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Research-Competencies Assessment Instrument for Nurses (R-CAIN): A preliminary psychometric analysis

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Background & Purpose

- Translating health-related research findings into practice and policy can improve quality and efficiency of care; patient, provider, system outcomes.
- RNs as knowledge workers and professionals should be equipped with certain research competencies in using research findings to make clinical decisions.
- The Health Services Researcher Pathway (HSRP) study in BC, Canada, was commissioned by the Michael Smith Foundation for Health Research (MSFHR; http://www.msfhr.org) to develop a comprehensive professional development self-assessed tool for RNs' research competencies (i.e., knowledge, skills, attitudes) at different career stages. The initial tool guides RNs' progress through five levels (i.e., the first three articulated as research *users* and the latter two as research *producers*) of research competencies to demonstrate enactment of them and self-study resources for professional development (http://www.msfhr.org/health-services-researcher-pathway-0).
- Based on this initial work, we developed the "Research-Competencies Assessment Instrument for Nurses (R-CAIN)".
- **Purpose**: To evaluate the newly developed R-CAIN & report the preliminary findings of psychometric properties.

Methods

- Literature review (doi: http://dx.doi.org/10.4172/hccr.1000114), focus groups, interviews with RNs → self-administered R-CAIN.
- Competencies defined as **K**nowledge, **S**kills, **A**ttitudes.
- R-CAIN instrument measures RNs' perceptions on **R**esearch **P**rocess (15 questions), **K**nowledge **S**ynthesis (14 questions) and **K**nowledge **T**ranslation (19 questions) activities; 48 questions.
- Response options: "*choose up to three appropriate verbs that describe your level of knowledge, skills and attitudes*".
- Each verb (using Broom' s taxonomy) has assigned a level of competence from Level 1 to Level 5.
- Target population: RNs employed in healthcare facilities in BC.
- Using the *InspireNet (*http://www.inspirenet.ca) virtual network (BC's Health Services Research; > 4,000 members) and online survey (fluidsurveys.com), we collected the data (Mar-Jul 2015).

Sample of the survey

Stem (alphabetically)		Items
I can… (knowledge)	□ construct (L5) □ describe (L1) □ explain (L3) □ evaluate/assess (L4) □ understand (L2)	…evidence-based practice (EBP). …quantitative research design/methodology (e.g., correlational, experimental). …basic research activities in quantitative research (e.g., form a research question and hypothesis). …at least one method for doing knowledge synthesis (e.g., integrative literature review, scoping review, systematic review). …appraisal activities for evaluating the quality of the literature. …research-based evidence to address a clinical problem. …use of evidence to improve practice.
I am able to… (skills)	□ apply/use (L2) □ consult with (L4) □ conduct/manage (L5) □ engage/participate (L1) □ facilitate (L3)	
I… (attitudes)	□ am interested in (L1) □ committed to (L5) □ intend to embrace (L4) □ promote/support (L3) □ value (L2)	

Results – Demographics

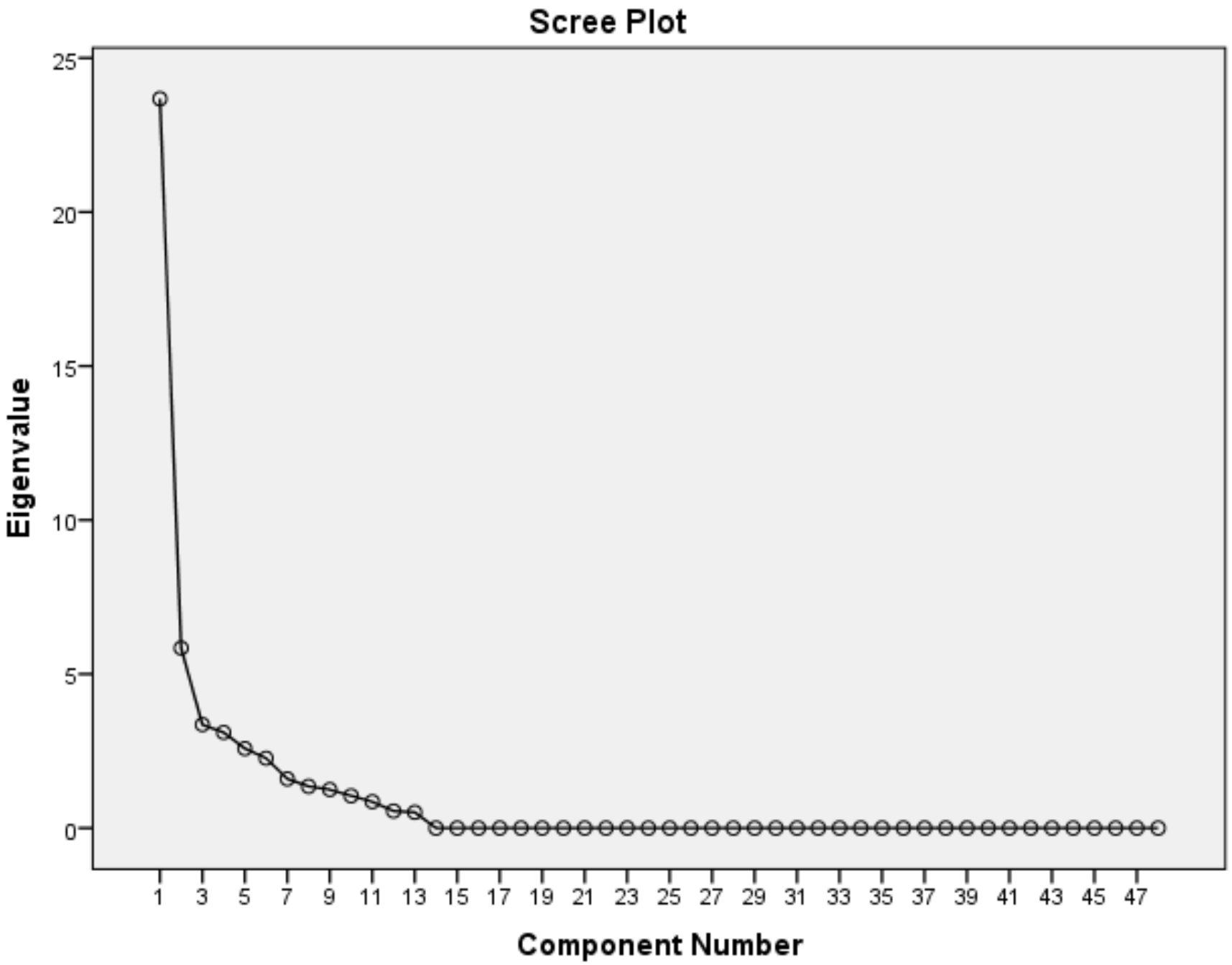
- 88 respondents, **63** completed surveys.
- 96% female
- 31% staff nurse, 66% other (e.g., educators, quality management, graduate students)
- 40% BSN, 12% MN, 8% Diploma in nursing
- 48% regularly & 49% irregularly attend seminars, lectures, workshops
- 52% reported annual personal income > $90,000

Results – Reliability & EFA

- Consistency
  - Overall Cronbach's coefficient alpha: **.975** (48 questions)
  - Inter-item correlations: next slide
- Communalities: >.904 (all are high indicating the extracted components represent variables well)
- EFA (Extraction Method: Principal Component Analysis) Rotation Method: Varimax with Kaiser Normalization; Rotation converged in 28 iterations.
- Three factors
  - Comprehension of research process
  - Application of research findings
  - Planning for conducting research

Mean (SD), Alpha, Pearson correlations

Variable	Mean (SD)	Alpha	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3
1.1. RP-Knowledge	2.84 (0.67)	**.813**	1.00								
1.2. RP-Skills	2.59 (0.78)	**.871**		1.00							
1.3. RP-Attitudes	2.59 (0.55)	**.892**	**.548**		1.00						
2.1. KS-Knowledge	2.88 (0.74)	**.932**	**.746**			1.00					
2.2. KS-Skills	2.60 (1.15)	**.961**	**.658**	**.786**		**.685**	1.00				
2.3. KS-Attitudes	2.52 (0.58)	**.939**	**.473**		**.773**	**.655**	**.472**	1.00			
3.1. KT-Knowledge	2.92 (0.82)	**.918**	**.621**			**.812**	**.542**	**.639**	1.00		
3.2. KT-Skills	2.62 (0.95)	**.946**	**.517**	**.760**			**.818**		**.474**	1.00	
3.3. KT-Attitudes	2.76 (0.57)	**.900**	**.541**	**.483**	**.833**	**.489**	**.509**	**.723**	**.589**	**.521**	1.00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Component Number

EFA Analysis - Items	Component				% Explained Variance (Cumulative)	
	1	2	3			
Theoretical frameworks that guide research	.605			Q13		
At least one type of knowledge synthesis	.660			Q15		
Knowledge translation (KT) activities	.844			Q20		
Research reports relevant to practice area	.803			Q27	49.33 (49.33)	
Appraisal activities of the literature	.737			Q33		
Activities for literature analysis	.733			Q34		
Use of diverse sources to inform practice	.833			Q51		
Rigorous methods in knowledge synthesis	.665			Q53		
Org. protocols for routine practices		.661		Q25		
Evidence-based practice guidelines		.897		Q26		
Activities related to quality improvement		.957		Q28	12.17 (61.50)	
Research findings to address clinical problem		.846		Q38		
Use of research findings in practice for QI		.649		Q55		
Use of evidence to improve practice		.785		Q56		
Quantitative (QN) research design			.928	Q3		
Basic research activities in QN			.741	Q6		
Basic research activities in qualitative (QL)			.669	Q10	7.00 (**68.50**)	
Org. resources that support research			.653	Q22		

Limitations

- Specific target population (i.e., RNs in BC) – convenient sample
- Long survey questionnaire (i.e., about 60-70 min to complete)
- Unusual scale of measurement (Bloom's taxonomy)
- Small sample size (e.g., 63 participants)*
- CFA follows with a new sample.

*MacCallum, R.C, Widaman, K.F., Preacher, K.J., & Hong, S. (2001). Sample size in factor analysis: The role of model error. *Multivariate Behavioral Research, 36*(4), 611-637. MacCallum, R.C, Widaman, K.F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods, 4*(1), 84-99.

Conclusions

- RNs should be able to appraise the literature, choose the best available evidence and apply research findings for EBP & QoC.
- R-CAIN: a valuable tool for professional development and assessment of modifiable research competencies.
- Practicing RNs, educators, employers can use it to assist:
  - Nurses themselves in improving research knowledge and skills by continuing education;
  - Educators in developing curricula; so, nursing students and graduates accomplish research competencies; and
  - Healthcare organizations in achieving consistent and sustainable EBHC for quality health outcomes and efficient system performance.
- Further assessments of the R-CAIN psychometric properties are underway.

Thank you!

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