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

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Background

EBP is a key solution to ensure the care we deliver has the ***highest clinical effectiveness*** known to science

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

Evaluating Effectiveness of EBP Education

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

Measurement not robust (mostly self report)

REFERENCES:
Balakas et al., 2013; Chang et al., 2013; Dizon 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., 2011; White-Williams et al., 2013

Measuring EBP Knowledge/Skill

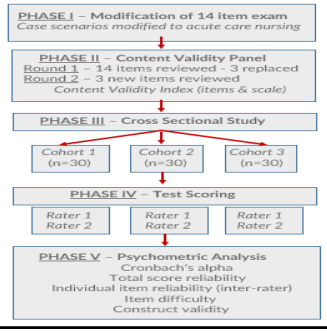
- Objective, case-based tests with multiple-choice or short answer items have been recommended
- ***The Fresno Test*** (with a standardized scoring rubric) has been validated with:
  - *Family physicians*
  - *Physical therapists*
  - *Occupational therapists*
  - *Speech therapists*

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

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



Exam Modification

- Cases modified to acute care scenarios

Scenario 1: You are caring for Bill, a 76 year old man three days postoperative from major abdominal surgery. He developed a fever and shows other signs of potential sepsis. His physician has ordered blood cultures X2. Since he has a central line you wonder if you should draw centrally as opposed to a peripheral venipuncture. 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 70 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-pharmacologic therapies but are unsure which approach (music therapy, or 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*)

	Original EBP Content	New EBP Content
#1	Sensitivity, + predictive value, likelihood ratio calculations	• Evaluating tools for practice
#2	ARR, RRR & NNT calculations	• Applying qualitative findings (meta-synthesis) to practice
#3	Best design to study prognosis	• Best design to study meaning

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

Item #	Topic	Possible Score	Novices (*n*=30)	Masters (*n*=30)	Experts (*n*=30)	p-value*
			Mean (SD)	*Mean (SD)*	*Mean (SD)*	
1	**PICO question**	0-24	**13.73 (7.37)**	**19.47 (3.71)**	**18.13 (4.55)**	***.001*** (N-M, N-E)
2	**Sources**	0-24	**15.03 (6.53)**	**20.33 (5.09)**	**17.53 (6.05)**	***.004*** (N-M)
3	**Treatment design**	0-24	**5.80 (6.77)**	**10.50 (6.90)**	**11.90 (5.87)**	***.001*** (N-M, N-E)
4	Search	0-24	13.93 (5.06)	16.53 (4.69)	15.10 (4.69)	*.18*
5	**Relevance**	0-24	**7.47 (6.31)**	**9.77 (6.83)**	**12.03** (6.72)	***.03*** (N-E)
6	Validity	0-24	**7.30 (6.75)**	**10.67 (7.77)**	**10.23 (7.38)**	*.16*
7	**Significance**	0-24	**3.40 (3.94)**	**9.97 (8.18)**	**7.70 (7.03)**	***.001*** (N-M, N-E)
8	Patient preference	0-16	6.13 (4.36)	8.20 (5.59)	9.00 (4.95)	*.08*

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

Modified Fresno Test Scores

Item #	Topic	Possible Score	Novices (*n*=30)	Masters (*n*=30)	Experts (*n*=30)	p-value*
			Mean (SD)	*Mean (SD)*	*Mean (SD)*	
9	Clinical expertise	0-8	4.80 (3.04)	5.60 (2.49)	6.40 (2.49)	*.08*
10	**Tools**	0-12	**3.90 (4.18)**	**8.50 (3.35)**	**7.00 (4.12)**	***.001*** (N-M, N-E)
11	Qualitative	0-16	12.13 (4.75)	10.93 (5.35)	12.53 (6.19)	*.50*
12	**Confidence intervals**	0-4	**0.13 (0.73)**	**0.40 (1.22)**	**1.07 (1.80)**	***.02*** (N-E)
13	Design diagnosis	0-4	0.27 (1.01)	0.27 (1.01)	0.27 (1.01)	*1.00*
14	**Design meaning**	0-4	**2.13 (2.03)**	**3.73 (1.01)**	**3.87 (0.73)**	***.001*** (N-M, N-E)
Total Scores		0-232	**96.17 (26.14)**	**134.87 (30.76)**	**132.77 (28.94)**	***.001*** (N-M, N-E)

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

Psychometric Evaluation

Intraclass Correlation Coefficients (ICC)	Item Discrimination Index (IDI)	Corrected Item-Total Correlation Coefficients (CITC)
Relationship between one rater's scores and another's (inter-rater reliability)	Ability of item to discriminate between high and low total scores	Correlation between individual item & total exam scores
>0.60	**>0.20**	**>0.30**

Item #	Topic	ICC (>0.6)	IDI (>0.2)	CITC (>0.3)
1	PICO question	0.78	0.43	0.53
2	Sources	0.78	0.35	0.53
3	Treatment design	0.86	0.61	0.56
4	Search	0.72	0.26	0.48
5	**Relevance**	**0.48**	0.65	0.63
6	**Validity**	**0.47**	0.43	0.50
7	Significance	0.74	0.52	0.57
8	Patient preference	0.55	0.52	0.39
9	**Clinical expertise**	**0.23**	0.22	0.40
10	Tools	0.76	0.74	0.68
11	**Qualitative**	0.68	**0.17**	0.31
12	**Confidence intervals**	0.90	**0.04**	**0.12**
13	**Design diagnosis**	0.61	**0.13**	**0.12**
14	Design meaning	0.89	0.35	0.37
TOTAL SCORE RELIABILITY		**0.88**	N/A	N/A

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

MODIFIED FRESNO TEST – ACUTE CARE NURSING (14-item), with Scoring Rubric

QUESTION #1: Choose one of the above clinical scenarios.
Write a focused PICO clinical question for that scenario that will help you organize a search of the clinical literature.

Point Scale (24 possible)	Population	Intervention	Comparison	Outcome
Excellent (6 points per component)	Multiple relevant descriptors; 1. 'male', abdominal surgery', fever', 'sepsis', 'patient with central line' 2. 'female', 'lung cancer', 'metastasis', 'severe pain'	Includes specific intervention of interest; (intervention could be a diagnostic technique); 1. 'blood cultures'; 'central line blood draw' 2. 'non-pharmacologic interventions'; 'music therapy'; 'guided imagery with relaxation'	Identifies specific alternative of interest; 1. 'peripheral venipuncture' 2. 'non-pharmacologic interventions'; 'music therapy'; 'guided imagery with relaxation'	Objective & meaningful outcome to patient or patient case (if question is diagnostic, should relate to diagnosis trying to detect) 1. 'accuracy of blood culture tests' 2. 'pain reduction'
Strong (4 points per component)	1 appropriate descriptor as above; Examples: 1. 'male', 'surgical patient, or 'fever', 'adult', 'geriatric' 2. 'cancer, 'female', 'pain', 'adult', 'geriatric'	Incomplete descriptor; 1. 'culture; 'central line' 2. 'music', 'imagery'	Incomplete descriptor; 1. 'peripheral', 'venipuncture' 2. 'music', 'imagery'	Non-specific outcome 1. 'test result'; 'blood culture report' 2. 'discomfort'
Limited (2 points per component)	A single general descriptor unlikely to contribute to search; 1.& 2. 'patient'	Mentions intervention but unlikely to contribute to search; 1.&2. 'methods', 'options', 'treatments'	Mentions comparison but unlikely to contribute to search 1.&2. 'alternate methods', 'usual care', 'current practice'	Outcome so general, unlikely to contribute to search 1.&2. 'effects'; 'change the outcome'; 'effective'; ' improvement', 'success'
Not evident (0 points per component)	None of the above present	None of the above present	None of the above present	None of the above present

Recommendations

- Six items need revision via a panel of experts & re-testing
  - ***#5 - Assessing Relevance***
  - ***#6 - Assessing Validity***
  - ***#9 - Use of Clinical Expertise***
  - ***#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

- Dizon J, Somers K, Kumar S. (2012). Current evidence on evidence-based practice training in allied health: A systematic review of the literature. International J Evidence Based Healthcare, 10:347-360.
- Halm M. (2014). Science driven care: Can education alone get us there by 2020? AJCC. 23(4):339-343.
- Halm M. (In press). Evaluating the impact of EBP education: Development of a modified Fresno test for acute care nursing. WorldViews on Evidence-Based Nursing.
- Institute of Medicine (US) Roundtable on Evidence-Based Medicine: The Learning Healthcare System: Workshop Summary (2007). Olsen L, Aisner D, McGinnis J (Eds.). Washington (DC): National Academies Press (US). Available from: www.ncbi.nlm.nih.gov/books/NBK53483.
- Jonsson A, & Svingby G. (2007). The use of scoring rubrics: Reliability, validity and educational consequences. Educational Research Review, 2:130–144.
- Melnyk B, Gallagher-Ford L, Long E, Long L, Fineout-Overholt E. (2014). The establishment of evidence-based practice competencies for practicing registered nurses and advanced practice nurses in real-world clinical settings: Proficiencies to improve healthcare quality, reliability, patient outcomes, and cost. WorldViews Evidence-Based Nursing, 11(1):5-15.
- Ramos K, Schafer S, & Tracz C. (2003). Validation of the Fresno test of competence in evidence based medicine. British Medical Journal, 326:319–21.
- Shaneyfelt T, Baum K, Bell D, Feldstein D, Houston T, Kaatz S. … Green M. (2006). Instruments for evaluating education in evidence-based practice. JAMA, 296:1116-1127.
- Tilson J. (2010). Validation of the modified Fresno test: Assessing physical therapists' evidence based practice knowledge and skills. BMC Medical Education, 10:1-9.

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