Nursing Informatics Competency Assessment for Nurse Leaders (NICA-NL)

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Speakers

- Mary Kennedy, MS, RN-BC
  - Consultant, Adjunct Faculty (NEU)
- Sarah Collins PhD, RN;
  - Senior Clinical and Nurse Informatician, Partners eCare, Partners HealthCare; Instructor in Medicine, Harvard Medical School and Brigham Health
- Andy Phillips PhD, RN
  - Assistant Professor; MGH Institute of Health Professions
- Po-Yin Yen PhD, RN;
  - Clinical Assistant Professor; The Ohio State University
- Stephanie Colman-Brochu MS, RN
  - Manager Clinical Informatics at Milford Regional Medical Center

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Mary K. Kennedy MS, RN-BC

THE BEGINNING

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Early EMR Adoption & Nurses

HIMSS EMRAM Model		
	Level 6	Level 7
Massachusetts	37	1
Rhode Island	7	0
New Hampshire	5	0
Conneticut	10	3

http://www.himssanalytics.org/stage7

State	BORN	20%	15%	10%
Massachusetts	148,429	29,686	22,264	14,843
Connecticut	76452	15,290	11,468	7,645
New Hampshire	24868	4,974	3,730	2,487
Rhode Island	20673	4,135	3,101	2,067
Total	***270,422***	54,084	40,563	27,042

https://www.ncsbn.org/national-nursing-database.htm (Retrieved July 22,2016)

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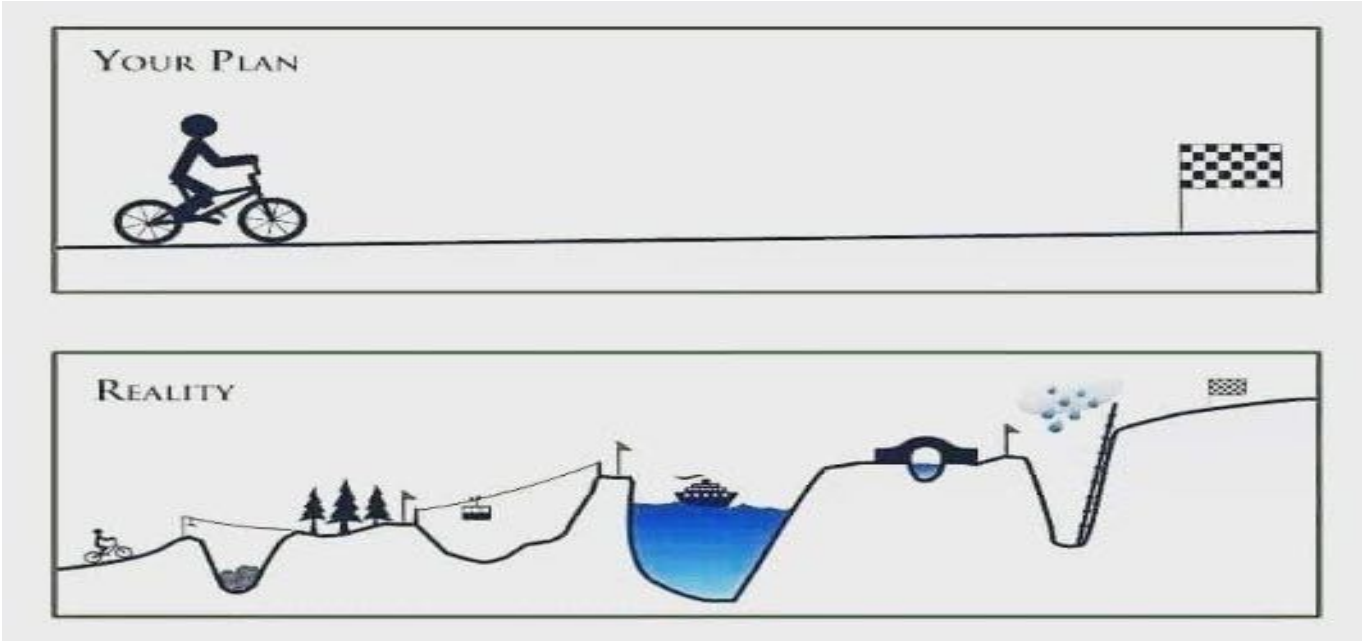
Resources for the Nurse Leader

- The Journey begins….



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Resources for the Nurse Leader

- Vision
  - ANCC Certification Nursing Informatics
  - Develop Nursing Informatics Competency for the Nurse Leader (NICA-NL)
    - Today's presentation
  - Develop Nursing Informatics Competency for the Registered Nurse (NICA-RN)
    - 2016 Parallel initiative: Mass. Action Coalition Nurse of the Future Nursing Core
      - Nurse of the Future Core Nursing Competencies – Updated 2016
      - Massachusetts Nurse of the Future Nursing Core Competencies© (NOFNCC), the Toolkit – Updated 2016

Conscious Decision not to focus on E.H.R. functional areas

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Resources for the Nurse Leader

- Organization for Nurse Leaders (MA, RI, NH, CT)
  - 2009
    - Established a Nursing Informatics and Technology as Management of Practice sub-committee
  - 2009- 2013
    - Felt like trying to “Boil the Ocean”
    - Focus on
      - Membership surveys,
      - Sharing best practices,
      - Educational Opportunities:
        - » guest speakers- national and local, partnerships with other professional organizations (i.e. HIMSS Nursing Informatics Institute)
    - Competencies
      - Recognized a need for an evaluation tool both Nurse Leaders and Registered Nurses (LPN-out of scope)
      - Reached out to local experts which thought it was a good idea

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Resources for the Nurse Leader

- Organization for Nurse Leaders (MA, RI, NH, CT)
  - 2013 – 2017
    - Understand needs, competency areas and develop a tool that can be delegated, or done independently and used broadly
    - 2013 NICA- NL (Nursing Informatics Competency Assessment –Nurse Leader) – Delphi Study
      - ONL Board and membership support
      - IRB approved; Unfunded
    - 2014- 2016 NICA- NL (Nursing Informatics Competency Assessment –Nurse Leader)- Psychometric Analysis
      - ONL Board and membership support
      - IRB approved; Unfunded
      - Snowball methodology to invite participants outside the New England area with the goal of developing a psychometric, valid and reliable tool
    - 2017 - Findings published in JONA

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Sarah Collins PhD,RN

THE DELPHI STUDY

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"Clinical informatics is not simply 'computers in medicine' but rather is a body of knowledge, methods, and theories that focus on the effective use of information and knowledge to improve the quality, safety, and cost-effectiveness of patient care as well as the health of both individuals and populations."

(Detmer DE, Shortliffe EH. Clinical Informatics. *JAMA* Published Online First: 13 May 2014.)

- **Background**
  - Informatics Competencies for Nursing and Healthcare Leaders (Westra and Delaney, 2008)
  - "State of Contemporary Informatics Competencies for Chief Nurse Executives" (Simpson, AONE 2013)
  - HIT competencies require frequent attention and updating
    - Rapid advances in technology
    - Ensure relevance to nursing leaders' work
- **Aim**
  - To efficiently and comprehensively seek ***Nurse Leaders'*** expert opinion of informatics competencies that are relevant & critical for a nurse leader to attain

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Methods

- Clarify the concepts to measure
- Generate an item pool
- Determine the format for measurement
- Have the item pool reviewed by experts
- Consider inclusion of the validated items
- Administer items to a development sample
- Evaluate the items
- Optimize scale length

Competency Identification

Factor Analysis

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Methods

- Data Collection
  - Survey based on Westra and Delaney competencies + Simpson competencies
  - Expert Delphi Survey – 3 rounds
    - Rounds 1 (June 2013 – July 2013)
      - Vote “yes, include”/”no, exclude”
      - Enter free text comments
    - Rounds 2 (Sep 2013 - Oct 2013)
      - Vote “yes, include”/”no, exclude”
      - Review comments from round 1
      - Enter free text comments
    - Rounds 3 (Dec 2013 - Jan 2014)
      - Rate on 4 point Likert scale
        - Not Relevant, Somewhat Relevant, Quite Relevant, Very Relevant (%)
      - Review comments from round 2
      - Enter free text comments
  - Changed competency wording based on comments from previous round

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Methods

- Data Analysis
  - Replicated methods from Westra & Delaney
  - Content Validity Index (CVI; Polit and Beck, 2006)
  - Criteria to retain a competency
    - CVI >.80 votes of Quite or Very Important
    - **CVI >.80 consistent with Westra and Delaney**
  - Kruskal-Wallis ANOVA for differences among groups
  - Qualitative analysis
    - if “borderline” vote, can use qualitative data to make judgment if item should be retained
    - Qualitative was not used to exclude items with CVI >.80

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Participant Demographics (1/2)

	Round 1	Round 2	Round 3
Number of Participants	34	26	41
Percent that tool previous round	NA	Completed 1st Round: 33.3%	Completed 1st Round: 46.3% Completed 2rd Round: 55%

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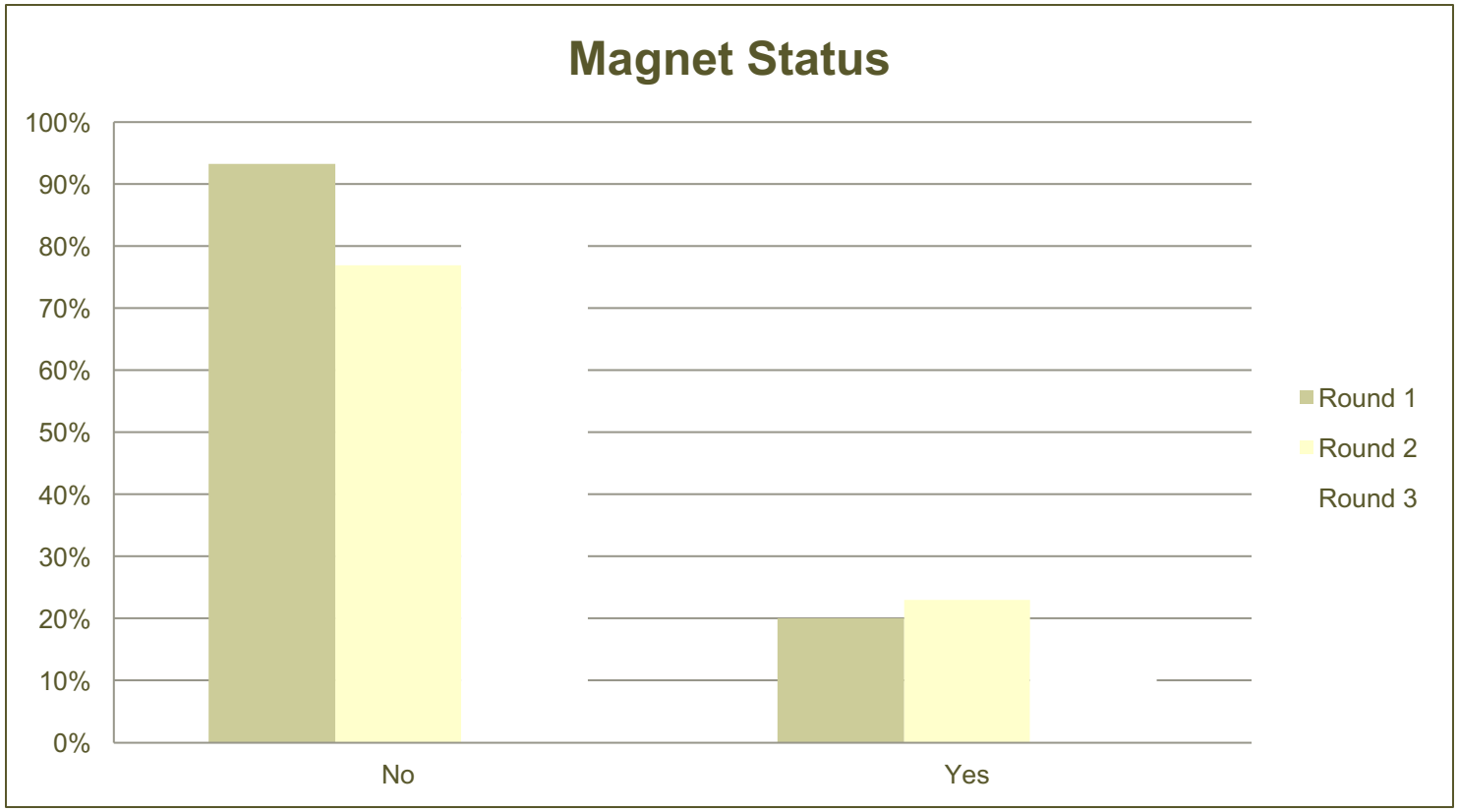

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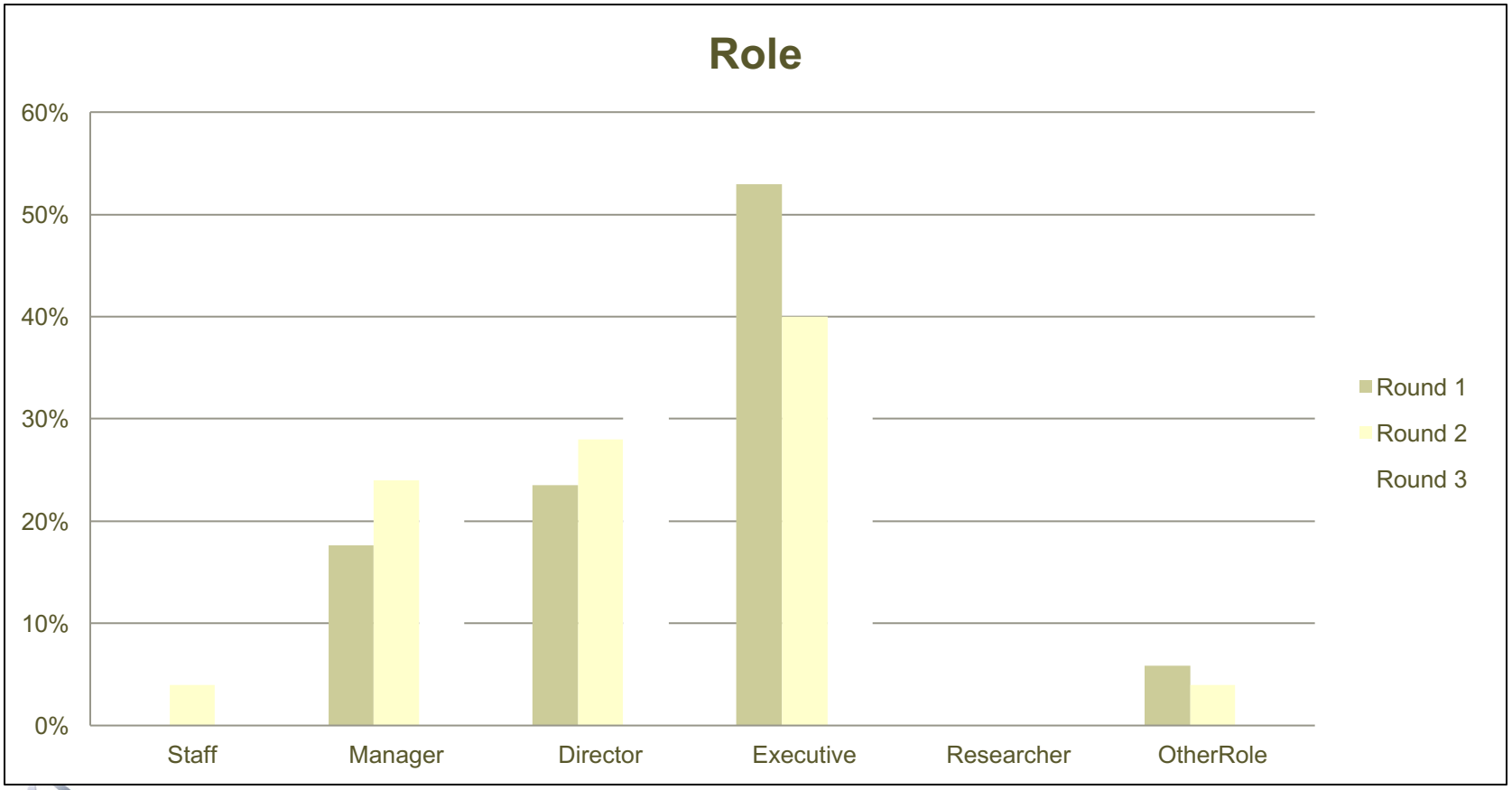

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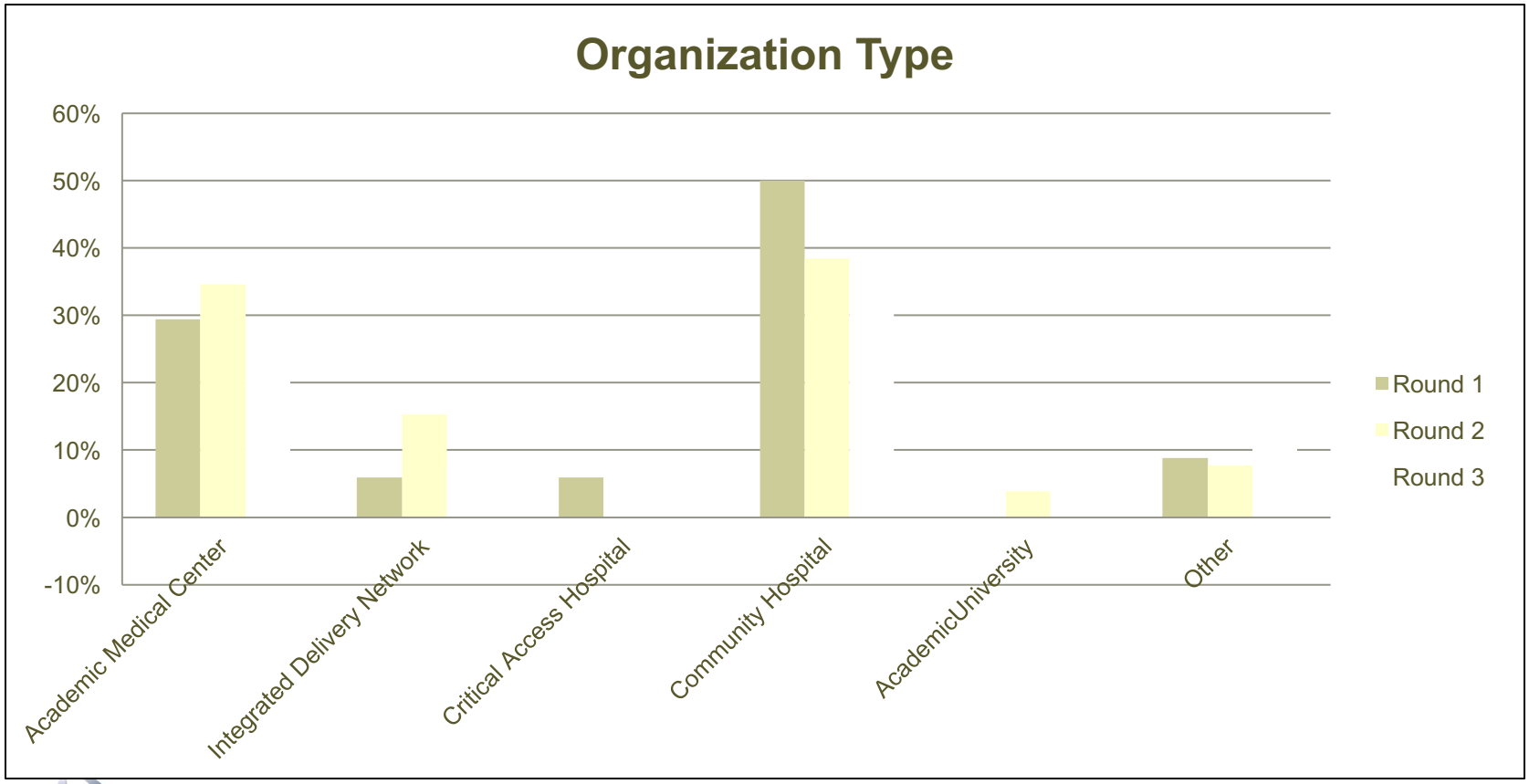

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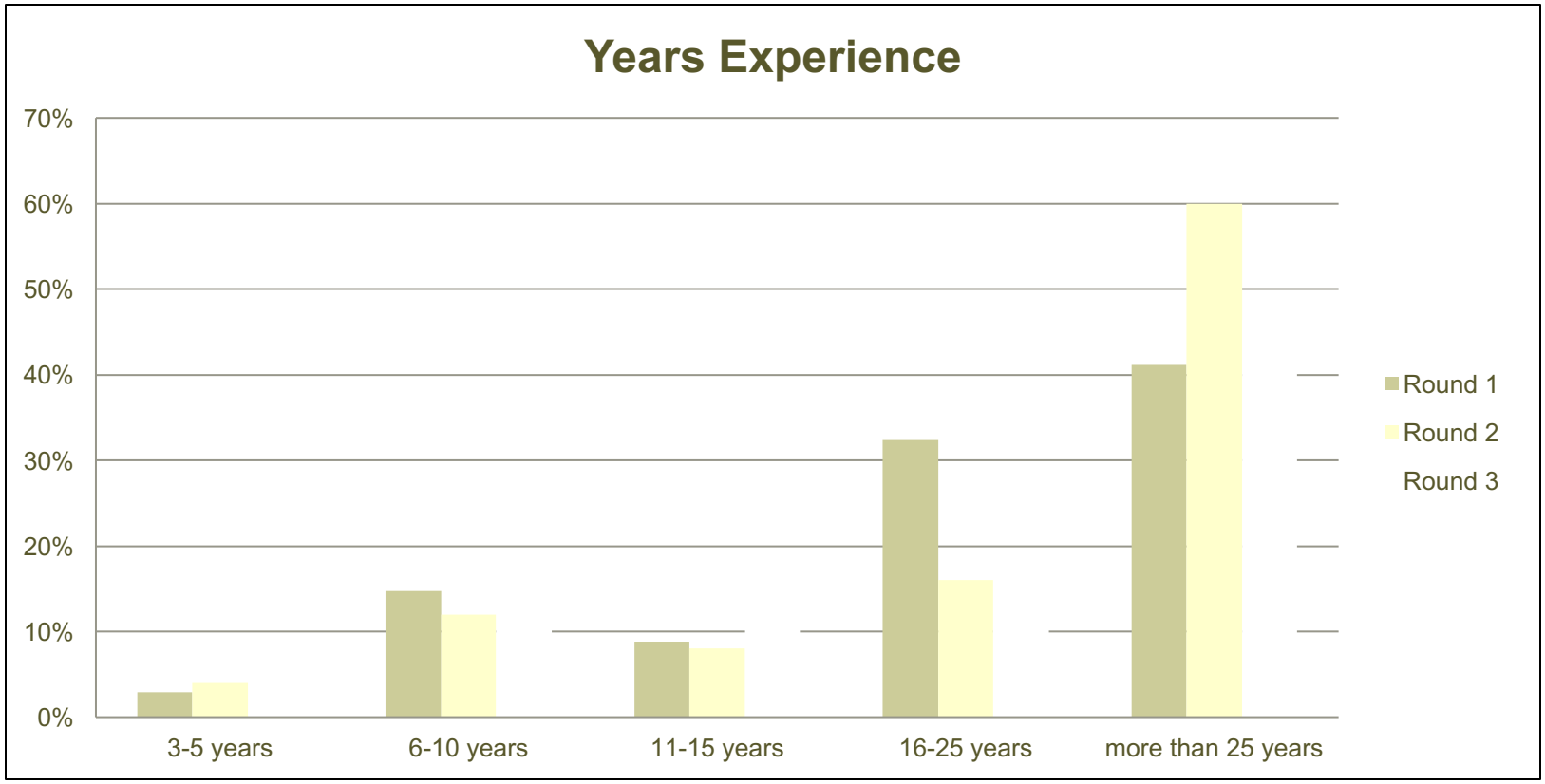

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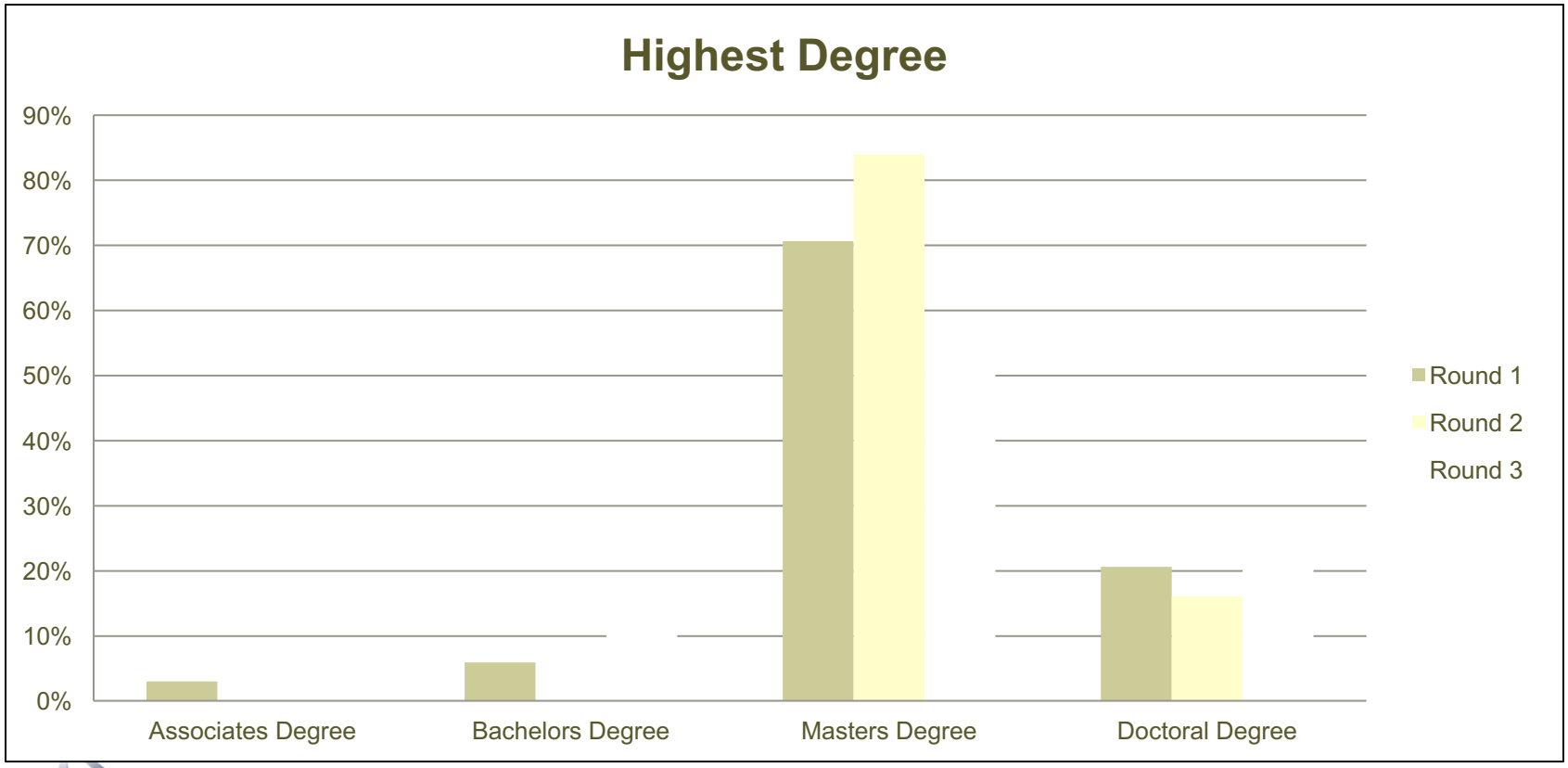

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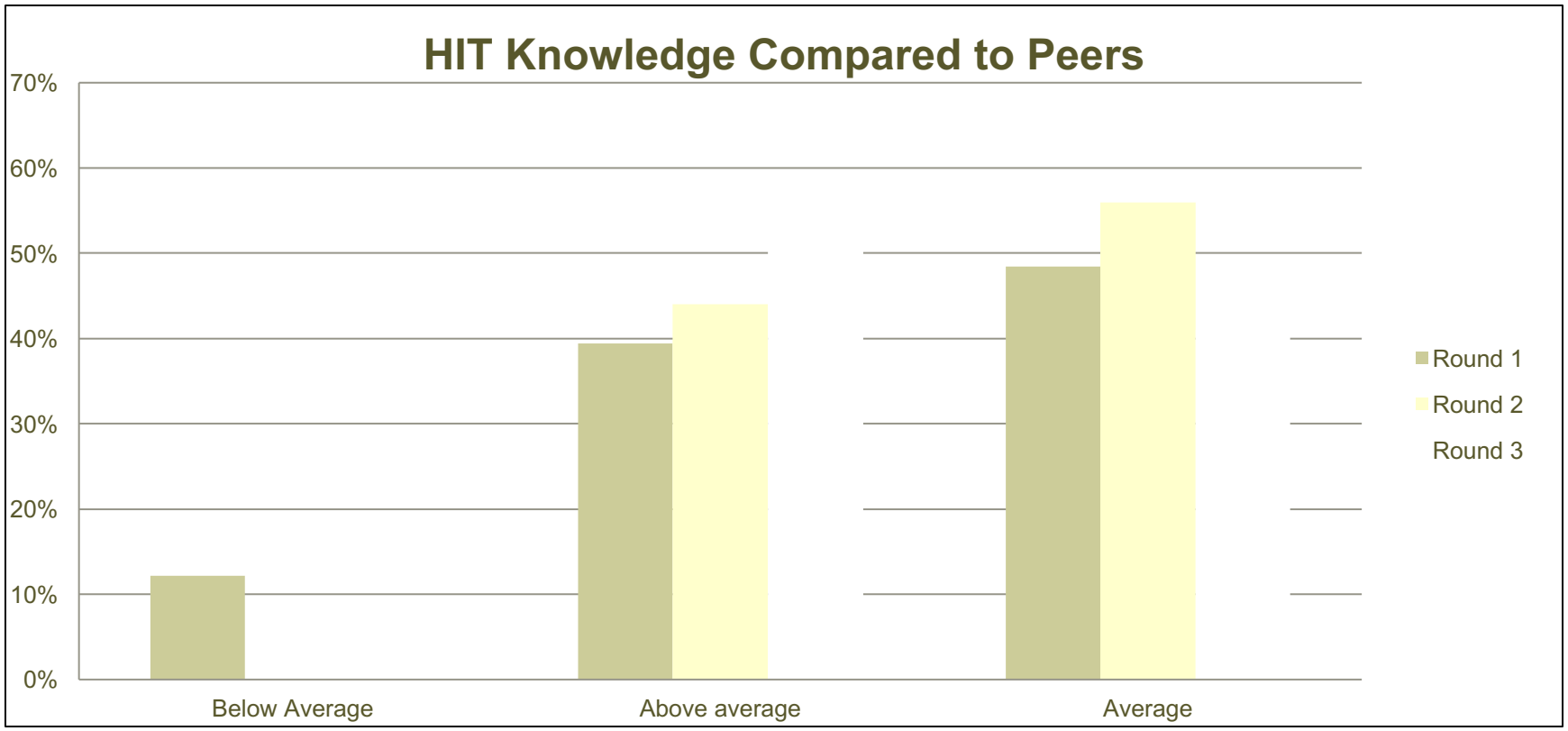

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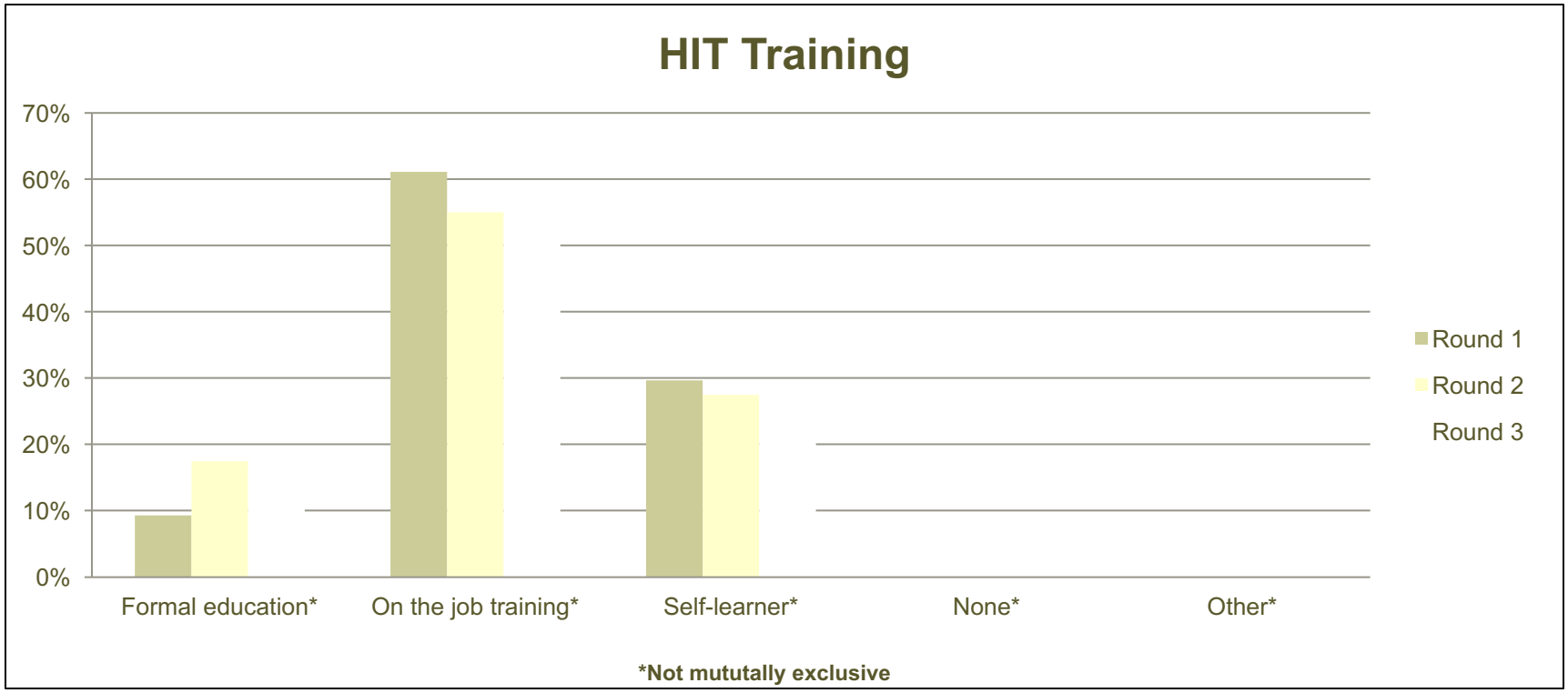

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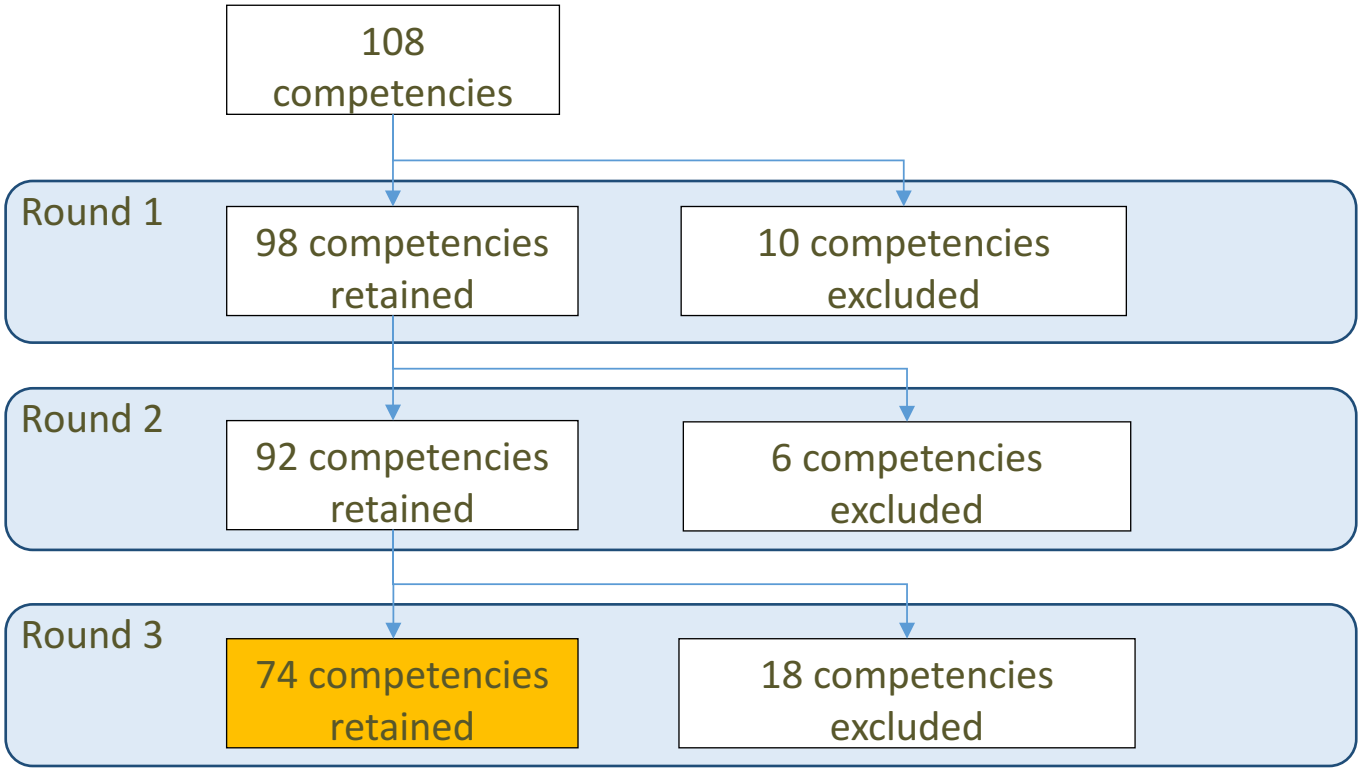
Delphi Rounds Results Overview



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Categories of Competencies Retained in Round 3 Results (CVI>.80)

Category	Competencies Retained
Management Concepts	9
Requirements and System Selection	9
Ethical/ Legal Concepts	8
Information Systems Concepts	7
Advances Software Applications	6
Executive Leadership	5
Financial	5
Implementation/ Management	5
Patient Related Applications	5
Data Issues	4
Technical knowledge	4
Collaboration	2
Electronic Communications	2
HIT Selection	2
Standardization	1
Total	74

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Top 15 Ranked Competencies To Retain	Not Relevant (%)	Somewhat Relevant (%)	Quite Relevant (%)	Very Relevant (%)	CVI
1 Ability to assure that Nursing values/ requirements are represented in HIT selection and evaluation	0	0	35	65	1
2 Inclusion of nursing information within HIT systems	0	0	22	78	1
3 Budgeting using technology	0	2	39	59	0.98
4 Data-based planning and decision making through the utilization and synthesis of HIT system data	0	3	54	44	0.98
5 Ability to collaborate with other departments regarding project management and resource allocation for HIT system implementations	0	3	47	50	0.97
6 Ability to collaborate with CMO peers related to HIT and needs of nurses and physicians	0	3	37	61	0.98
7 Ability to collaborate with interprofessional team in HIT system selection process	0	3	38	59	0.97
8 Ability to advocate for the development (or purchase) and use of integrated, cost-effective HIT systems within the organization	0	3	35	62	0.97
9 Communicating a system and nursing vision about the benefits of HIT	0	3	30	68	0.98
10 Ability to involve front-line staff in the evaluation of HIT systems related to their practice	0	3	32	65	0.97
11 Abilty to involve front-line staff in the development of HIT system requirements	0	3	24	73	0.97
12 Ability to involve front-line staff in appropriate aspects of HIT design, implementation, and testing related to their practice	0	3	24	73	0.97
13 Ability to see HIT as a top priority and strategic decision	0	3	31	67	0.98
14 Recognition of value of clinicians involvement in all appropriate phases of HIT	0	3	36	61	0.97
15 Quality assurance using technology		5	38	58	0.96

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Andy Phillips PhD, RN

NICA-NL (METHODS)

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Methods

- Clarify the concepts to measure
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Competency Identification

Factor Analysis

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Collection Methods for Inclusion and Validation of Competency Items

Multi-voting method*

Goal 1 - Consolidation of like items

- Eliminate potentially duplicative items
  - Eliminated items can be added back later
- Facilitated process with experts

Goal 2 – Item Voting

- Each expert participant allocated "votes" ~1/2 of total items
- Voting using survey tool
- Prioritization or Elimination based on voting results

Result – Reduced list with high level of agreement

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*Nelson, E. C., Batalden, P. B., & Godfrey, M. M. (2011). *Quality by design: a clinical microsystems approach*: John Wiley & Sons.

Collection Methods for Inclusion and Validation of Competency Items

Multi-voting method

Goal 1 - Consolidation and clarification

Repeat for all items

Potential Competency Item 1

- Is the meaning of the item clear?
- Edit language as needed

Potential Competency Item 2

- Is the meaning of the item clear?
  - Edit language as needed'
- Is the item the same as a prior item?
  1. Consolidate 2 items
     - Edit language as needed
  2. Keep Item

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Collection Methods for Inclusion and Validation of Competency Items

Multi-voting method

Goal 2 – Item Voting

Repeat

Start with consolidated list from Step 1 –(74 ->> 50 Items)

- Each expert participant allocated "votes" ~1/2 of total items
- Voting using survey tool
- Prioritization or Elimination based on voting results
- Evaluate prioritization
- Add back in items if necessary to reflect competency

50 ->> 45 Remaining Items across 12 categories

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Collection Methods for Inclusion and Validation of Competency Items

Administer Items to a Development Sample

1. Survey using 45 competency items *(reflects reduction from 74 original items)*
2. Sample of Nurse Leaders using snowball sampling methodology
3. IRB Approval

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Po-Yin Yen PhD, RN

PSYCHOMETRIC ANALYSIS

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Methods

- Clarify the concepts to measure
- Generate an item pool
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Competency Identification

Factor Analysis

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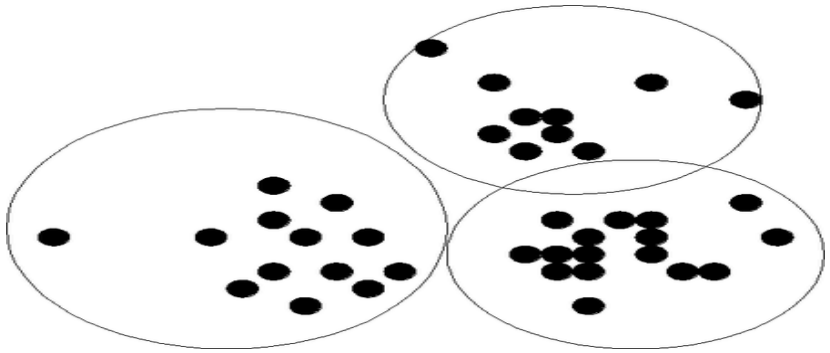
Nursing Informatics Competency Assessment for the Nurse Leader (NICA-NL): Instrument Refinement, Validation, and Psychometric Analysis

Po-Yin Yen, PhD, RN

Improving People's Lives Through Innovations in Personalized Health Care

The Ohio State University
Wexner Medical Center

Exploratory Factor Analysis



1. searches for common clusters;
2. distinguish between clusters;
3. identify and eliminate irrelevant or indistinct (overlapping) items.

Procedures

- Determine the number of factors (e.g. parallel analysis, Veciler's MAP, eigen-value-greater-than-one rule, model fit indices)
- Select extraction method (e.g. Principal Axis Factoring, Maximum Likelihood), and rotation types, (e.g. orthogonal- varimax vs. oblique rotations-promax)
- Item reductions based upon item loadings and Cronbach's alpha reliabilities
  - Cross-loading: a) .32 or higher on two or more factors; b) less than half the difference of factor loading with other factors
  - Cronbach's alpha reliabilities
- Repeat procedures until final solution is reached

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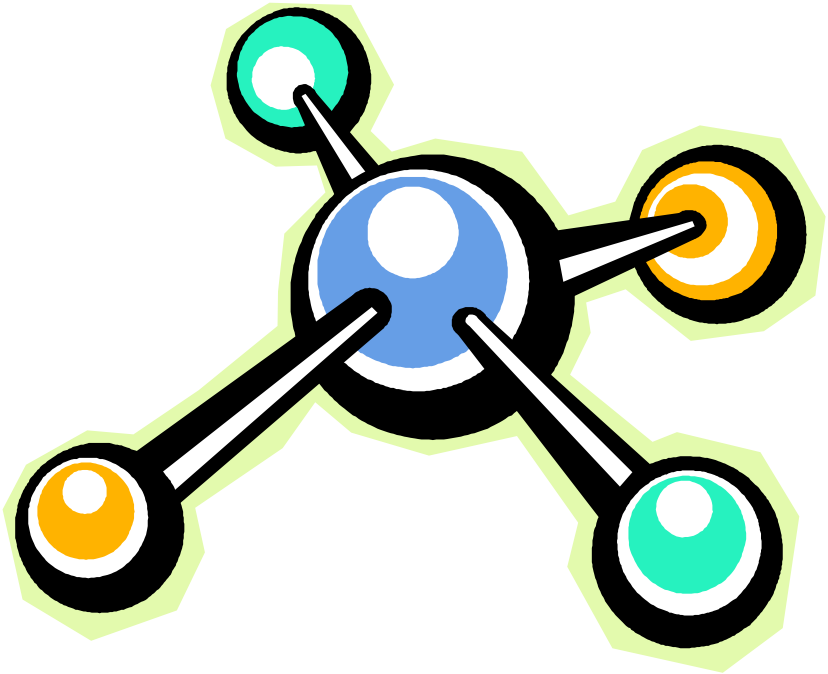

Results

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Responses

- 539 responses
- 357 valid responses with < 20% missing values

Total	N=357		
Age		Professional Position	
Range	21-76 y/o	Clinical Nurse	6 (1.7%)
Mean (SD)	51.85 (9.54)	Clinical Nurse Leader	22 (6.2%)
Gender		Clinical Nursing Specialist	19 (5.3%)
Male	30 (8.4%)	Nurse Manager	74 (20.7%)
Female	325 (91%)	Director	103 (28.9%)
Missing	2 (0.6%)	Chief Nursing Officer	38 (10.6%)
Ethnicity		Other	95 (26.6%)
White/Caucasian	304 (85.2%)	EHR functionalities	
Black/African American	12 (3.4%)	CPOE	294 (82.4%)
Hispanic/Latino(a)	13 (3.6%)	Clinical Decision Support	220 (61.6%)
Asian/Pacific Islander	17 (4.8%)	Laboratory	302 (84.6%)
Native American	2 (0.6%)	Radiology (PCAS)	292 (81.8%)
Prefer not to answer	2 (0.6%)	Pharmacy	301 (84.3%)
Other	1 (0.3%)	Health Information Exchange Capability	215 (60.2%)
Education		Physician Documentation	295 (82.6%)
BS/BA	151 (42.3%)	Nursing Documentation	311 (87.1%)
MS or MSN	213 (59.7%)	Years of current EHR	Total N = 309
MBA	31 (8.7%)	Range	0-45 years
MPH	5 (1.4%)	Mean (SD)	7.34 (6.6) years
RN	123 (34.5%)	EHR developer	
DNP	24 (6.7%)	Homegrown	20 (5.6%)
MD	0 (0%)	Commercial EHR	225 (63%)
PhD	28 (7.8%)	Combined	58 (16.2%)
Current Practice Setting		Not sure	19 (5.3%)
Academic Institution/Medical School	31 (8.7%)	Missing	35 (9.8%)
Academic Medical Center	93 (26.1%)	HIMSS EMR Adoption Model, Stage	
Critical Access Hospital	6 (1.7%)	Stage 1	8 (2.2%)
Community Hospital	149 (41.7%)	Stage 2	19 (5.3%)
Integrated Health System	42 (11.8%)	Stage 3	10 (2.8%)
Private practice	3 (0.8%)	Stage 4	12 (3.4%)
Public Health	2 (0.6%)	Stage 5	49 (13.7%)
Other	30 (8.4%)	Stage 6	66 (18.5%)
Missing	1 (0.3%)	Stage 7	72 (20.2%)
Years in current position	6.16 (6.46)	Not sure	83 (23.2%)
Years working experience (total)	27.7 (10.58)	Missing	38 (10.6%)
Have EHR	324 (90.8%)		
In the process of having EHR	111 (31.1%)		

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Missing Data Imputation

- 357 valid responses with <20% missing values
- 216 responses had no missing values
- Impute missing values: Expectation Maximization (EM)

- Roth, P. L. (1994). Missing data: A conceptual review for applied psychologists. Personnel Psychology, 47, 537–570.
- Gabriel L. Schlomer, Sheri Bauman, and Noel A. Card. Best Practices for Missing Data Management in Counseling Psychology Journal of Counseling Psychology 2010, Vol. 57, No. 1, 1–10
- Graham, J. W. (2009). Missing data analysis: Making it work in the real world. Annu. Rev. Psychol., 60, 549– 576.
- Weaver, B., & Maxwell, H. (2014). Exploratory factor analysis and reliability analysis with missing data: A simple method for SPSS users. The Quantitative Methods for Psychology, 10 (2), 143-152.

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Number of Factors

- Eigen-value-greater-than-one rule
- Parallel analysis
- Model fit indices

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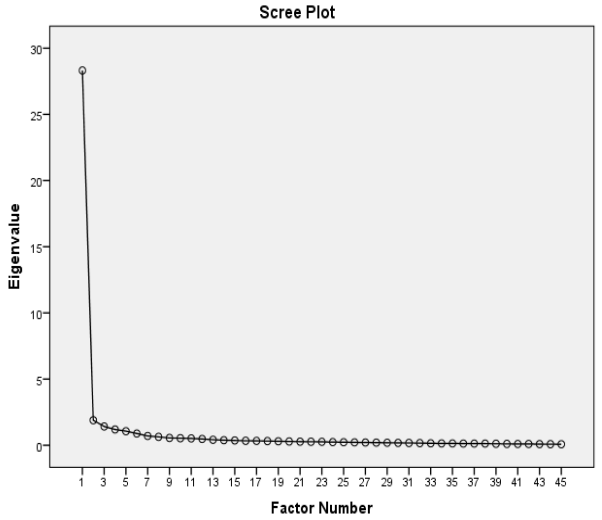
Eigen-value-greater-than-one rule

Eigen value > 1: 5 factors

Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total
1	28.318	62.928	62.928	24.864
2	1.893	4.206	67.134	22.744
3	1.420	3.157	70.291	18.496
4	1.196	2.657	72.948	19.687
5	1.065	2.366	75.314	9.775
6	.885	1.966	77.280	
7	.700	1.555	78.835	



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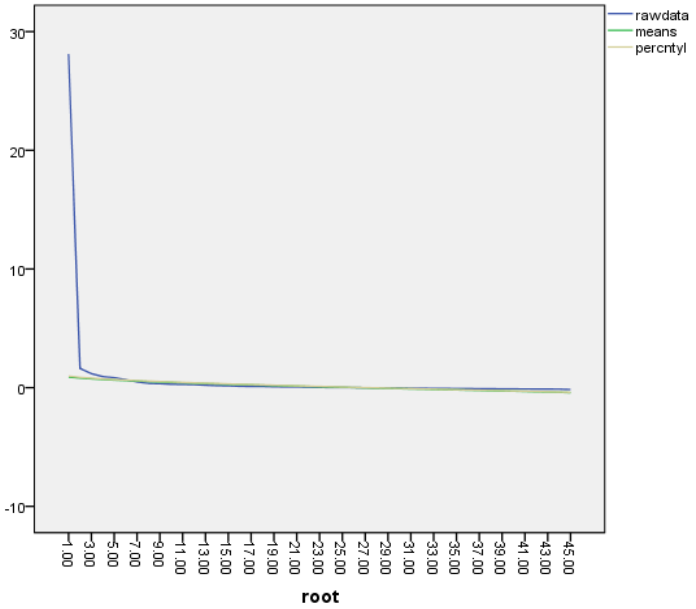
Parallel Analysis

Specifications for this Run:

Ncases	357
Nvars	45
Ndatsets	1000
Percent	95

Raw Data Eigenvalues, & Mean & Percentile Random Data Eigenvalues

Root	Raw Data	Means	Prcntyle
1.000000	28.106874	.889272	.977018
2.000000	1.619501	.806187	.870997
3.000000	1.180990	.742450	.802322
4.000000	.934077	.688770	.738663
5.000000	.849929	.639630	.683403
6.000000	.674082	.596964	.640994
7.000000	.478605	.556435	.595681
8.000000	.359908	.517752	.556454
9.000000	.334445	.481103	.516691
10.000000	.287865	.446677	.481511



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- O'Connor, B. P. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behavior Research Methods Instruments & Computers, 32*(3), 396-402.
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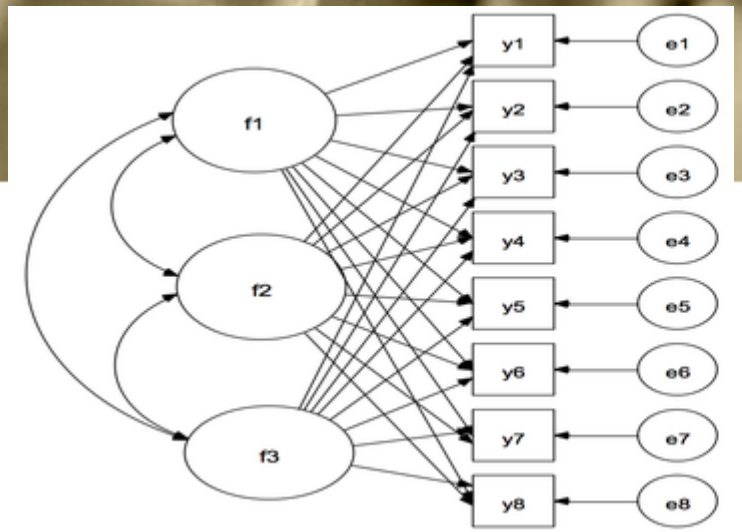

Model Fit Indices

	Chi-square	RMSEA (<0.05,0.08)	CFI/TFI (>0.9, 0.95)	SRMR (0.05, 0.08)
4 factors	3004.513	0.087 (0.083, 0.09)	0.882/0.857	0.031
5 factors	2547.264	0.08 (0.077, 0.083)	0.905/0.878	0.027
6 factors	2171.343	0.074 (0.070, 0.078)	0.923/0.896	0.021
7 factors	1914.630	0.070 (0.066, 0.074)	0.934/0.907	0.018
8 factors	1723.362	0.067 (0.063, 0.071)	0.943/0.914	0.017

- Preacher, Kristopher J.; Zhang, Guangjian; Kim, Cheongtag; Mels, Gerhard. Choosing the Optimal Number of Factors in Exploratory Factor Analysis: A Model Selection Perspective. Multivariate Behavioral Research, v48 n1 p28-56 2013

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Number of Factors

- Parallel analysis: 6 factors
- Eigen-value-greater-than-one rule: 5 factors
- Model fit indices: 6 - 7 factors
- **Assess factor solutions with 5 - 7 factors**

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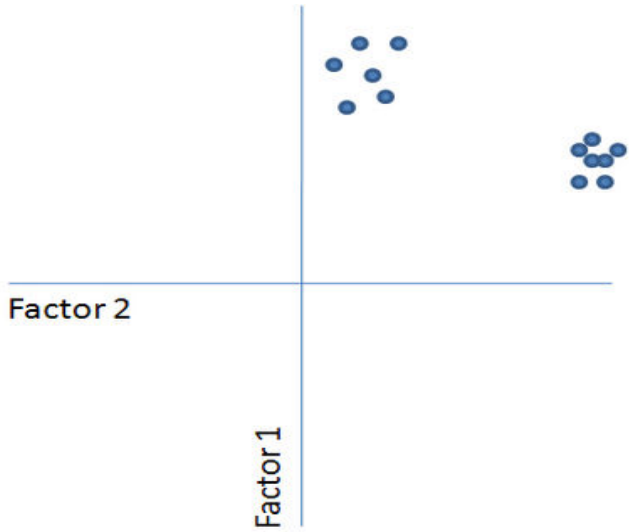
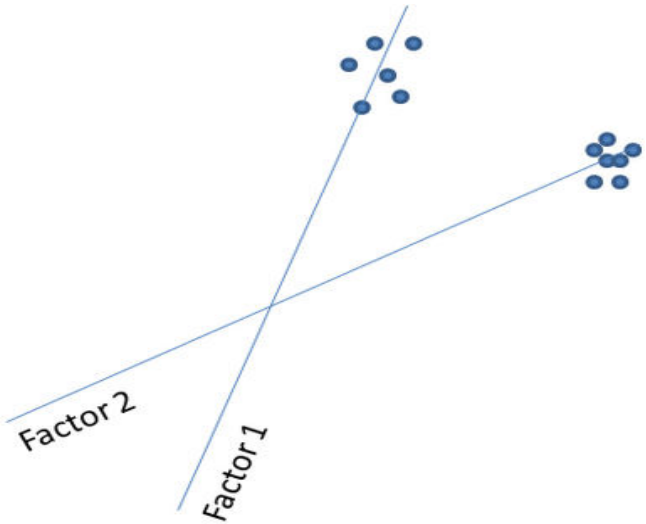
Extraction Method & Rotation

- Principal Axis Factoring (PAF) with oblique rotation (promax) as the extraction method
  - In social and behavioral science, we usually expect some correlation among factors.
  - With orthogonal (varimax) rotation, it may lose information if factors correlate.





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Factor Solutions Comparison

n=357 (After EM) 5 factors solution

	1	2	3	4	5
45. Ability to evaluate HIT systems in practice settings	0.972				
43. Ability to specify what evidence-based standards are integrated in the HIT system	0.957				
42. Ability to standardize nursing process and automate workflow related to HIT	0.873				
46. Synthorizing the whole patient picture from a multidisciplinary perspective using HIT	0.853				
44. Ability to understand, appreciate and leverage rapidly advancing HIT capabilities	0.849				
40. Ability to understand HIT 'work arounds' and the consequences of Human - computer interface interactions	0.777				
24. A conceptual understanding of nursing intervention documentation using HIT, it's impact of care delivery, nursing productivity and secondary use of information	0.495				
38. Ability to evaluate, contribute and revise project scope, objectives, and resources	0.474				
12. Conceptual understanding of data quality issues for HIT		0.984			
13. Avoidance of potential negative impacts of HIT		0.874			
11. Searching information retrieval systems		0.759			
16. Understanding of methods for HIT education		0.608			
14. Ability to articulate the application and significance of HIT to clinical practice		0.602			
27. Data-based driven planning and decision making through the utilization and synthesis of HIT system data		0.562			
15. Ability to understand technological trends, issues and new HIT developments as they apply to nursing		0.492			
7. Ability to define (in collaboration with the IT department) Total Cost of Ownership (TCO) containment strategies and hidden costs on HIT implementation (i.e. education, system maintenance, upgrade support staffing requirements and physical plant chang			1.006		
8. Ability to define (in collaboration with the IT department) Total Cost of Ownership (TCO) specifically when it relates to the HIT related costs of staff education, and re-education related to upgrades and staff turnover			0.709		
5. Ability to function in a strategic capacity for HIT and not at a functional or recommender role			0.541		
21. Ability to integrate patient care processes and nursing administrative functions in HIT system requirements				0.879	
20. Ability to assure that Nursing values/requirements are represented in HIT selection and evaluation				0.857	
2. Understanding of patients' rights related to HIT and computerized patient data					0.906
1. Understanding of ethical principles for collection, maintenance, use, and dissemination of data and information related to HIT					0.764

n=357 (After EM) 6 factors solution

	1	2	3	4	5	6
37. Change management for HIT	1.004					
35. Ability to manage the impact of change due to HIT implementation	0.973					
39. Understanding of methods for evaluation of HIT implementation and use	0.846					
34. Ability to champion the collection, analysis and trending of Nursing data in non-nursing dominated HIT discussions	0.838					
33. Communicating system and nursing vision about the benefits of HIT	0.825					
38. Ability to evaluate, contribute and revise project scope, objectives, and resources	0.749					
36. Recognition of value of clinicians' involvement in all appropriate phases of HIT	0.727					
32. Conceptual understanding of the importance of integrating nursing data elements in HIT systems	0.659					
31. The ability to understand regulations and transitions in policies as they relate to HIT	0.51					
24. A conceptual understanding of nursing intervention documentation using HIT, it's impact of care delivery, nursing productivity and secondary use of information	0.398					
41. Ability to conceptually understand how to define, design (create a schematic) and implement a HIT solution to achieve overarching nursing workflow					0.682	
42. Ability to standardize nursing process and automate workflow related to HIT					0.65	
40. Ability to understand HIT 'work arounds' and the consequences of Human - computer interface interactions					0.645	
12. Conceptual understanding of data quality issues for HIT		0.824				
11. Searching information retrieval systems		0.804				
13. Avoidance of potential negative impacts of HIT		0.765				
16. Understanding of methods for HIT education		0.659				
15. Ability to understand technological trends, issues and new HIT developments as they apply to nursing		0.529				
7. Ability to define (in collaboration with the IT department) Total Cost of Ownership (TCO) containment strategies and hidden costs on HIT implementation (i.e. education, system maintenance, upgrade support staffing requirements and physical plant chang			0.996			
8. Ability to define (in collaboration with the IT department) Total Cost of Ownership (TCO) specifically when it relates to the HIT related costs of staff education, and re-education related to upgrades and staff turnover			0.771			
5. Ability to function in a strategic capacity for HIT and not at a functional or recommender role			0.656			
6. Ability to collaborate with CMO peers related to HIT and needs of nurses and physicians			0.419			
21. Ability to integrate patient care processes and nursing administrative functions in HIT system requirements						0.844
20. Ability to assure that Nursing values/requirements are represented in HIT selection and evaluation						0.736
2. Understanding of patients' rights related to HIT and computerized patient data				0.849		
1. Understanding of ethical principles for collection, maintenance, use, and dissemination of data and information related to HIT				0.823		

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Final 6-factor Solution (26 items)

1. Strategic Implementation Management (10 items)
2. Advanced Information Management and Education (5 items)
3. Executive Planning (4 items)
4. Ethical and Legal Concepts (2 items)
5. Information Systems Concepts (3 items)
6. Requirements and System Selection (2 items)

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Factor Correlation Matrix

Factor	1	2	3	4	5	6
1. Strategic Implementation Management	1.000	.763	.707	.489	.713	.778
2. Advanced Information Management and Education		1.000	.708	.549	.654	.723
3. Executive Planning			1.000	.525	.616	.655
4. Ethical and Legal Concepts				1.000	.346	.503
5. Information Systems Concepts					1.000	.621
6. Requirements and System Selection						1.000

Cronbach's alphas (α) were .96, .91, .90, .83, .92, & .81.

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Factor	item	Factor loadings
Strategic Implementation Management (α = .961)	1. Change management for HIT	1.004
	2. Ability to manage the impact of change due to HIT implementation	0.973
	3. Understanding of methods for evaluation of HIT implementation and use	0.846
	4. Ability to champion the collection, analysis and trending of Nursing data in non-nursing dominated HIT discussions	0.838
	5. Communicating a system and nursing vision about the benefits of HIT	0.825
	6. Ability to evaluate, contribute and revise project scope, objectives, and resources	0.749
	7. Recognition of value of clinicians' involvement in all appropriate phases of HIT	0.727
	8. Conceptual understanding of the importance of integrating nursing data elements in HIT systems	0.659
	9. The ability to understand regulations and transitions in policies as they relate to HIT	0.510
	10. A conceptual understanding of nursing intervention documentation using HIT, it's impact of care delivery, nursing productivity and secondary use of information	0.398
Advanced Information Management and Education (α = .911)	11. Conceptual understanding of data quality issues for HIT	0.824
	12. Searching information retrieval systems	0.804
	13. Avoidance of potential negative impacts of HIT	0.765
	14. Understanding of methods for HIT education	0.659
	15. Ability to understand technological trends, issues and new HIT developments as they apply to nursing	0.529
Executive Planning (α = .897)	16. Ability to define (in collaboration with the IT department) Total Cost of Ownership (TCO) containment strategies and hidden costs on HIT implementation (i.e. education, system maintenance, upgrade support staffing requirements and physical plant change	0.996
	17. Ability to define (in collaboration with the IT department) Total Cost of Ownership (TCO) specifically when it relates to the HIT related cost of staff education, and re-education related to upgrades and staff turnover	0.771
	18. Ability to function in a strategic capacity for HIT and not at a functional or recommender role	0.656
	19. Ability to collaborate with CMO peers related to HIT and needs of nurses and physicians	0.418
Ethical and Legal Concepts (α = .829)	20. Understanding of patients' rights related to HIT and computerized patient data	0.849
	21. Understanding of ethical principles for collection, maintenance, use, and dissemination of data and information related to HIT	0.823
Information Systems Concepts (α = .917)	22. Ability to conceptually understand how to define, design (create a schematic) and implement a HIT solution to achieve overarching nursing workflows	0.682
	23. Ability to standardize nursing process and automate workflow related to HIT	0.650
	24. Ability to understand HIT 'work arounds' and the consequences of Human - computer interface interactions	0.645
Requirements and System Selection (α = .810)	25. Ability to integrate patient care processes and nursing administrative functions in HIT system requirements	0.844
	26. Ability to assure that Nursing values/ requirements are represented in HIT selection and evaluation	0.736

Feedback

- 50 comments
- Length: "*the survey [45 items] is too long*"
- Difficult language and terminology
  - *"[NICA-NL] really reveals how deficient I am in this area- need much more education on this"*
  - *"I do not speak this language"*

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Nursing Informatics Education and Training

- Nursing informatics education and training are needed.
  - *Conceptually and theory wise I understand quite a bit, but resource wise have not been able to fully implement my role as an Informatics Nurse."*
  - *"I am currently in an MSN program taking Informatics. I really hope that you can implement informatics into the undergraduate level and also work to give older nurses an opportunity to learn this."*
  - *"I have only been in my role as a clinical nurse manager for 2 months. I have not been exposed to many of these concepts as a staff nurse. I believe with further education and training I can become competent in area related to Nursing Informatics."*

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Self-assessment vs. EHR assessment

- Some competencies are related to the capabilities of their EHR system, but an informatics nurse may not be able to implement with limited system functionalities or resources.
  - *"[NICA-NL] may want to consider participants' understanding of HIT issues vs. actually implementing them"*
  - *"The biggest challenge has been to make sure that the system meets the actual needs. Huge amounts of customization were necessary for our Cerner product and because of this the roll out was very slow and continues to pose challenges around effective documentation and our ability to retrieve aggregate information despite having an electronic record"*

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Conclusion

- This research provides a foundation and focus for specific informatics and technology competencies required by today's Nurse Executive and Leader.
- This study established a valid and reliable nursing informatics competency assessment instrument, NICA-NL, for nurse leaders.
- Future direction includes advancing NICA-NL (additional analyses with more responses from other nurse leaders).

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Stephanie Colman Brochu DNP (c), MS, RN-BC

NICA-NL: UMMHC CASE STUDY

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Introduction

- In the last decade, technology has touched all aspects of our society and has transformed the way we live, work, and communicate.
- Technology is embedded in almost every aspect of healthcare
- Information revolution

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Importance of Nursing commitment

- Nurses have closest and most sustained relationships with patients and are largest users of technology
- Informatics and technology are integral tools built into all levels and areas of nursing practice

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Local Problem

- UMass Memorial Health Care (UMMHC) is in the process of implementing an integrated electronic medical record across its enterprise
- 700 million dollar (projected) investment
- Data was lacking on nurse leaders informatics competencies prior to implementing the new EMR

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The purpose of this study

- To examine the nurse leaders self report of competency in informatics

- To provide data to inform practice improvement needs in informatics competencies

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Research Questions

I. Do the nurse leaders have the informatics competencies needed to use a new electronic health record in a large academic medical center?

II. How prepared are nurses in leadership positions to utilize information technologies to collect and analyze data to make business and patient care decisions?

III. Does a relationship exist between groups and their self-reported competency in informatics?

IV. Do differences exist between nurse leaders self-report of informatics competency between age, years in position, education, or years of experience?

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Ethical Considerations

- IRB approval granted
- Expedited review
  - Minimal risk
- Data confidential
- Reported at aggregate level

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Methods

- Design
  - Cross sectional, descriptive study
- Population
  - Convenience sample; surveyed N=147
    - Inclusion criteria
    - Exclusion criteria
- Setting:
  - Four campuses of UMMHC
- Recruitment
  - Invitation to participate
  - Survey link
- Data collection
  - 3 weeks period

Analysis

- SPSS
- Statistics
  - Descriptive
  - Chi squared

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Results

- Respondents
  - Fifty-five nurse leaders completed the survey, response rate of 37%

Sample Characteristics

		N (%)
Role		
	Clinical Coordinator/Supervisor	10 (18.2)
	Clinical Nurse Educator	12 (21.8)
	Clinical Nursing Specialist	1 (1.8)
	Director	9 (16.3)
	Nurse Manager	20 (36.4)
	Other	3 (5.5)

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Sample characteristics cont.

	Mean (SD)	N (%)	Missing N (%)
Age	50.6 (11.9%)		
20-29		2 (3.6)	
30-39		10 (18.2)	
40-49		7 (12.7)	
50-59		17 (30.9)	
60-69		15 (27.3)	
			4 (7.3)

Education	N (%)
BA/BS/BSN	10 (18.2)
MA/MS/MPH	37 (67.3)
PhD/DNP	3 (5.5)
RN	5 (9.1)

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Sample characteristics cont.

		Mean (SD)	N (%)
Years of experience		25.3 (5.24)	
	<10		10 (18.2)
	11-20		14 (25.2)
	21-30		10 (18.2)
	30+		21 (38.2)
Years in position		5.5 (5.24)	
	1-5		32 (58.2)
	6-10		16 (29.1)
	11-25		7 (12.7)

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Results -> Nurse leaders overall reported being "very competent" in a number of competencies

Factor	Competency	Very Competent
Ethical & Legal Concepts	Understanding of ethical principles for collection, maintenance, use and dissemination of data and information related to HIT	50.9%
	Understanding of patients rights related to HIT and computerized patient data	58.5%
Requirements & System Selection	Ability to assure that nursing values/requirements are represented in HIT selection & evaluation	49.1%
Strategic Implementation Management	A conceptual understanding of nursing intervention documentation using HIT, its impact on care delivery, nursing productivity and secondary use of information	54.5%
	Conceptual understanding of the importance of integrating nursing data elements into HIT systems	54.5%
	Communication a system and nursing vision about the benefits of HIT	54.7%
	Recognition of value of clinicians involvement in all appropriate phases of HIT	69.8%


Results-> Nurse leaders reported less competency in a number of competencies

Factor	Competency	Less competent
Executive Planning	In the ability to define (in collaboration with IT department) the Total Cost of Ownership (TCO) containment strategies and hidden costs of HIT implementation	56.2%
	In the ability to define (in collaboration with the IT department) TCO related to the HIT related cost of staff education and re-education due to upgrades and staff turnover	48%
Information Systems Concepts	In the ability to understand how to define, design, and implement a HIT solution for nursing workflows	46.3%
Strategic Information Management	Understanding of methods for evaluation of HIT implementation and use	40.4%
Advanced Information Management and Education	Conceptual understanding of data quality issues for HIT	38.9%

Results

- No differences existed by education level or years in position.
- Differences existed between reported informatics competencies by:
  - Age, years working experience and professional position.

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Age

- Nurse leaders 60 years and older reported more competency than their counterparts in the ability to understand the ethical principles for the collection, use, and dissemination of data and information related to HIT (x^2=36.48, p=.002).

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Position

- Senior executive nurse leaders reported more competency than less senior leaders in:
  - Ability to define the TCO specifically associated with education, re-education and turnover (x^2= 24.130, p=.002)
  - Conceptual understanding of data quality issues related to HIT (x^2=20.443, p=.0009)
  - Ability to understand regulations and transitions in policies as they relate to HIT policy requirements (x^2= 14.005, p=.03)

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Years of experience

- Nurse leaders with 31+ years of experience reported greater competency in
  - Understanding of ethical principles for collection, maintenance, use & dissemination of data & information (x^2=18.928, p=.02)
  - Recognition of value of clinicians involvement in all appropriate phases of HIT (x^2=18.888, p=.02)

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Years of experience cont.

- Nurse leaders with <10 years of experience reported greater competency in
  - Communicating a systems and nursing vision about the benefits of HIT (x^2=16.899, p=.05)
  - Ability to champion the collection, analysis and trending of nursing data in non-nursing dominated HIT discussions (x^2=21.235, p=.04)
  - Ability to manage the impact of change due to HIT implementation (x^2=18.096, p=.03)
  - Ability to evaluate, contribute and revise project scope, objectives and resources (x^2= 21.935, p=.03)

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Discussion

- Nurse leaders at UMMHC have many of the informatics competencies needed to utilize the new EHR to support quality patient care and fiscal decision making.
- Senior nurse executives and nurse leaders with a number of years of experience reported greater competency in several areas.
- Nurse leaders with less experience reported greater competency in ability to manage change, to communicate a nursing vision and in representing data specific to nursing.
- Several areas were identified as professional development opportunities to enhance informatics knowledge and skill.

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Conclusions

- Information technology is the stethoscope of the 21st century (TIGER)
- Nurse leaders are better prepared than 10 years ago but more needs to be done
- Technology changes rapidly
  - Life cycle is ~ 7 years
- Further research is needed
- Continue validation of the instrument

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Limitations

- New instrument
- Small sample size
- One academic center, not generalizable
- The organization was in process of designing/building their EMR so awareness may have been heightened

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NEXT

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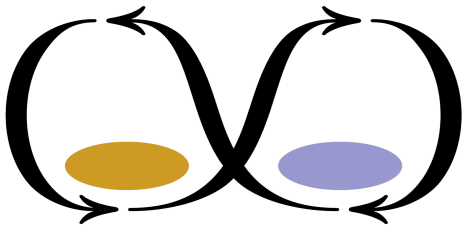
NICA

- NICA-NL
  - Scoring metric
  - Further analysis / trends
  - Deployment/ Implementation
    - Partners
- NICA- RN
  - Complete analysis, publish
- Funding
- Exploring Polarity “Both-And Thinking”
    - Real Time Health System (Gartner)



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QUESTIONS

JONA

- Nursing Informatics Competency Assessment for the Nurse Leader: The Delphi Study

- Nursing Informatics Competency Assessment for the Nurse Leader: Instrument Refinement, Validation, and Psychometric Analysis

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