Psychometric Properties and Clinical Utility of the CNA Pain Assessment Tool (CPAT)

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Objectives
- Discuss the concepts of reliability and validity used to improve the psychometric soundness of instruments
- Describe the development of the CPAT
- Report the results of the psychometric testing and clinical utility of the CPAT
Definitions

- Validity: the ability of the instrument to measure the attributes of the construct under study
- Reliability: the ability of the instrument to measure the attributes consistently

Construct Validity Diagram

- Translational Validity
- Conceptual Validity
- Criterion Validity
- Face
- Content
- Concurrent
- Predictive
- Convergent
- Discriminant

Construct Validity

- Degree to which the instrument measure the construct it is intended to measure
  - Contrasting group method
  - Hypothesis testing
  - Factor analysis
Translational validity

- Face validity
  - Subjective assessment
  - Weakest form of validity
- Content validity
  - Items in tool sample the complete range of study attribute

Criterion Validity

- Definition: the evidence of a relationship between the attributes in a measurement tool with its performance on some other variable.
  - Predictive validity
  - Concurrent validity
  - Convergent validity
  - Discriminant validity

Reliability

- Stability reliability
  - Test-retest: administration of the same test to the same group of people at different times.
  - Inter-rater reliability: the degree to which two raters, acting independently, assign the same rating to the attribute being measured
- Equivalence reliability
  - Coefficient alpha: how well the sub-parts (items) in the tool fit together conceptually
CPAT: Development Phase 1

- Purpose: to develop a pain assessment tool to be utilized by certified nursing assistant direct care providers for nursing home residents with dementia.
- Initial 41 behavior items obtained from literature review, expert opinion, and direct care providers.
- 5 domains: facial expression (9 items), behavior (8), mood (6), body language (9) and activity level (9).
- Correlated against objective indicators: past medical history of known painful condition, present diagnosis of painful condition, pain medication use (time 1 assessment).
- Correlated against 26 MDS indicators related to function, mood, behavior, medication use. (time 2 assessment).

CPAT phase 1

- Time 1: CNA’s instructed and administered CPAT over 6 month interval
  - 182 participants; 2619 assessments
  - P value of <.05 and OR >1.5; 26 items retained
- Time 2
  - 105 participants; 2527 assessments
  - P value of <.05 and OR >1.0; 24 items retained
- Final Phase 1 CPAT: collapsed to 12 items

Statistically Significant Items for the Presence of Pain

<table>
<thead>
<tr>
<th>Item</th>
<th>OR</th>
<th>CI</th>
<th>P  value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scared</td>
<td>2.61</td>
<td>0.61-0.97</td>
<td>.063</td>
</tr>
<tr>
<td>Fearful</td>
<td>2.67</td>
<td>1.12-4.48</td>
<td>.023</td>
</tr>
<tr>
<td>Calling out</td>
<td>2.69</td>
<td>1.39-5.21</td>
<td>.003</td>
</tr>
<tr>
<td>Moaning</td>
<td>2.94</td>
<td>1.67-5.16</td>
<td>.002</td>
</tr>
<tr>
<td>Whining</td>
<td>1.98</td>
<td>1.14-3.43</td>
<td>.016</td>
</tr>
<tr>
<td>Tense</td>
<td>1.69</td>
<td>1.07-2.65</td>
<td>.023</td>
</tr>
<tr>
<td>Rigid</td>
<td>2.53</td>
<td>1.21-5.29</td>
<td>.014</td>
</tr>
<tr>
<td>Hand wringing</td>
<td>2.27</td>
<td>1.05-4.87</td>
<td>.036</td>
</tr>
</tbody>
</table>
CPAT: Phase 1

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facial expression</td>
<td>0</td>
</tr>
<tr>
<td>Mood</td>
<td>0</td>
</tr>
<tr>
<td>Behavior</td>
<td>0</td>
</tr>
<tr>
<td>Body Language</td>
<td>0</td>
</tr>
<tr>
<td>Activity Level</td>
<td>0</td>
</tr>
</tbody>
</table>

Facial expression: Relaxed, Scared/fearful
Mood: Normal, Calling out/fearful
Behavior: Pleasant, Whiny
Body Language: Tense/rigid
Activity Level: Moves easily, Hand wringing


Mood: Normal, Calling out/fearful
Behavior: Pleasant, Whiny
Body Language: Tense/rigid
Activity Level: Moves easily, Hand wringing

Expert Critique

- **State of the Art Review of Tools for Assessment of Pain in Nonverbal Older Adults**
- **Criteria for evaluation:** conceptualization, subjects, scoring and feasibility, reliability, validity
- **http://prc.coh.org/pain-noa.htm**
  - The tool is conceptually supported (purpose, item generation, content validity). However, there is no evidence of reliability; validity support is limited.
  - More information is needed as to the specific actions the CNAs were instructed to take without nursing assistance if pain were found to be present.

CPAT: Development and psychometric testing phase 2

- **Research question 1:** Does the CPAT have sufficiently strong psychometric properties to warrant its use and dissemination as an objective measure of pain in nursing home patient with dementia?
- **Research question 2:** What is the clinical utility of the CPAT as perceived by the CNA's
Methods

- Setting: 3 suburban regional long-term care facilities
- Eligibility criteria: moderate to severe dementia
  - MMSE score: 19 or less (0-30)
  - Global Deterioration Scale: 5 or greater (1-7)
  - Alzheimer’s or non-Alzheimer’s type dementia
- Exclusion criteria
  - Reversible cognitive impairment, delirium, severe sensory impairment

CNA Training

- 30 minute CNA training sessions by (co-I)
- Instructed to observe resident for 1 minute, check off one box in each category, record a total pain score.
- Each CNA completed two practice tests for each of the testing periods.
- Discussion and feedback sessions after the training period
- Modified, enhanced 45 minute training included descriptors for each indicator
- Instruction Sheet given to each CNA

Directions:
1. Observe Resident in each of the five (5) categories
2. Place an "X" in the appropriate box
3. Record total score and action taken at the bottom of the page

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FACIAL EXPRESSION</td>
<td></td>
</tr>
<tr>
<td>2. BEHAVIOR</td>
<td></td>
</tr>
<tr>
<td>3. MOOD</td>
<td></td>
</tr>
<tr>
<td>4. BODY LANGUAGE</td>
<td></td>
</tr>
<tr>
<td>5. ACTIVITY LEVEL</td>
<td></td>
</tr>
<tr>
<td>TOTAL SCORE</td>
<td></td>
</tr>
</tbody>
</table>

- 0 = Relaxed
- 1 = Scared/Fearful
- 2 = Normal
- 3 = Calling Out/Moaning
- 4 = Whiny
- 5 = Tense/Rigid
- 6 = Hand Wringing
- 7 = Moving
- 8 = Resting
- 9 = Need Increasing
CPAT Indicators: examples

- Relaxed Facial Expression - looks calm; smiling; no particular expression; eye contact and interest in surroundings; looks of pleasure or contentment; looks at ease
- Scared/Fearful Facial Expression - looks worried or frightened; anxious expression; looks alarmed; troubled or concerned expression; looks nervous
- Normal Behavior - not calling out or moaning; no distressing vocalizations; speech is pleasant or neutral
- Calling Out/Moaning Behavior - mournful or murmuring sounds; phrases or words being used over and over in an anxious, uneasy or distressed tone; troubled calling out; groaning; chanting; grunting

Psychometric Testing

- **Inter-Rater Reliability**: Two raters observe a resident simultaneously and each will complete a CPAT.
- **Test-Retest Reliability**: The same rater administers the CPAT to the resident twice with a five minute interval between the tests.
- **Construct Validity**: Assess the resident before and after a known painful or uncomfortable event such as bathing, dressing, repositioning, transferring, or toileting.
- **Criterion Validity**: CPAT was completed and later compared to the DS-DAT.
  - **DS-DAT**: Discomfort Scale-Dementia of Alzheimer’s Type

Demographics N=145

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Long Island State Veterans Home</strong></td>
<td>60 (41%)</td>
</tr>
<tr>
<td><strong>Maria Regina Residence</strong></td>
<td>43 (30%)</td>
</tr>
<tr>
<td><strong>Gurwin Jewish</strong></td>
<td>42 (29%)</td>
</tr>
<tr>
<td><strong>Age (years) mean (range)</strong></td>
<td>84.3 (62-101)</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td>72 (50%)</td>
</tr>
<tr>
<td><strong>Global Deterioration Scale; mean (range)</strong></td>
<td>6.0 (5-7)</td>
</tr>
<tr>
<td><strong>MMSE; mean</strong></td>
<td>7.8 (19-0)</td>
</tr>
<tr>
<td><strong>Score 0-9</strong></td>
<td>75 (52%)</td>
</tr>
<tr>
<td><strong>Score 10-19</strong></td>
<td>70 (48%)</td>
</tr>
</tbody>
</table>
### Reliability Testing

<table>
<thead>
<tr>
<th>Item</th>
<th>Initial Training Results [95% CI]</th>
<th>Modified Training Results [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inter-rater reliability</td>
<td>ICC=0.57 [0.37, 0.71]</td>
<td>ICC=0.71 [0.56, 0.80]</td>
</tr>
<tr>
<td>Test-retest</td>
<td>ICC=0.50 [0.22, 0.64]</td>
<td>ICC=0.67 [0.53, 0.77]</td>
</tr>
<tr>
<td>Internal Consistency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IRR</td>
<td>$\alpha = 0.75 [0.64, 0.84]$</td>
<td>$\alpha = 0.77 [0.68, 0.84]$</td>
</tr>
<tr>
<td>TRR</td>
<td>$\alpha = 0.72 [0.61, 0.84]$</td>
<td>$\alpha = 0.84 [0.69, 0.78]$</td>
</tr>
<tr>
<td>Construct validity</td>
<td>$\alpha = 0.77 [0.67, 0.85]$</td>
<td></td>
</tr>
<tr>
<td>Criterion validity</td>
<td>$\alpha = 0.81 [0.73, 0.87]$</td>
<td></td>
</tr>
<tr>
<td>Composite score</td>
<td>$\alpha = 0.77 [0.69, 0.83]$</td>
<td></td>
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</tbody>
</table>

### Validity Testing

<table>
<thead>
<tr>
<th>Item</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct validity (pre/post uncomfortable activity)</td>
<td>P= .043 mean of difference=0.33 [95%CI 0.01,0.65]</td>
</tr>
<tr>
<td>Criterion validity (CPAT and DS-DAT scale)</td>
<td>Spearman’s rank correlation coefficient=0.25, p=.048</td>
</tr>
</tbody>
</table>

### Practicality of Instrument Survey

(1=totally agree, 10=totally disagree)

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>This pain scale was easy to use</td>
<td>1.61</td>
</tr>
<tr>
<td>This pain scale was not time consuming</td>
<td>1.44</td>
</tr>
<tr>
<td>This pain scale is appropriate to use in cognitively impaired residents</td>
<td>2.33</td>
</tr>
<tr>
<td>This pain scale is able to differentiate the level of pain residents are in</td>
<td>3.75</td>
</tr>
<tr>
<td>This pain scale will help me in my decision making regarding treatment of pain for cognitively impaired residents</td>
<td>2.44</td>
</tr>
</tbody>
</table>
Discussion

- CPAT is a reliable and valid instrument to assess pain in nursing home residents with dementia
- CPAT is an easy to use and clinically practical pain assessment tool

Future Directions

- Incorporate CPAT into American Medical Directors Association Guidelines for pain assessment and treatment and evaluate process
- Examine CPAT's ability to measure response to treatment