INSTRUMENT DEVELOPMENT & TESTING FOR SIMULATION RESEARCH – AN EXAMPLE FOR ASSESSING NON-TECHNICAL SKILLS

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- Doctoral Student/Faculty - Natália Del’Angelo Aredes, PhD, RN, Goiás Brazil – creation/Testing Global Interprofessional Therapeutic Communication Scale© (GITCS©)
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Learning Outcomes

- Recognize the need for reliable and valid instruments to contribute to the development of nursing science and the scholarship of teaching and learning.
- Identify the process of instrument development – from conception, to development, to testing and analysis.
- Differentiate between instruments used in simulation that measure technical and non-technical skills.
- Consider the assessment of patient-provider communication.
- List ways for faculty development in the use of valid and reliable instruments during simulation to enhance faculty comfort and inter-rater reliability.

Evolution of Simulation Research

Contributing factors:
- INACSL Best Practice Standards: Simulation SM (2016)
  - Increased confidence in reliability of scenarios, facilitation, teaching, and evaluation methods
  - NLN-INACSL Debriefing Across the Curriculum
- Society for Simulation in Healthcare (SSHI) Dictionary
  - Importance of speaking the same language
- Repository of Instruments Used in Simulation Research INACSL
- SSHI-Instruments for evaluating healthcare simulation

Disclosure

Suzanne Hetzel Campbell PhD, RN, IBCLC
- Royalty Jones & Bartlett Learning, Co-editor Core Curriculum for Interdisciplinary Lactation Care, 2018
- Sit on Editorial Board of Clinical Simulation in Nursing
- Sit on Advisory Board of LiquidGoldConcept, Inc.
- Sit on Board of Directors of ConHealth International
- Sit on Board of Directors of INACSL, VP International Affairs
- Canadian Association of Schools of Nursing (CASN/ACESI) Course Instructor, Canadian Simulation Nurse Educator Certification Program (Modules 2 & 3)
- I do not intend to discuss an unapproved/investigative use of a commercial product/device in my presentation
Goal in developing the Global Interprofessional Therapeutic Communication Scale© (GITCS©)

- Provide faculty with a scale to assess student’s patient-provider communication skills.
- Create items that will give feedback and guidance to students regarding their communication.
- Identify key components to developing a therapeutic relationship as evidenced by communication that is patient centered, empathetic, power-sharing and trust and rapport building.
- Create a globally robust scale for use in a simulated, clinical, or virtual environment.

Measurement > data analysis

- Development:
  - Theory of construct to be measured – what are the indicators of the concept?
  - Define the concept – Review of literature
  - Develop the instrument – items, descriptors
- Validation Process
  - Face & content validity
  - Calibration of the instrument – Likert-type
  - Calibrated instrument reviewed by expert panel
- Statistics & reduction of items (IRR)
- Testing of instrument for reliability and validity
  - Does it measure a well-understood concept/construct?

Item and descriptor tweaking

- Identify concept as specifically as possible
  - Brainstorm indicators
  - Define the concept
  - Draft items
- Balance the constructs, actions, and incorporate the breadth of the concept you are measuring
  - Beware of complicated language, health literacy, and advocacy/inquiry approach
  - Create more items than you need, even if some seem repetitive
- Pre-test and pilot test
- Redraft/refine and re-test

Developing a scale: Creating items – construct, factor, and behavior identification – 44 item GITCS©

- Methods:
  - Active listening strategies
  - Active Communication- encouragement
  - Asking questions
  - Verbal Interventions
  - Non-verbal Communication
  - Boundaries
  - Barriers
- Constructs
  - Introduction
  - Empathy
  - Trust building
  - Education
  - Power sharing
  - Develop Rapport
Expert panel review – Who, what, where, how

- Content & clinical experts; varied disciplines; varied institutions – practice and academic
- GITCS© was reviewed by an expert panel of nurse educators and pilot tested using videos while experts watched simultaneously and provided feedback on wording, descriptors, and redundancies.
- Expert panel reviewed the edited scale in two rounds, to consolidate the scale constructs and refine the scale items. (These experts* also made up the intra-class coefficient expert reviewers for the crowd-source testing of the instrument)
- Training videos were developed.

What is factor analysis?

- Factor analysis – identifies clusters of covariance (factors) via multivariate correlational methods
- Two purposes:
  - Theoretical
  - Data Reduction
- Two main types and methods of extraction:
  - Exploratory factor analysis (EFA)
  - Confirmatory factor analysis (CFA)

Reliability and validity testing of GITCS©

- Crowd-sourcing was used for the first round of exploratory factor analysis.
- Respondents watched a 5 to 7 minute video of a seasoned nurse interacting with a trained actor who role played an older adult at home.
  - Completed 44-item GITCS© - Rate nurses behaviors plus final analog scale
  - Rated behaviors via a six-point, Likert-type scale
  - 0 (Not Applicable); 1 (Never); 2 (Rarely); 3 (Sometimes); 4 (Usually); 5 (Always)
- Higher scores = more effective communication.
- Best statistics with 6 to 20 participants/item (264 to 880) OR N>200

Exploratory Factor Analysis

- Factor Models of the GITCS© items

The second-order model contained a single latent variable representing overall quality of the therapeutic relationship and three lower level constructs:
  - Factor 1: Trust and Rapport Building (23 items),
  - Factor 2: Power-Sharing (9 items),
  - Factor 3: Empathy (9 items).

Note: Two items were excluded based on expert opinion and one item was deleted as it was repeated. 35-items.

GITCS© 35-item scale further tested - Constructs

- Exploratory factor analysis revealed a one-factor model with three sub-concepts.
  - Intraclass correlation coefficient (ICC) ≥ 0.99*
  - Single-measure consistency ICC was good (11 items) to excellent (26 items) for 37 of the initial 44 items tested (ICC ≥0.60)*
  - Items were retained by comparing factor loadings, conceptual/theoretical fit, % of variance explained and ICC scores.

*Individual rater score acceptable at (0.60–0.74=good; 0.75–1.00=Excellent)
Confirmatory factor analyses indicated that a second-order factor model of general Therapeutic Relationship containing three sub-factors (Empathy, Trust and Rapport, and Power Sharing) provided a good fit to the data \( \chi^2 (776 \text{ DF}) = 2798.978, p<.01; \text{RMSEA} = 0.054 \) (90% CI: 0.052-0.056); \( \text{CFI} = 0.913; \text{SRMR} = 0.048 \).

The second-order model also provided a significantly better fit than a single factor model \( \chi^2 (779 \text{ DF}) = 3562.953, p<.01; \text{RMSEA} = 0.063 \) (90% CI 0.061-0.066); \( \text{CFI} = 0.880; \text{SRMR} = 0.049 \).

Cronbach's Alpha for the GITCS© scale was excellent (0.95).

Testing of GITCS© - Summary

- GITCS© was assessed using Web-based methodology, 3 professionally developed videos that were randomly assigned, and a crowd-sourcing sample, who would qualify as patients.
- There were no restrictions on the respondents and only 45 out of 877 identified as health care provider backgrounds.
- Analysis of the GITCS© with this sample provided evidence of the instrument's reliability and construct validity and will inform ongoing efforts to shorten the scale.
- The intra-class coefficient for experts rating all 3 videos was Strong when averaged among the 10 experts; suggest keeping the items that show good to excellent ICC’s.

Re-analysis of items; feasibility testing

- Reliability and validity testing of Global Interprofessional Therapeutic Communication Scale (GITCS©) with an international and interprofessional sample using an on-line survey. [Participant burden]
- Train-the-trainer model tested in BC of educating health professional faculty from many disciplines to use GITCS© – website, professional videos, inter-rater reliability training.
- Provincial study testing GITCS© with nursing students at different stages, with a variety of health communication curriculum models.

Train-the-trainer instrument use for inter-rater reliability

- Introduced BC Nursing faculty at participating schools to GITCS© for assessment of students’ communication skills.
- Used synchronous webinar training.
- Provided asynchronous video training giving examples and scoring outcomes.
- On-site training with faculty using live demonstrations and videos.

Future Testing-Construct Validity

Higher scores = more effective health communication behaviors.

Use an analog scale and/or another communication scale – e.g. Hammer et al. 2014
**Future Research**

- Train-the-trainer model of educating health professional faculty from many disciplines to use GITCS©
- ResearchGate Project website [https://www.researchgate.net/project/GITCS-Global-Interprofessional-Therapeutic-Communication-Scale](https://www.researchgate.net/project/GITCS-Global-Interprofessional-Therapeutic-Communication-Scale)
- Construct Validity Testing
  - Compare the scale with another communication tool: verify if GITCS© predicts improvement in therapeutic communication performance
- Translation of GITCS© in progress. Once translation has been achieved, further testing can take place globally
  - Partners:
    - Brazil (Portuguese)
    - Belgium, Quebec (French)
    - Colombia (Spanish)

**Questions?**

- Discussion
  - What instruments are you using to evaluate and assess student skills/competencies?
  - Have you created your own?
  - What barriers have you experienced?
  - Is there a level of psychological safety when using instruments or scales for assessment and evaluation in simulation, clinical practice, in general?
  - Anything else to share?

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