Validation of a Modified Fresno Test to Evaluate EBP Education in Acute Care Nursing

MARGO A. HALM, PHD, RN, NEA-BC
DIRECTOR, NURSING RESEARCH, PROFESSIONAL PRACTICE & MAGNET

Funding: American Nurse's Foundation 2014-2016

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IOM's 2020 Goal:
90% of clinical decisions will be supported by accurate, timely & up-to-date clinical information that reflects the best available evidence.

Background

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Evaluation of EBP Education

Many studies have evaluated educational programs in building EBP domains in nurses.

Measurement not robust (mostly self report)

Evaluating Effectiveness of EBP Education

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Specific Aims

1. To evaluate the validity of a Fresno Test modified for acute care nursing
2. To examine if the modified Fresno discriminates EBP knowledge/skills across educational cohorts of acute care nurses
3. To test the psychometric properties of the Modified Fresno Test-Acute Care Nursing

Methods

PHASE I - Validation of 3.4 item exam
Case scenarios modified to acute care nursing

PHASE II - Content Validity Panel
Revised Fresno - 3.4 item exam modified
Content Validity Ratio (items & scale)

PHASE III - Cross Sectional Study

PHASE IV - Test Scoring

PHASE V - Psychometric Analysis
Cronbach's alpha Total score reliability
Individual Item reliability (inter-rater & intra-rater correlation)
Item difficulty Construct validity

References

Balakas et al., 2013; Chang et al., 2013; Dixon et al., 2012; Edward & Mills, 2013; Gardner et al., 2012; Leung et al., 2014; Nesbitt, 2013; Sciarra, 2011; Toole et al., 2013; Wendler et al., 2013; White-Williams et al., 2013

References

Fritsche et al., 2002; Lai & Teng, 2011; Miller et al., 2013; Ramos et al., 2003; Shaneyfelt et al., 2006; Spek et al., 2012; Tilson, 2010
Exam Modification

- Cases modified to acute care scenarios

Scenario 1: You are caring for Bill, a 79-year-old man three days postoperative from major abdominal surgery. The physician has ordered opioid cough syrup. Since he has a central line you wonder if you should sole the solution or administer the medicine. You ask your colleagues if both methods are accurate and obtained mixed recommendations on how to proceed with drawing the cultures.

Scenario 2: Eve is a 79-year-old woman with lung cancer metastasized to her spine. She is undergoing radiation for palliation and is also on an opioid regime to control severe pain. Since she has significant breakthrough pain you are considering suggesting non-pharmacological therapies but are unsure which approach (music therapy, guided imagery with relaxation) might have the best adjunctive pain control.

Content Validation of Exam

Panel of 5 national EBP experts rated each item:
- Importance, clarity & comprehensiveness
- 3 items replaced (Round 1) & rated by panel (Round 2)

<table>
<thead>
<tr>
<th>Original EBP Content</th>
<th>New EBP Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Sensitivity, + predictive value, likelihood ratio calculations</td>
<td>• Evaluating tools for practice</td>
</tr>
<tr>
<td>#2 ARR, RRR &amp; NNT calculations</td>
<td>• Applying qualitative findings (meta-synthesis) to practice</td>
</tr>
<tr>
<td>#3 Best design to study prognosis</td>
<td>• Best design to study meaning</td>
</tr>
</tbody>
</table>

Content Validity Index (CVI)

Individual Item (I-CVI's) = 0.75–1.00

Scale CVI = 0.95

Acceptable standard >.90

Cross Sectional Study (N=90)

- COHORT 1 - Novices nurses recruited from 3 Magnet hospitals in diverse U.S. regions (n=30)
- COHORT 2 - Master prepared advanced practice nurses recruited from Magnet & CNS listservs (n=30)
- COHORT 3 - Doctorally prepared nurses recruited from Magnet listserv & a Midwestern university (n=30)

Modified Fresno Test Scores

<table>
<thead>
<tr>
<th>Item #</th>
<th>Topic</th>
<th>Possible Score</th>
<th>Novices (n=30)</th>
<th>Masters (n=30)</th>
<th>Experts (n=30)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PICO question</td>
<td>0-24</td>
<td>13.73 (7.37)</td>
<td>19.47 (5.71)</td>
<td>18.13 (4.55)</td>
<td>.001 (N-M-E)</td>
</tr>
<tr>
<td>2</td>
<td>Sources</td>
<td>0-24</td>
<td>15.03 (6.33)</td>
<td>20.23 (6.33)</td>
<td>17.53 (6.05)</td>
<td>.001 (N-M)</td>
</tr>
<tr>
<td>3</td>
<td>Treatment design</td>
<td>0-24</td>
<td>5.80 (6.77)</td>
<td>10.50 (5.90)</td>
<td>11.00 (5.87)</td>
<td>.001 (N-M-E)</td>
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<tr>
<td>4</td>
<td>Search</td>
<td>0-24</td>
<td>13.93 (5.06)</td>
<td>16.53 (4.69)</td>
<td>15.00 (4.90)</td>
<td>.78</td>
</tr>
<tr>
<td>5</td>
<td>Relevance</td>
<td>0-24</td>
<td>7.47 (6.31)</td>
<td>9.77 (6.83)</td>
<td>12.01 (6.72)</td>
<td>.63 (N-E)</td>
</tr>
<tr>
<td>6</td>
<td>Validity</td>
<td>0-24</td>
<td>7.30 (6.75)</td>
<td>10.67 (7.77)</td>
<td>10.23 (7.38)</td>
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<tr>
<td>7</td>
<td>Significance</td>
<td>0-24</td>
<td>3.40 (2.94)</td>
<td>9.92 (5.18)</td>
<td>7.70 (7.03)</td>
<td>.001 (N-M-N-E)</td>
</tr>
<tr>
<td>8</td>
<td>Patient preference</td>
<td>0-16</td>
<td>6.13 (3.36)</td>
<td>9.20 (5.59)</td>
<td>9.00 (4.95)</td>
<td>.08</td>
</tr>
</tbody>
</table>

Modified Fresno Test Scores

<table>
<thead>
<tr>
<th>Item</th>
<th>Topic</th>
<th>Possible Score</th>
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<th>Masters (n=30)</th>
<th>Experts (n=30)</th>
<th>p-value*</th>
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<tbody>
<tr>
<td>9</td>
<td>Clinical expertise</td>
<td>0-8</td>
<td>4.89 (3.04)</td>
<td>5.60 (2.49)</td>
<td>6.40 (2.49)</td>
<td>.08 (N-M-E)</td>
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<tr>
<td>10</td>
<td>Tools</td>
<td>0-12</td>
<td>5.90 (3.18)</td>
<td>8.50 (3.35)</td>
<td>7.00 (4.12)</td>
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<tr>
<td>11</td>
<td>Qualitative</td>
<td>0-16</td>
<td>12.13 (3.45)</td>
<td>10.93 (5.35)</td>
<td>12.53 (6.19)</td>
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<tr>
<td>12</td>
<td>Confidence intervals</td>
<td>0-4</td>
<td>0.13 (0.73)</td>
<td>0.40 (1.22)</td>
<td>1.07 (1.80)</td>
<td>.02 (N-E)</td>
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<tr>
<td>13</td>
<td>Design diagnosis</td>
<td>0-4</td>
<td>0.27 (1.01)</td>
<td>0.27 (1.01)</td>
<td>0.27 (1.01)</td>
<td>1.00</td>
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<tr>
<td>14</td>
<td>Design meaning</td>
<td>0-4</td>
<td>2.13 (2.03)</td>
<td>3.73 (1.01)</td>
<td>3.87 (0.73)</td>
<td>.001 (N-M-N-E)</td>
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<tr>
<td>Total Scores</td>
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<td>96.17 (26.14)</td>
<td>134.87 (30.76)</td>
<td>132.77 (28.94)</td>
<td>.001 (N-M-N-E)</td>
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</tr>
</tbody>
</table>

*Key for significant cohort differences: N-Novice; M-Master; E-Expert
Psychometric Evaluation

<table>
<thead>
<tr>
<th>Item</th>
<th>Topic</th>
<th>ICC (&gt;0.6)</th>
<th>IDI (&gt;0.2)</th>
<th>CITC (&gt;0.3)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>PICO question</td>
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<td>0.43</td>
<td>0.53</td>
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<tr>
<td>2</td>
<td>Sources</td>
<td>0.78</td>
<td>0.35</td>
<td>0.53</td>
</tr>
<tr>
<td>3</td>
<td>Treatment design</td>
<td>0.86</td>
<td>0.61</td>
<td>0.56</td>
</tr>
<tr>
<td>4</td>
<td>Search</td>
<td>0.72</td>
<td>0.26</td>
<td>0.48</td>
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<tr>
<td>5</td>
<td>Relevance</td>
<td>0.48</td>
<td>0.65</td>
<td>0.63</td>
</tr>
<tr>
<td>6</td>
<td>Validity</td>
<td>0.47</td>
<td>0.43</td>
<td>0.50</td>
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<tr>
<td>7</td>
<td>Significance</td>
<td>0.74</td>
<td>0.52</td>
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<td>8</td>
<td>Patient preference</td>
<td>0.55</td>
<td>0.52</td>
<td>0.39</td>
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<tr>
<td>9</td>
<td>Clinical expertise</td>
<td>0.23</td>
<td>0.22</td>
<td>0.40</td>
</tr>
<tr>
<td>10</td>
<td>Tools</td>
<td>0.76</td>
<td>0.74</td>
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<td>Qualitative</td>
<td>0.68</td>
<td>0.17</td>
<td>0.31</td>
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<tr>
<td>12</td>
<td>Confidence intervals</td>
<td>0.90</td>
<td>0.04</td>
<td>0.12</td>
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<tr>
<td>13</td>
<td>Design diagnosis</td>
<td>0.61</td>
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<td>14</td>
<td>Design meaning</td>
<td>0.89</td>
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<td><strong>Total Score Reliability</strong></td>
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<td><strong>N/A</strong></td>
<td><strong>N/A</strong></td>
<td></td>
</tr>
</tbody>
</table>

Limitations

Sample
- Lack of demographic data (e.g., time since graduation, years of EBP experience or self-assessment of EBP expertise)
- Small sample (but similar to other Fresno validations)

Scoring
- Raters not blinded to cohorts
- Raters need EBP experience & training for reliable use of complex rubric
- Manual grading increases rater burden (10-15 minutes/exam), especially with large volumes of nurses or students

Recommendations

- Six items need revision via a panel of experts & re-testing
  - #5 - Assessing Relevance
  - #6 - Assessing Validity
  - #11 - Applying Qualitative Findings
  - #12 - Evaluating Confidence Intervals
  - #13 - Design for Diagnosis

- Once validated, acute care nurses can use exam:
  - As a self-study and assessment guide
  - To evaluate EBP education in practice, academic & research settings

Conclusion

The Modified Fresno Test-Acute Care Nursing is a 14-item test to objectively assess EBP knowledge and skills of acute care nurses.

While preliminary psychometric properties for this new EBP knowledge measure are promising, further validation of 6 items and the scoring rubric is needed.
References


Contact Information

Margo A. Halm
Salem Health
c/o Nursing Administration
890 Oak St. SE
Salem, OR 97301
Margo.halm@salemhealth.org
503-814-2835