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

Presenter on Behalf of CASN Simulation Interest Group:
Suzanne H. Campbell PhD, RN, IBCLC, Associate Professor, UBC School of Nursing, Faculty of Applied Science
Moderator:
Leslie Graham, RN MN CNCC CHSE, Coordinator of the RPN to BScN Bridging Program, and Professor, Nursing/Adjunct Professor at the University of Ontario, Institute of Technology –Durham College (UOIT-DC)

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Disclosure

Suzanne Hetzel Campbell PhD, RN, IBCLC

- Royalties Springer Publishers, Inc. Co-editor *Simulation Scenarios for Nursing Educators: Making it Real 3rd Ed.*, 2018.
- 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 *CanHealth 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

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Outline

This presentation will cover:

- Identification of concept to measure
- Review of the literature for reliable and valid scales
- Developing your own scale: creating items – construct, factor, and behavior identification
- Expert panel review – who, what, where, how
- Item and descriptor tweaking
- Reliability and validity testing
- Re-analysis of items; feasibility testing
- Train-the-trainer instrument use for inter-rater reliability
- Future – continuous testing and translation

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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 use 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.

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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 ([SSH](#)) Dictionary
 - Importance of speaking the same language
- Repository of Instruments Used in Simulation Research [INACSL](#)
- SSH-Instruments for [evaluating healthcare simulation](#)

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INACSI

REPOSITORY OF INSTRUMENTS

Repository of Instruments Used in Simulation Research

The INACSI Research committee has provided a list of categorized citations, but cannot ensure the completeness of this list or validate any psychometric properties. We acquired proper pilot testing and psychometric with use.

The instruments used for simulation were categorized based on the domains used in the ALN/Jeffries Simulation Theory as found in:

Jeffries, A.R. (Ed.). (2013). *The ALN/Jeffries Simulation Theory*. New York, New York: Lippincott Williams & Wilkins.

A separate category for debriefing was also added. There was a good faith effort to place instruments in the correct category, although many instruments can be placed in multiple categories. Where possible, the purpose or names of the instruments are identified above the citation. Citations grouped together under a bold heading belong to the same category.

This webpage is easily searchable using the Ctrl + F feature. Once clicking the control key and F at the same time, a text box will appear and allow a keyword search.

If you would like to send feedback or request an instrument be added to the list, please complete the request form here: [INACSI Instrument Repository Request Form](#). If you have any questions, please contact the INACSI Instrument Repository Liaison, Susan Prior at sprior@uafca.edu.

SKILL Performance:
Instruments to assess or evaluate skill acquisition for the clinical nursing role.

Lambson, J., Pauley, C.H., S., & DeGroot, T. (2008). Simulation as a strategy to teach clinical pediatric hematology nursing curriculum. *Clinical Simulation in Nursing*, 4(2), 67-67. doi:10.1016/j.cnsn.2008.05.003

Murray, D., Boudier, J., Ziv, A., Woodhouse, J., Kreis, J., & McAllister, J. (2002). An acute care skills evaluation for graduating medical students: A pilot study using clinical simulation. *Medical Education*, 36(9), 822-843.

Voncken, M.A., Swafford, R., Mallory, B. (2018). The Efficacy of High-Fidelity Simulation on Psychomotor Clinical Performance Improvement of Undergraduate Nursing Students. *CIN: Computers, Informatics, Nursing*, 32(2), 78-84.

Adults: Communication and Knowledge in Simulations Used
Rambold, J.B., D'Almeida, I., Castellanos, M.A., & Borchardt, D.J. (2018, November). Development and psychometric analysis of a tool to evaluate confidence. *Clinical Simulation in Nursing*, 4(1-4), 476-484. <https://doi.org/10.1016/j.cnsn.2018.07.006>

Checklist used for critical attributes for assessment students
Harris, S., Smith, K., & Caprau, D. (2007). *Simulation readiness*. *Clinical Simulation in Nursing Education*, 1(1-3), 30-36. doi:10.1016/j.cnsn.2007.05.002

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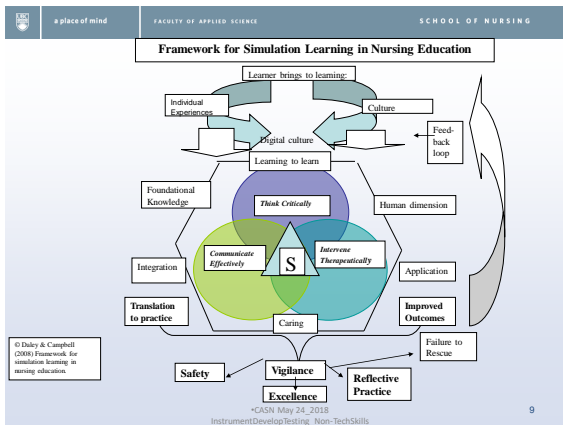
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Goal in developing the Global Interprofessional Therapeutic Communication Scale© (GITCS©)

- 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.



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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
 - Create videos for validation
- 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?

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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

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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

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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.

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Professionally Developed Videos



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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)

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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)

1	2	3	4	5	NA
Never	Rarely	Sometimes	Usually	Always	Not applicable

- Higher scores = more effective communication.
- Best statistics with 6 to 20 participants/item (264 to 880) OR N>200

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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.

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GITCS© 35-item scale further tested - Constructs

- Exploratory factor analysis revealed a one-factor model with three sub-concepts.



- Intraclass correlation coefficient [ICC] $\geq 0.99^*$
- 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)

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Global Interprofessional Therapeutic Communication Scale (GITCS)

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30 items – does not require video to complete the instrument.
20 items – requires video and open to appropriate trained staff. Introduction may require video and be considered “minor”, items are scored according to the response level.
10 items – requires video that can be used by all participants. No patient response or video needed, and requires 1 out of 3 items.
10 items – requires video of the video – 10 small reflections or conversations each time, with response 1 out of 5 items.
10 items – considers their own behavior as expected.

30 items – requires video and open to appropriate trained staff. Introduction may require video and be considered “minor”, items are scored according to the response level.

20 items – requires video and open to appropriate trained staff. Introduction may require video and be considered “minor”, items are scored according to the response level.

10 items – requires video that can be used by all participants. No patient response or video needed, and requires 1 out of 3 items.

10 items – requires video of the video – 10 small reflections or conversations each time, with response 1 out of 5 items.

10 items – considers their own behavior as expected.

1 Introduces themselves by name and title without prompting 1 2 3 4 5 NA
 2 Provides a professional greeting given the context 1 2 3 4 5 NA
 3 Verbalizes competence 1 2 3 4 5 NA
 4 Verbalizes interest in patient and their perspective, encouraging rapport 1 2 3 4 5 NA
 5 Demonstrates appropriate proximity to the patient or family according to the context 1 2 3 4 5 NA
 6 Encourages feedback and enhances clarity of the communication situation 1 2 3 4 5 NA
 7 Purposefully explains mutually established goals for the visit 1 2 3 4 5 NA
 8 Provides accurate information to the patient at the level they understand 1 2 3 4 5 NA
 9 Adheres to patient's wishes in relation to clinical behaviors 1 2 3 4 5 NA
 10 Asks permission to touch BEFORE doing anything to the patient (e.g. blood pressure, checking, palpation) 1 2 3 4 5 NA
 11 Permission questions providing the patient an opportunity for active communication (open-ended question versus close-ended question) 1 2 3 4 5 NA
 12 Gives advice rather than explain options and alternatives 1 2 3 4 5 NA
 13 Explains the reason for the communication in a culturally safe manner 1 2 3 4 5 NA
 14 Uses questions in a balanced way, avoiding patient's passive participation (e.g. only responding to questions) 1 2 3 4 5 NA
 15 Describes what they are going to do BEFORE doing it 1 2 3 4 5 NA
 16 Gives appropriate (dignity) reassurance 1 2 3 4 5 NA
 17 Makes direct eye contact, if in a face-to-face communication situation, as appropriate to the culture 1 2 3 4 5 NA
 18 Provides appropriate feedback encouraging communication 1 2 3 4 5 NA
 19 Admits expression of feelings and thoughts 1 2 3 4 5 NA
 20 Identifies potential conflict and finds opportunities to gather information to minimize or manage it 1 2 3 4 5 NA
 21 Maintains control appropriate to the culture when talking with the patient and/or family (e.g. eye contact, distance, spatial organization) 1 2 3 4 5 NA
 22 Listens attentively and answers questions from the recipient patient care depending on the context 1 2 3 4 5 NA
 23 Finds input from the patient regarding their feelings and goals 1 2 3 4 5 NA
 24 Balances listening and talking 1 2 3 4 5 NA
 25 Recognizes and responds to patient's non-verbal reactions 1 2 3 4 5 NA
 27 Treats the patient in a culturally respectful manner 1 2 3 4 5 NA
 28 Speaks in an appropriate tone and volume given the situation 1 2 3 4 5 NA
 29 Encourages feedback and input from patient 1 2 3 4 5 NA
 30 Sets or remains level with the patient when possible given the communication 1 2 3 4 5 NA
 31 Encourages patient reflection on their behavior to facilitate change about the message 1 2 3 4 5 NA
 32 Offers patient opportunities to organize and express their thoughts 1 2 3 4 5 NA
 33 Explains differently if necessary according to the patient's feedback 1 2 3 4 5 NA
 34 Shares possible providers for history and minimal interruptions during the interaction 1 2 3 4 5 NA
 35 Demonstrates knowledge about patient's case or situation 1 2 3 4 5 NA

0	1	2	3	4	5	NA
0	1	2	3	4	5	NA

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Results for GITCS©

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-square (776 DF) = 2798.978, p<.01; RMSEA = 0.054 (90% CI: 0.052-0.056); CFI = 0.913; SRMR = 0.048].

The second-order model also provided a significantly better fit than a single factor model [Satorra-Bentler Scaled Chi-square difference (3DF) = 763.975, p<.01] which demonstrated moderate to good fit [Chi-square (779 DF) = 3562.953, p<.01; RMSEA = 0.063 (90% CI 0.061-0.066); CFI = 0.880; SRMR = 0.049].

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

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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.

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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.



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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.

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Future Testing-Construct Validity

Higher scores = more effective health communication behaviors.

0	1	2	3	4	5	6	7	8	9	10
0	1	2	3	4	5	6	7	8	9	10

*Non-therapeutic communication Therapeutic Communication

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

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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>
- 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)
 - Columbia (Spanish)

Courtesy of USP-RP



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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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CONTACT

- **Suzanne Hetzel Campbell**
– suzanne.campbell@ubc.ca
– Twitter: @shcampbell27

