr>
<tr>
<td></td>
<td>All of the above facial movements plus eyelid tightly closed</td>
<td>Grimacing</td>
</tr>
<tr>
<td><strong>Body movements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does not move at all (does not necessarily mean absence of pain)</td>
<td>Absence of movements</td>
</tr>
<tr>
<td></td>
<td>Slow, cautious movements, touching or rubbing the pain site, seeking attention through movements</td>
<td>Protection</td>
</tr>
<tr>
<td></td>
<td>Pulling tube, attempting to sit up, moving limbs/thrashing, not following commands, striking at staff, trying to climb out of bed</td>
<td>Restlessness</td>
</tr>
<tr>
<td><strong>Muscle tension</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation by passive flexion and extension of upper extremities</td>
<td>No resistance to passive movements</td>
<td>Relaxed</td>
</tr>
<tr>
<td></td>
<td>Resistance to passive movements</td>
<td>Tense, rigid</td>
</tr>
<tr>
<td></td>
<td>Strong resistance to passive movements, inability to complete them</td>
<td>Very tense or rigid</td>
</tr>
<tr>
<td><strong>Compliance with the ventilator (Intubated patients)</strong></td>
<td>Alarms not activated, easy ventilation</td>
<td>Tolerating ventilator or movement</td>
</tr>
<tr>
<td></td>
<td>Alarms stop spontaneously</td>
<td>Coughing but tolerating</td>
</tr>
<tr>
<td></td>
<td>Asynchrony: blocking ventilation, alarms frequently activated</td>
<td>Fighting ventilator</td>
</tr>
<tr>
<td><strong>OR</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vocalization (extubated patients)</strong></td>
<td>Talking in normal tone or no sound</td>
<td>Talking in normal tone or no sound</td>
</tr>
<tr>
<td></td>
<td>Sighing, moaning</td>
<td>Sighing, moaning</td>
</tr>
<tr>
<td></td>
<td>Crying out, sobbing</td>
<td>Crying out, sobbing</td>
</tr>
<tr>
<td><strong>Total, range</strong></td>
<td></td>
<td>0-8</td>
</tr>
</tbody>
</table>

Source: Am J Crit Care © 2006 American Association of Critical-Care Nurses
Table 1. Study Characteristics

<table>
<thead>
<tr>
<th>Mean (SD) or N (valid %)</th>
<th>N=67 (all patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, years mean (SD)</strong></td>
<td>71.3</td>
</tr>
<tr>
<td><strong>Gender:</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>40 (61.5%)</td>
</tr>
<tr>
<td>Female</td>
<td>25 (38.5%)</td>
</tr>
<tr>
<td><strong>Family:</strong></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>6 (9.4%)</td>
</tr>
<tr>
<td>Single</td>
<td>18 (28.1%)</td>
</tr>
<tr>
<td>Widowed</td>
<td>23 (35.9%)</td>
</tr>
<tr>
<td>Divorced</td>
<td>16 (25.0%)</td>
</tr>
<tr>
<td><strong>Race:</strong></td>
<td></td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>31 (47.7%)</td>
</tr>
<tr>
<td>African American</td>
<td>12 (18.5%)</td>
</tr>
<tr>
<td>Latin/Hispanic</td>
<td>12 (18.5%)</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>6 (9.2%)</td>
</tr>
<tr>
<td>Native American</td>
<td>4 (6.2%)</td>
</tr>
<tr>
<td><strong>Mortality</strong></td>
<td>24 (36.9%)</td>
</tr>
<tr>
<td><strong>Hospital (LOS), mean (SD)</strong></td>
<td>18.0 (12.9)</td>
</tr>
<tr>
<td><strong>ICU (LOS), mean (SD)</strong></td>
<td>9.1 (7.7)</td>
</tr>
<tr>
<td><strong>Average pain score across 9 time points:</strong></td>
<td></td>
</tr>
<tr>
<td>PAINAD</td>
<td>1.2 (1.0)</td>
</tr>
<tr>
<td>CPOT</td>
<td>1.2 (0.9)</td>
</tr>
</tbody>
</table>
Table 1. Study Characteristics cont...

<table>
<thead>
<tr>
<th>Co-Morbidities</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hematological</td>
<td>23 (35.4%)</td>
</tr>
<tr>
<td>Immunological</td>
<td>5 (7.7%)</td>
</tr>
<tr>
<td>Cardiac (HTN, AMI, HF)</td>
<td>49 (75.4%)</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>18 (27.7%)</td>
</tr>
<tr>
<td>Shock</td>
<td>13 (20.0%)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>26 (40.0%)</td>
</tr>
<tr>
<td>CVA</td>
<td>23 (35.4%)</td>
</tr>
<tr>
<td>Liver Failure</td>
<td>9 (13.8%)</td>
</tr>
<tr>
<td>Respiratory Failure</td>
<td>34 (52.3%)</td>
</tr>
<tr>
<td>Trauma</td>
<td>6 (9.2%)</td>
</tr>
<tr>
<td>MODS</td>
<td>2 (3.1%)</td>
</tr>
<tr>
<td>Cardiac Arrest</td>
<td>6 (9.2%)</td>
</tr>
<tr>
<td>Spinal Cord Injury</td>
<td>2 (3.1%)</td>
</tr>
<tr>
<td>UTI</td>
<td>5 (7.7%)</td>
</tr>
<tr>
<td>Neurological</td>
<td>16 (24.6%)</td>
</tr>
<tr>
<td>Infection/Sepsis</td>
<td>24 (36.9%)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>18 (27.7%)</td>
</tr>
<tr>
<td>Chronic Kidney Disease</td>
<td>21 (32.3%)</td>
</tr>
<tr>
<td>Cancer</td>
<td>6 (9.2%)</td>
</tr>
</tbody>
</table>
Table 4. Assessment of number (N) of patients with values on both scales at each time point, distributional differences in average scores across time points within each tool, reliability of CPOT (interchangeability with PAINAD) by calculation of percent agreement and weighted kappa.

<table>
<thead>
<tr>
<th>Study</th>
<th>PAINAD</th>
<th>CPOT</th>
<th># Scale Levels Represented in Data</th>
<th>% Agree Unweighted</th>
<th>Weighted Kappa(^b) (SE)</th>
<th>p-value</th>
<th>Landis-Koch Interpretation of weighted kappa coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>59</td>
<td>0 (0-0.5)</td>
<td>6</td>
<td>71.1%</td>
<td>0.80 (0.09)</td>
<td>P&lt;.001</td>
<td>Substantial</td>
</tr>
<tr>
<td>T2</td>
<td>59</td>
<td>2 (0-5)</td>
<td>10</td>
<td>28.8%</td>
<td>0.67 (0.09)</td>
<td>P&lt;.001</td>
<td>Moderate</td>
</tr>
<tr>
<td>T3</td>
<td>59</td>
<td>0 (0-0)</td>
<td>5</td>
<td>76.3%</td>
<td>0.56 (0.16)</td>
<td>P&lt;.001</td>
<td>Moderate</td>
</tr>
<tr>
<td>T4</td>
<td>34</td>
<td>0 (0-0)</td>
<td>4</td>
<td>82.4%</td>
<td>0.67 (0.16)</td>
<td>P&lt;.001</td>
<td>Moderate</td>
</tr>
<tr>
<td>T5</td>
<td>34</td>
<td>1 (0-3)</td>
<td>9</td>
<td>38.2%</td>
<td>0.62 (0.16)</td>
<td>P&lt;.001</td>
<td>Moderate</td>
</tr>
<tr>
<td>T6</td>
<td>32</td>
<td>0 (0-0.5)</td>
<td>4</td>
<td>62.5%</td>
<td>0.43 (0.18)</td>
<td>P=.027</td>
<td>Fair</td>
</tr>
<tr>
<td>T7</td>
<td>19</td>
<td>0 (0-0)</td>
<td>3</td>
<td>89.5%</td>
<td>0.52 (0.38)</td>
<td>P=.018</td>
<td>Slight</td>
</tr>
<tr>
<td>T8</td>
<td>19</td>
<td>2 (0.5-3.0)</td>
<td>7</td>
<td>47.4%</td>
<td>0.69 (0.10)</td>
<td>P&lt;.001</td>
<td>Substantial</td>
</tr>
<tr>
<td>T9</td>
<td>18</td>
<td>0 (0-0)</td>
<td>5</td>
<td>83.3%</td>
<td>0.29 (0.25)</td>
<td>P=.025</td>
<td>Slight</td>
</tr>
</tbody>
</table>

Test of difference across time points\(^a\)  
P<.001  
P<.001
Table 5. Bland-Altman analyses assessed statistical significance of difference between the two measurement tools and whether proportional bias present: PAINAD and CPOT (Study nurse data).

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Mean difference (SD)</th>
<th>P-value b</th>
<th>β</th>
<th>P-value c</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>59</td>
<td>-0.07 (0.76)</td>
<td>P=0.497</td>
<td>β = -0.093</td>
<td>P=0.303</td>
</tr>
<tr>
<td>T2</td>
<td>59</td>
<td>0.07 (1.95)</td>
<td>P=0.790</td>
<td>β = 0.103</td>
<td>P=0.406</td>
</tr>
<tr>
<td>T3</td>
<td>59</td>
<td>-0.05 (0.64)</td>
<td>P=0.635</td>
<td>β = -0.231</td>
<td>P=0.090</td>
</tr>
<tr>
<td>T4</td>
<td>34</td>
<td>0.06 (0.42)</td>
<td>P=0.42</td>
<td>β = 0.294</td>
<td>P=0.039 *</td>
</tr>
<tr>
<td>T5</td>
<td>34</td>
<td>-0.41 (1.86)</td>
<td>P=0.21</td>
<td>β = 0.040</td>
<td>P=0.802</td>
</tr>
<tr>
<td>T6</td>
<td>32</td>
<td>-0.09 (0.14)</td>
<td>P=0.52</td>
<td>β = -0.347</td>
<td>P=0.097</td>
</tr>
<tr>
<td>T7</td>
<td>19</td>
<td>0.05 (0.52)</td>
<td>P=0.67</td>
<td>β = 0.286</td>
<td>P=0.253</td>
</tr>
<tr>
<td>T8</td>
<td>19</td>
<td>-0.47 (1.35)</td>
<td>P=0.14</td>
<td>β = 0.131</td>
<td>P=0.523</td>
</tr>
<tr>
<td>T9</td>
<td>18</td>
<td>-0.28 (1.07)</td>
<td>P=0.29</td>
<td>β = -0.930</td>
<td>P=0.002 *</td>
</tr>
</tbody>
</table>

a PAINAD-CPOT scores  
b P-value based on one sample t-test run to test the null hypothesis of zero difference between tools.  
c P-value based on linear regression with difference score as dependent variable and average score on two tools the predictor. Testing the null hypothesis of no proportional bias (β=0).
SECONDARY AIM

Critical Care Nurses Response(s) N=19
Feasibility and Clinical Utility of the Critical-Care Pain Observation Tool (CPOT) Questionnaire
Q1: Feasibility: Was the length of time sufficient to train to use the CPOT accurately?
Q2: Feasibility: Is the CPOT quick to use?
Q3: Feasibility: Is the CPOT easy to complete?
Q4: Clinical Utility: Would you recommend to use the CPOT routinely?
• Many critically ill patients experience significant pain in ICU:
  - 30% pain at rest
  - More than 50% during routine care - i.e. turning, endotracheal suctioning and wound care.

• Pain is multidimensional, complex and personal experience that cannot easily be adequately described and treated without a patient’s self-report. *Patient’s self-report is gold standard

• However many ICU patients cannot self-report. Remains a challenge to RN’s.

• ICU RN’s must be encouraged to use a validated behavioral pain assessment tool when caring for these patients.

• The CPOT took into account whether the patient was intubated or not and still nonverbal. Could be used for any nonverbal patient.

• Gap = the CPOT tells us the presence of pain but not intensity.
Study Limitations

• Limited to one institution though had 3 critical care units involved.
• Only 18 patients had all three complete observations done.
• Only compared the Painad and CPOT for this study. May have also used looked at the Behavioral Pain Scale (BPS)
• Could also have followed patients when they became able to self report to see how they described the intensity of their pain and how it correlated to the patient’s self report.

• Small sample ICU/CCU RN’s completed survey on survey monkey N=19 out >200
• More education re: the use of the CPOT may have increased RN’s participation in the feasibility survey
Conclusions / Recommendations

- Routine pain assessment is a fundamental responsibility of nurses. The present study suggests that the CPOT was highly significant in accurate pain assessment, and had high reliability compared to PAINAD tool.

- Patients who are unable to communicate their discomfort may be at risk of poor pain assessment and management. Consequently, using a more accurate tool for systematic and standardized evaluation of pain in nonverbal patients is essential.

- **Recommendations:**
  - Study findings have been presented across MemorialCare. There has been wide-spread support to adopt the use of the CPOT tool to use among ICU non-verbal patients. The tool is already available in epic, and will go live within the next month, following staff nurse in-services to train nurses on how to complete the CPOT accurately,
  - Scholarly dissemination of findings at upcoming conferences, journal article.
  - Submitting to AACN NTI, 2017
  - Manuscript in progress