

Validating Targeted Behavioral Markers For Baccalaureate Nursing Student Teamwork Skill And Performance Outcomes In Simulation



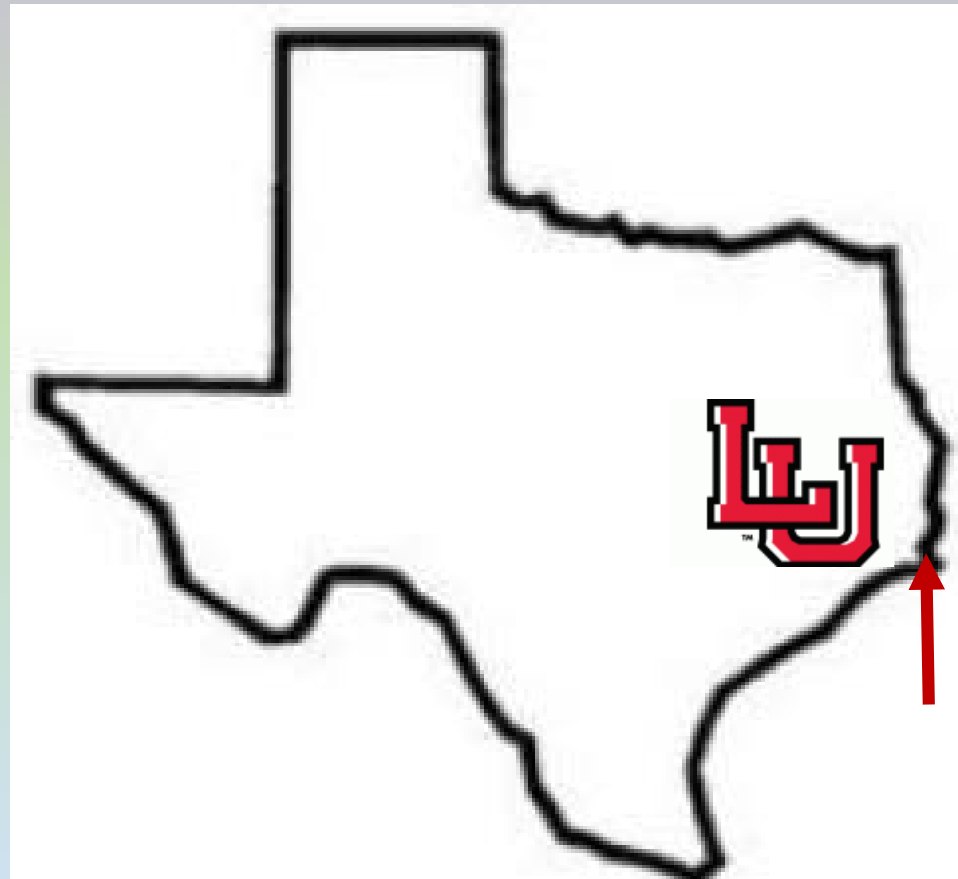
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» *28th International*
NURSING RESEARCH
CONGRESS
27-31 July 2017 | Dublin, Ireland



Greetings from Dishman School Of Nursing, Kappa Kappa Chapter STTI



- 1000 pre-nursing
- 300 BSN Students
- RN-BSN
- RN-MSN
- MSN
 - Education
 - Administration

Learning Outcome #1

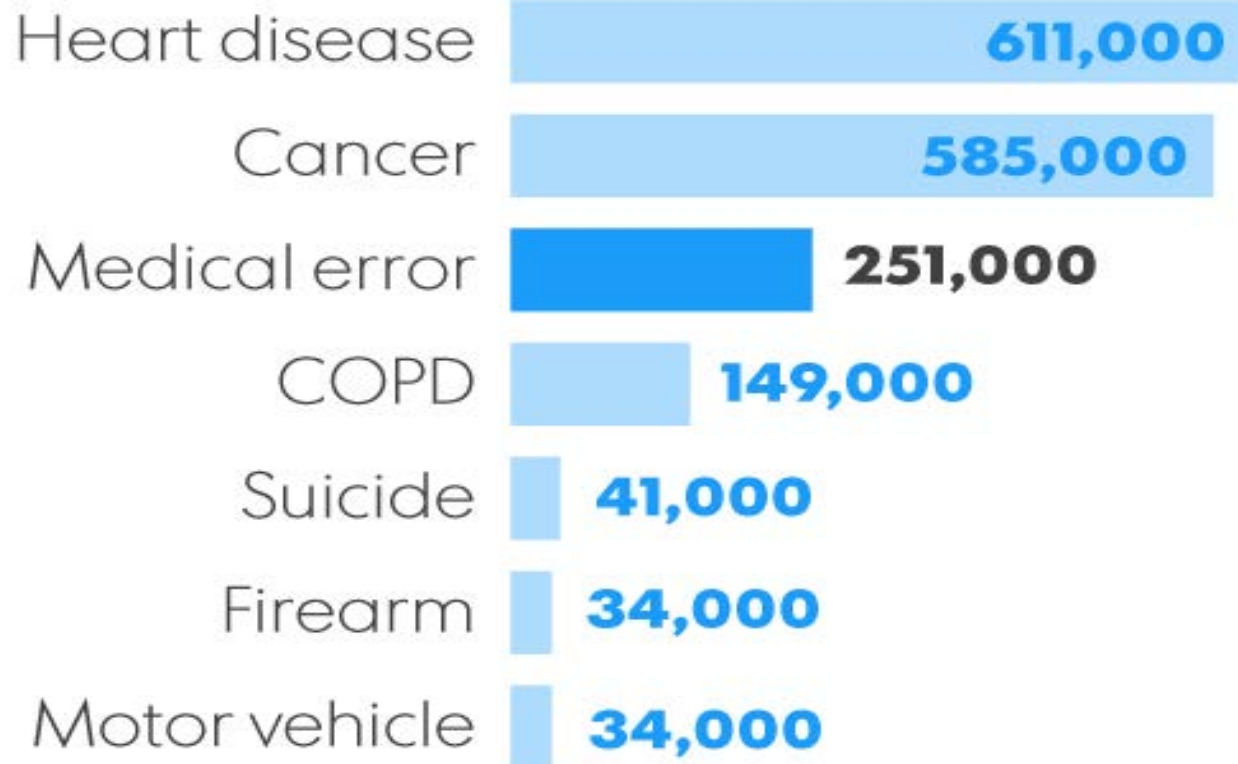


Upon completion of this educational activity, participants will be able to:

- Discuss the importance of **measuring baccalaureate teamwork behaviors** in simulation as evidence for transference of teamwork knowledge to professional nursing practice.

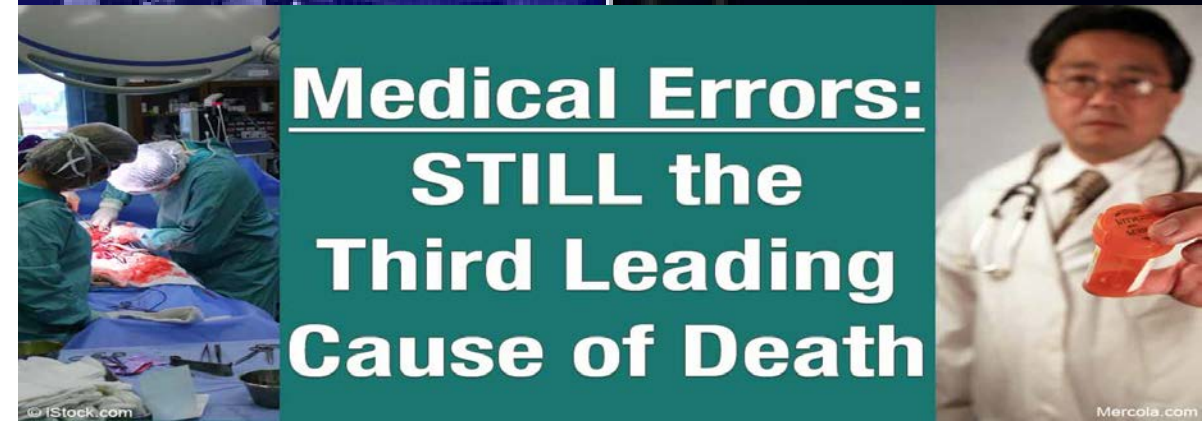
News Headlines: 2016

MEDICAL ERRORS NATION'S THIRD BIGGEST KILLER IN 2013



Source: Martin Makary, Michael Daniel study at Johns Hopkins University School of Medicine

Jim Sergent, USA TODAY



Patient Safety

- 98,000 deaths annually associated with medical error
 - (IOM, 1999, 2001)
- 180,000 Medicare patient deaths related to medical mistakes
 - (Department of Health and Human Services, 2010)
- 200,000 – 400,000 deaths annually associated with medical error
 - (James, 2013)
- Many errors related to ineffective teamwork and communication



Teamwork Competencies

- Teamwork competencies
 - National Academy of Medicine (IOM 2001, 2003)
 - Quality and Safety Education for Nursing (QSEN, 2012)
- Teamwork and Collaboration were the least integrated competencies in nursing curricula
 - Barnsteiner et al., 2012
- Nursing students need to have the opportunity to reflect on teamwork and receive feedback
 - Hirokawa, 2012)

Learning Outcome #2

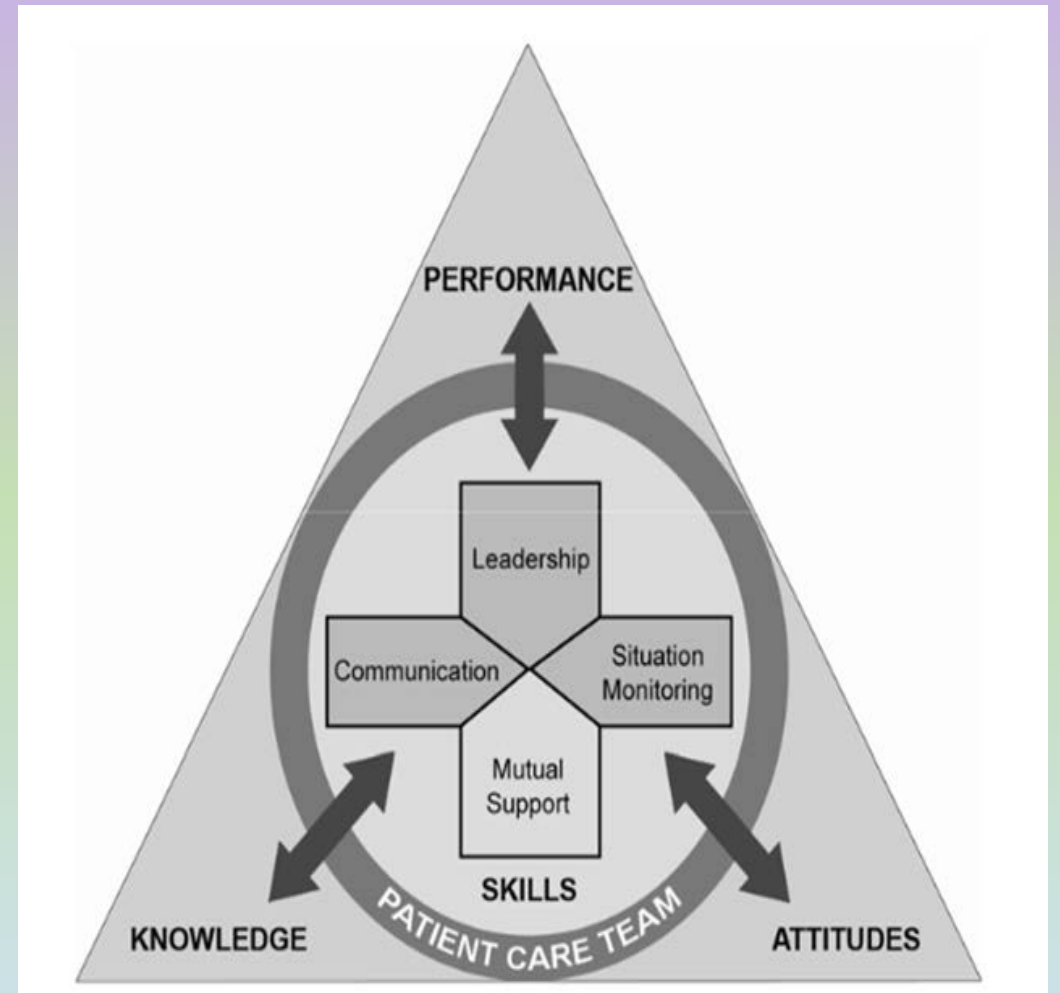


- Distinguish teamwork evaluation **research design and analysis elements** which facilitate reliable research outcomes.

TeamSTEPPs[®]

Teamwork Concepts

- Team Structure
- Leadership
- Communication
- Shared Mental Model
- Mutual Support

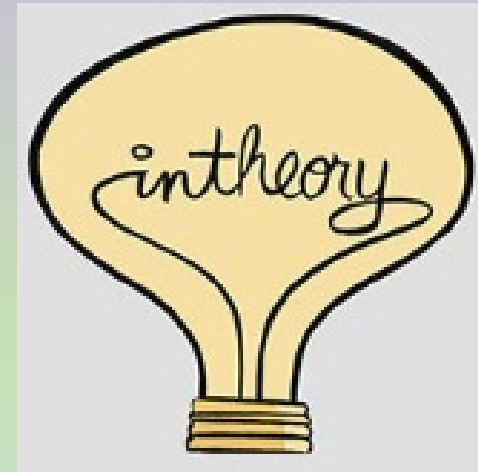


TeamSTEPs[®]

Teamwork Measurement Instruments

- Attitudes
 - Teamwork Attitudes Questionnaire (TAQ)
- Perceptions
 - Teamwork Perceptions Questionnaire (TPQ)
- Performance
 - Teamwork Performance Observation Tool (TPOT)
 - Uses global rating scales for each concept
 - Need to identify specific behaviors to be measured
 - Need method to determine reliability and validity of the newly developed behaviors

Theoretical basis for the Multitrait- Multimethod Correlation Matrix



Construct Validity

- “...the ability of an instrument to measure an abstract concept or construct.” Portney & Watkins (2009)
 - **Convergent Validity** – different test measuring same construct reveal similar results (high correlations)
 - **Divergent Validity** – tests measuring different constructs will reveal different results (low correlations)

Teamwork Nomological Network

Theorized relationships

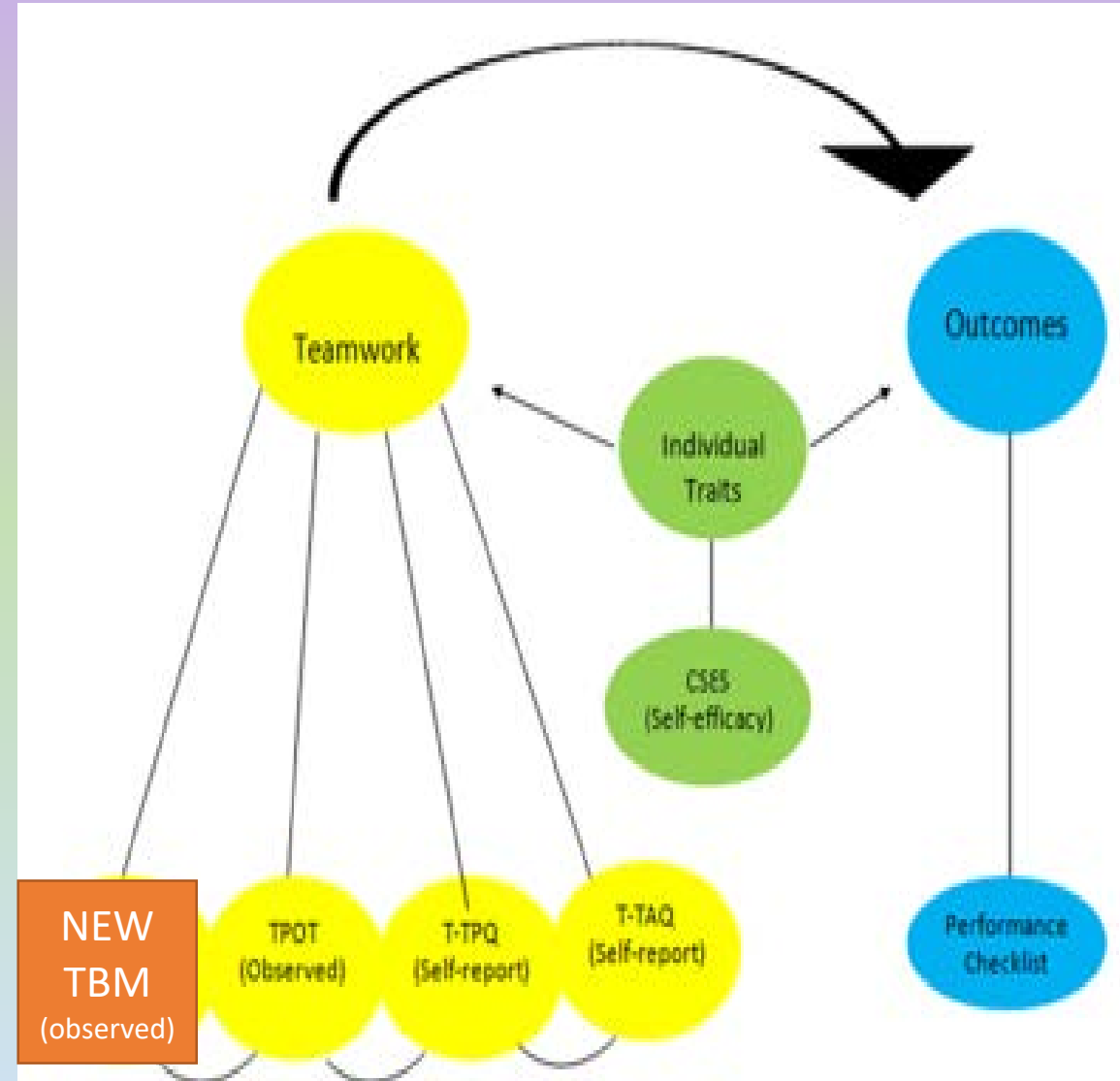
Convergent
Validity

Performance (TPOT/TBM)
Attitudes
Perceptions

Divergent
Validity

Skill Self-efficacy

Multitrait-Multimethod
Correlation Matrix



Research Methods

- Multitrait-Multimethod Correlation Design
- Convenience Sample
 - N=54 Senior BSN students (n=18 teams)
- Data Collection
 - Demographics
 - Survey
 - TeamSTEPPs® Teamwork Attitudes Survey
 - TeamSTEPPs® Teamwork Perceptions Survey
 - Clinical Skills Self Efficacy Scale
- Observation
 - TeamSTEPPs® Teamwork Performance Observation Tool
 - Targeted Behavioral Markers for Teamwork
 - National League for Nursing Simulation Checklist

Implementing Teamwork Education Simulations with Baccalaureate Nursing Students

- Using Available Resources
 - TeamSTEPPs® resources (ahrq.org)
 - NLN/Laerdal developed simulations
- Education for Students
 - Master Trainer-developed One hour TeamSTEPPs® Seminar
- Education for Faculty
 - Five hour TeamSTEPPs® Workshop and Interrater Reliability
 - Video of simulation using volunteer students not in the sample cohort

Interrater Reliability

- How much of the variance is related to actual variance in true score after measurement error has been removed?
- How well do coders provide similar ratings?
- NOT an estimate of validity
- Design
 - All raters rate all subjects OR raters rate a subset
 - Fully crossed vs. not fully crossed

Hallgren, K. A. (2012). Computing Inter-Rater Reliability for Observational Data: An Overview and Tutorial. *Tutorials in Quantitative Methods for Psychology*, 8(1), 23–34.



Interrater Reliability Designs

	All Subjects Rated by Multiple				Subset rated by Multiple			
		Rater A	Rater B	Rater C		Rater A	Rater B	Rater C
Fully Crossed	Subject 1	X	X	X	Subject 1	X	X	X
	Subject 2	X	X	X	Subject 2	X		
	Subject 3	X	X	X	Subject 3	X	X	X
		Rater A	Rater B	Rater C		Rater A	Rater B	Rater C
Not Fully Crossed	Subject 1		X	X	Subject 1	X	X	
	Subject 2	X		X	Subject 2	X		
	Subject 3	X	X		Subject 3		X	X

Adapted from Hallgren, K.A. (2012). Computing Inter-Rater Reliability for Observational Data: An Overview and Tutorial. *Tutorials in Quantitative methods for Psychology*, 8(1), 23-34.

Interrater Reliability (IRR) Measures

Cohen's Kappa

- 2 raters
- Level of measurement
 - nominal/categorical
- Design
 - Fully crossed
- Does not correct for bias and prevalence
- Cohen's **weighted kappa**, penalize for disagreements based on the magnitude of the disagreement

Intraclass Correlation (ICC)

- 2 or more raters
- Level of measurement
 - Ordinal, interval, or ratio
- Design
 - Fully crossed or randomly assigned
- Incorporates the magnitude of disagreement to compute IRR

Note: Weighted kappa is identical to a two-way mixed, single-measures, consistency ICC

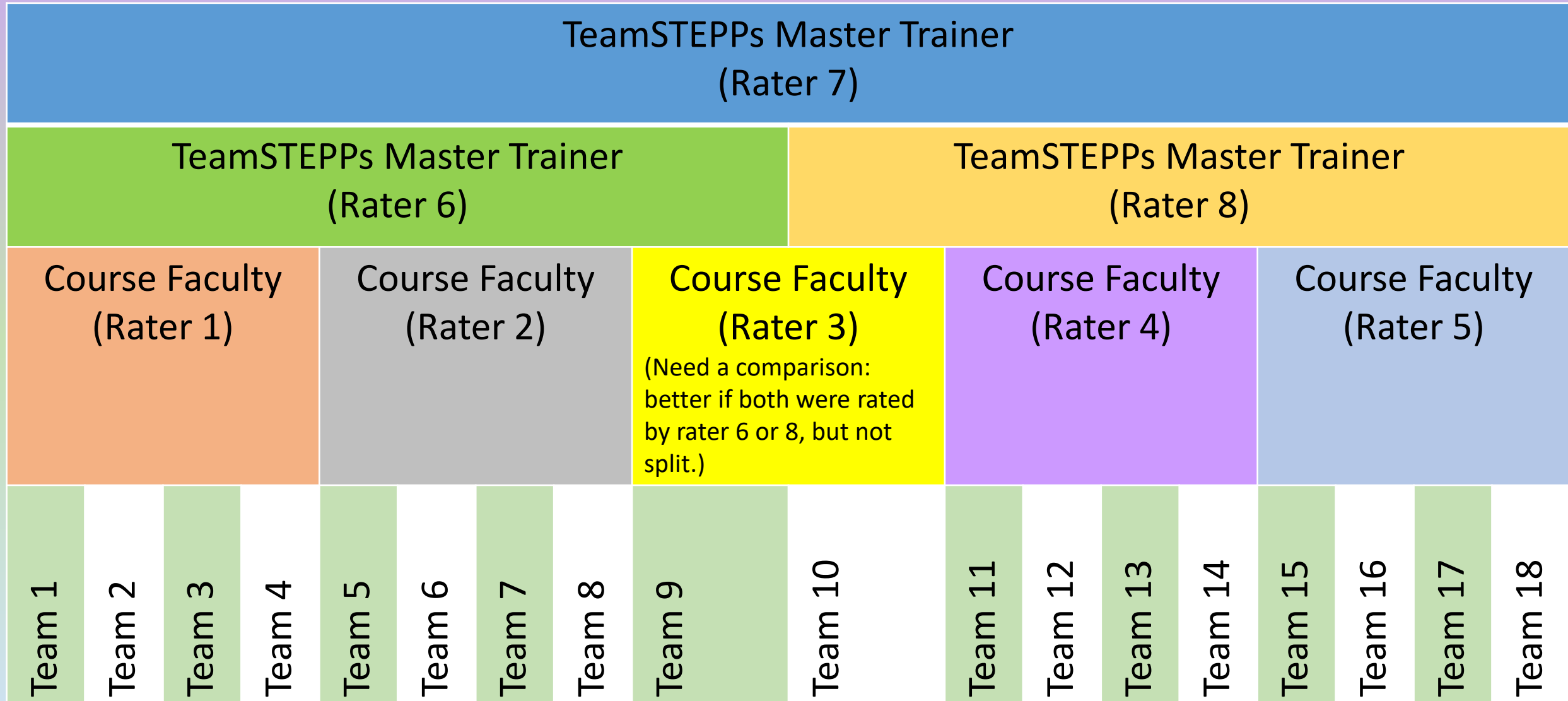
Common Mistakes in Reporting IRR

(Hallgren, 2012)

- Using percentages of agreement
- Not reporting the statistic used
- Incorrect statistic for the study design
- Not performing IRR analysis on the variables in their final transformed form
- Not interpreting the effect of IRR on power and pertinent study questions

Hallgren, K. A. (2012). Computing Inter-Rater Reliability for Observational Data: An Overview and Tutorial. *Tutorials in Quantitative Methods for Psychology*, 8(1), 23–34.

Rater Groups: Interrater Reliability Measured with Intraclass Correlation (ICC)



Preferred Grouping of Raters To Prevent Errors in ICC

TeamSTEPPs Master Trainer (Rater 7)																	
TeamSTEPPs Master Trainer (Rater 6)									TeamSTEPPs Master Trainer (Rater 8)								
Course Faculty (Rater 1)			Course Faculty (Rater 2)			Course Faculty (Rater 3)			Course Faculty (Rater 4)			Course Faculty (Rater 5)					
Team 1	Team 2	Team 3	Team 4	Team 5	Team 6	Team 7	Team 8	Team 9	Team 10	Team 11	Team 12	Team 13	Team 14	Team 15	Team 16	Team 17	Team 18

Data Analysis: Preliminary Analysis (Demographics)

	Sample (n)	Texas RNs (n)
African-American	10 (18.5%)	30,320 (10.5%)
Asian	9 (16.7%)	24,055 (8.4%)
Caucasian	30 (55.5%)	194,130 (67%)
Hispanic	5 (9.3%)	21,261 (7.4%)
TOTAL	54	287,698

Preliminary Analysis: Reliability of Instruments

- Cronbach's alpha: Survey Instruments
 - TPQ (perceptions) = 0.977 n=43
 - TAQ (attitudes) = 0.901 n=48
 - CSES (skill self-efficacy) = 0.843 n=53

Cronbach's alpha: Observational Instruments by Rater

RATER	N groups	TPOT	TBM	NLN Checklist
6	9	.871	.490	.711
7	18	.975	.775	.573
8	9	.987	.526	.627
All Raters (1-8)	18	.979	.785	.747

Data Analysis: Primary Analysis (Convergent validity)

- **RQ1:** What is the relationship between TPOT, TBMs, perceptions (TPQ), attitudes (TAQ), and the NLN Simulation Checklist?
 - TBM and the TPOT ($r^2 = .87$)
 - NLN Checklist and TPOT ($r^2 = .62$)
 - NLN Checklist and TBM ($r^2 = .63$)

		TBM	TPOT	TPQ	TPQ (SM)	TAQ	NLN Checklist _t	CSES
		Behavior	Behavior	Perception	Perception	Attitudes	Performance	Skill
TBM	Behav.	1.0						
TPOT	Behav.	.933**	1.0					
TPQ	Percept	-.354	-.315	1.0				
TPQ (SM)	Percept.	-.520*	-.516*	.905**	1.0			
TAQ	Attitudes	.191	-.190	.633**	.435	1.0		
NLN Check.	Perform.	.791**	.789**	-.357	-.490*	-.015	1.0	
CSES	Skills	.647**	.566*	.125	-.061	.250	.330	1.0

Expected to be moderate to highly correlated with TPOT & TBM

Not expected to be highly correlated with performance, attitudes, or perceptions

Data Analysis: Primary Analysis (Divergent Validity)

- RQ2: What is the relationship between the TPOT, TBMs, and the Clinical Skills Self-efficacy Scale?

		TBM	TPOT	TPQ	TPQ (SM)	TAQ	NLN Checklist	CSES
		Behavior	Behavior	Perception	Perception	Attitudes	Performance	Skill
TBM	Behav.	1.0						
TPOT	Behav.	.933**	1.0					
TPQ	Percept.	-.354	-.315	1.0				
TPQ (SM)	Percept.	-.520*	-.516*	.905**	1.0			
TAQ	Attitudes	.191	-.190	.633**	.435	1.0		
NLN Check.	Perform.	.791**	.789**	-.357	-.490*	-.015	1.0	
CSES	Skills	.647**	.566*	.125	-.061	.250	.330	1.0

Expected to be moderate to highly correlated with TPOT & TBM

Not expected to be highly correlated with performance, attitudes, or perceptions

Additional Findings: Students

- “This simulation was by far the hardest. I felt that it was very life-like, as if we were just getting a new patient on the floor.”
- “I will definitely take a lot away from this experience. I have learned from my mistakes during this simulation and won't forget them once I start working. Great simulation experience! We should do more like these. Great job!”
- “I liked this simulation because it did allow us to get a feel for appropriate and timely communication in an actual hospital setting; we may not have succeeded, entirely, but we definitely have a better idea of how we should go about communicating with our colleagues and our clients' family members.”

Anecdotal Feedback: Faculty

- TBMs facilitated providing specific feedback to student groups on how to improve teamwork.
- TBMs were easier to use than the TPOT with the global teamwork assessment.

Conclusions: Key Research Findings & Implications

- The TBM instrument did not demonstrate greater sensitivity than the TPOT in this study; however, they were highly correlated.
 - Implications
 - TBM instrument was less reliable than TPOT.
 - Revise grouping of raters to be consistent in order to accurately assess ICC.
 - Prevent contamination of TPOT by TBM by only assigning either the TPOT or TBM to each rater but not both.

Conclusions: Key Research Findings & Implications

- First study to correlate TPOT, TBM, teamwork attitudes (TAQ) and perceptions (TPQ)
 - Kirkpatrick asserts that learning can be measured by perceptions and attitudes (King et al., 2008)
 - Conversely, Vertino (2014) found improvements in team attitudes and Riggall & Smith (2015) found decreases in team perceptions from pre to post educational intervention
 - More research is needed. May have profound impact if perceptions and attitudes are not related to performance

Questions?

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Additional Information

Instrument	Scale	Level of Measurement
TPOT	5 Subscales which are scored from 1-5. Individual subscale mean and summed, Overall scale mean and sum.	Interval
TPOT with TBMs	Total number of behaviors observed	Interval
NLN Simulation Checklist	Summed Checklist Score	Interval
T-TPQ (Cronbach's alpha .88-.95)	Individual items are Likert Includes 5 Subscales. Individual subscale mean and summed, Overall scale mean and sum for team.	Interval
T-TAQ (Cronbach's alpha .70-.83)	Same as above	Interval
CSES	9 item Likert Scale 0 – 10, summed	Interval

Teamwork Performance Observation Tool (Excerpt)

1=Very Poor
2=Poor
3=Acceptable
4=Good
5=Excellent

2. Communication	Rating
a. Provides brief, clear, specific, and timely information to team members	
b. Seeks information from all available sources	
c. Uses check-backs to verify information that is communicated	
d. Uses SBAR, call-outs, and handoff techniques to communicate effectively with team members	
Comments:	
Overall Rating – Communication	

Targeted Behavioral Markers (Excerpt)

Adapted from Zhang (2015)

√ = present

Simulation Trigger	TPOT items	TBMs
Patient states “I am having pain”	1.c. Holds team members accountable. 2.a. Provides brief, clear, specific, and timely information to team members. 2.b. Seeks information from all available sources. 4.a. Monitors the status of the patient.	<input type="checkbox"/> Nurse gathers physical assessment data <input type="checkbox"/> Discusses data with other nurse.

Examples of Teamstepps® Education Resources

The screenshot shows the AHRQ website's navigation and content for TeamSTEPPS® 2.0. The top navigation bar includes links for Home, About Us, Careers, Contact Us, Español, FAQ, and Email Updates. The AHRQ logo and tagline "Advancing Excellence in Health Care" are prominently displayed. A search bar is located to the right of the logo. Below the navigation bar, a blue menu contains categories: Topics, Programs, Research, Data, Tools, Funding & Grants, News, and About. A purple breadcrumb trail indicates the current path: Home > TeamSTEPPS® > Curriculum Materials. On the left, a sidebar menu lists various TeamSTEPPS® resources, with "TeamSTEPPS® 2.0" selected. The main content area features the heading "TeamSTEPPS® 2.0" and a paragraph describing the program's purpose. A yellow callout box labeled "CONTACT INFORMATION" is positioned to the right of the text. Social media icons for Facebook, Twitter, YouTube, and Email are visible in the top right corner of the content area.

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Home > TeamSTEPPS® > Curriculum Materials

TeamSTEPPS®

- About TeamSTEPPS®
- Curriculum Materials
- TeamSTEPPS® 2.0**
- TeamSTEPPS® for Office-Based Care Version
- TeamSTEPPS® Long-Term Care Version
- TeamSTEPPS® Dental Module
- Patients with Limited English Proficiency

TeamSTEPPS® 2.0

The Agency for Healthcare Research and Quality (AHRQ) and the Department of Defense (DoD) have developed TeamSTEPPS, a teamwork system that offers a powerful solution to improving collaboration and communication within your institution. Teamwork has been found to be one of the key initiatives within patient safety that can transform the culture within health care. Patient safety experts agree that communication and other teamwork skills are essential to the delivery of quality health care and to preventing and mitigating medical errors and patient injury and harm.

CONTACT INFORMATION

TeamSTEPPS is an evidence-based program aimed at optimizing performance among teams of health care

<https://www.ahrq.gov/teamstepps/index.html>

RATERS	TBM		TPOT	
	Single Measures	Average Measures	Single Measures	Average Measures
6 & 7	.501	.667	.481	.649
7 & 8	.504	.670	.566	.723
3 & 7	.518	.682	.639	.780
5 & 7	.161	.278	.913	.954
3 & 8	.625	.769	.630	.773
5 & 8	.629	.772	.625	.770
4 & 7	.458	.628	.889	.942
4 & 6	.436	.608	.473	.642
1 & 7	-.008	-.016	.340	.508
1 & 6	-.429	-1.5	-.296	-.840
2 & 7	-.680	-4.25	.227	.370
2 & 6	-.667	-4.0	-.529	-2.25
2 & 8	.754	-.860	.797	.887
1 & 8	Unable to calculate			
5 & 6	Unable to calculate			

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