Purpose: The purpose of this study was to guide a committee of practicing nurses at a regional medical center to design a survey; in order to measure nurses’ perception of Nurse Physician communication. Through a process of self-analysis preparing for Magnet application, the medical center determined it was necessary to evaluate communication between nurses and doctors. A reoccurring theme regarding difficulties with nurse physician communication had been identified internally. A communication team was formed that included one nurse researcher, five staff & administrative nurses.

A Construct Modeling framework (Wilson, 2005) was used to create the survey. In order to guide survey construction, the construct modeling process was explained to the committee of nurses at the regional medical center. After several meetings, dimensions of communication between physicians and nurses were identified. Wilson (2005) describes Construct Modeling as a framework for developing a survey by using a set of building blocks. The building blocks include the following: The Construct Map, Item Design, Outcome Space, and Measurement Model. The goal was to identify the dimensions of communication, write items to measure the latent variable, and then analyze the results using Rasch Model diagnostics and analysis. Construct Modeling allows a researcher to focus on the institutional assessment needs (context) versus creating an instrument that would be generalizable to a population as seen in traditional statistics. The resulting construct map identified the dimensions of Nurse Physician communication is a less than more than direction of increasing complexity. Items were written and thus the survey created based on the construct map. Participants were also provided the ability to make comments within the survey for each item.

Methods: Following approval by the university’s institutional review board/human subjects committee and hospital, the survey was distributed in a paper format to RN’s during a research day sponsored by the regional medical center for all nurses. All potential participants received an information sheet about the study and asked to participate. Surveys were collected anonymously using a sealed box. Data was analyzed from the non-identified surveys by the researcher and only aggregated results reported to the hospital. Example Items include the following: 1. I feel uneasy when I call physicians at home. 2. I have experienced a physician questioning my competency. 3. A physician has personally belittled me in the presence of my co-workers.

Rasch Model diagnostics were performed on Likert survey responses; in order to assess the instrument’s functioning as it relates to objective measurement. Winsteps software was used to perform the Rasch Model analysis. In addition, diagnostic tests within Rasch Model analysis provided valuable information about item and category functioning (response categories of a likert scale); as well as, reliability and validity. Rasch Model results contribute to the overall technical quality of items thus contributing to the accumulation of validity evidence (Wolfe & Smith, 2007). As a result, Rasch Model diagnostics were used to evaluate the effectiveness of the instrument developed for objective measurement of communication.

Gravetter & Wallnau (2010) describe the limitations of ordinal data as the inability to measure the distance between each category consequently, it is inappropriate to use traditional statistics. Ordinal values only indicate the direction from one score to another. Bertoli-Barsotti (2005) describes Rasch Analysis as an acceptable alternative paradigm to traditional tests for ordinal data such as Chi Square, Mann-Whitney, Wilcoxon and Kruskal-Wallis. When ordinal data fit the Rasch model requirements, Rasch “transforms ordinal-level data into estimates of item/person parameters on interval-level scaling.” (p.72.)
**Results:** The Infit and outfit MNSQ of both the person and item measure is between 1.00 and 1.07, which indicates productive measurement. The person reliability index indicates the replicability of person ordering that we could expect if this sample of persons were given another parallel set of items measuring the same construct. A higher score means that we have developed a line of inquiry in which some persons expressed functional communication and some expressed dysfunctional communication via their category selections. (Bond & Fox, 2007)

Item reliability indicates the replicability of item placements along a continuum would be consistent if given to another sample of the same size. We can infer from the higher value .92, .93 that we have developed items based on dimensions of the construct communication that we would expect consistency of these inferences. (Bond & Fox, 2007) Person and item separation should be at least 2. For Item separation the survey scored 3.31,3.56, however the person separation was less than two at 1.46, 1.72. Item Fit: Construct Validity is a tenant of Rasch Diagnostics. Each of the items created in the survey need to contribute in a meaningful way to the measurement of the construct/concept under study. Rasch analysis provides a Fit statistic that identifies how each item fits within the underlying construct. The Fit statistics verifies that our assumptions of unidimensionality hold up empirically. (Unidimensionality means that one dimension or attribute is consistent with all items) Outfit mean squares greater than 2 indicate category dysfunction. All Outfit Mean Squares were less than 2. (Bond & Fox, 2007)

**TABLE 1. INPUT: 89 PERSON 17 ITEM REPORTED: 89 PERSON 17 ITEM 67 CATS WINSTEPS 3.72.2**

| TOTAL MODEL INFIT OUTFIT |
| SCORE COUNT MEASURE ERROR MNSQ ZSTD MNSQ ZSTD |

| MEAN 39.4 16.1 .34 1.00 -.3 1.06 -.2 |
| S.D. 8.0 2.1 .68 .03 .71 2.0 .96 2.1 |
| MAX. 53.0 17.0 1.48 .45 3.77 5.9 6.33 8.5 |
| MIN. 9.0 9.0 -1.94 .32 .14 -4.1 .17 -3.7 |

| REAL RMSE .39 TRUE SD .56 SEPARATION 1.46 PERSON RELIABILITY .68 |
| MODEL RMSE .34 TRUE SD .59 SEPARATION 1.72 PERSON RELIABILITY .75 |
| S.E. OF PERSON MEAN = .07 |
VALID RESPONSES: 94.7% (APPROXIMATE)

PERSON RAW SCORE-TO-MEASURE CORRELATION = .80 (approximate due to missing data)

CRONBACH ALPHA (KR-20) PERSON RAW SCORE "TEST" RELIABILITY = .87 (approximate due to missing data)

SUMMARY OF 17 MEASURED ITEM

| TOTAL MODEL INFIT OUTFIT |
| SCORE COUNT MEASURE ERROR MNSQ ZSTD MNSQ ZSTD |

| MEAN 206.1 84.3 .00 .15 1.02 -.2 1.07 .1 |
| S.D. 37.5 3.7 .56 .02 .28 1.7 .34 1.9 |
| MAX. 287.0 89.0 1.00 .18 1.53 2.2 1.74 2.9 |
| MIN. 141.0 77.0 -1.02 .13 .60 -3.4 .61 -3.2 |

| REAL RMSE .16 TRUE SD .54 SEPARATION 3.31 ITEM RELIABILITY .92 |
| MODEL RMSE .15 TRUE SD .54 SEPARATION 3.56 ITEM RELIABILITY .93 |
| S.E. OF ITEM MEAN = .14 |

**Conclusion:** As a result of the research partnership, data analysis provided evidence necessary for nursing to influence hospital administration to support change. In addition, qualitative data reinforced data analysis results measuring the underlying construct. Consequently, SBAR was implemented, offending physicians identified, and corrective actions implemented.

**Title:**
Improving Survey Development and Objective Measurement in Nursing Research: Construct Modeling and Rasch Diagnostics Analysis

**Keywords:**
Construct Modeling, Rasch Mode diagnostics and Rasch Model Analysis

**References:**
Publications in statistics are used based on experts and not a time frame. I wanted to point this out as these references are very important in the analysis.


Winsteps (Version 3.68.2) [Computer Software]. Chicago, IL: Winsteps.


**Abstract Summary:**
This presentation describes a partnership between a university researcher and a regional medical center RN committee to design and implement a survey to measure nurses perception of RN and MD communication using Construct Modeling. The survey results provided valuable data to effect change.

**Content Outline:**
Introduction: A partnership between nursing academia and practicing nurses provided data that resulted in significant change within the large medical center.

Body

Main Points: The purpose of this study was to guide a committee of practicing nurses at a regional medical center to design a survey in order to measure nurses’ perception of Nurse Physician communication.

A Construct Modeling framework (Wilson, 2005) was used to create the survey.


The building blocks include the following: The Construct Map, Item Design, Outcome Space, and Measurement Model.

The goal was to identify the dimensions of communication, write items to measure the latent variable, and then analyze the results using Rasch Model diagnostics and analysis.

Conclusion Themes identified include the following:

1. A small group of physicians were identified as very abusive.
2. Hospitalist's provided good experiences with communication.
3. Although nurses were abused on a regular bases by certain physicians, experienced nurses did not internalize negative comments.

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Author Summary: Dr. Bourke has a Ph.D. from Indiana University Bloomington with specializations in Community Health Nursing, Curriculum and Instruction, and Instructional Systems Technology. Upon completion of her Ph.D., she continued to advance her knowledge of statistics via graduate courses on advanced Rasch Analysis at the University of Western Australia, University of Leeds Medical School in England, and the University of Cambridge in England.