Original Research

# Development and Validation of a Scale to Measure Nurse/Medical Resident Physician Collaboration

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## Abstract

### Introduction
The purpose of this pilot study is to investigate the reliability of an interprofessional collaboration measurement scale used for nursing interactions with resident physicians. To date, the collaboration between nurses and residents has not been adequately investigated and a validated tool specifically for this purpose is not yet available. Our objective is to adapt a previously validated interprofessional scale for health care settings to the specific nurse/resident physician collaboration.

### Methods
In 2019, nurses from two hospitals were contacted via email and were invited to complete an anonymous survey that asked about the nurses' interaction and collaboration with resident physicians.

### Results
Our inquiry of 850 nurses with 59 completing a survey, returned a response rate of about 7%**.** Internal consistency for the scale was very high (*alpha* = 0.92) with no single item disproportionally reducing the reliability of the scale.

### Conclusion
Despite the limited sample size of the present pilot study, this scale was effective for examining nurse/resident collaboration. Further research will seek to expand our sample size and include measures of concurrent validity.

### Keywords
physician/nurse relations; internship and residency; education, medical, graduate; nurses attitude of health; personnel cooperative behavior; communication

## Introduction
Resident physician interactions with nurses represent one of the essential dynamics of the healthcare system. Given that even five years ago there were approximately 130,000 medical residents in the US[1] and three million nurses[2] the frequency of these interactions is significant. Nurses and residents should collaborate together, with clear responsibility delineation, positive collaboration and professional communication in order to ensure the best patient care possible.

A limited number of studies[3-5] have investigated the dynamics of nurse/resident interactions. For example, Muller-Judge and colleagues[4] conducted a qualitative investigation in which they concluded that nurse/resident collaboration is best when responsibilities are appropriately communicated and equitably shared. Conversely, in an investigation of medical residents' perspectives of collaborating with nurses,[5] Weinberg, Miner, and Rivlin found very poor resident perceptions of nurse cooperation and competence, resulting in a belief that the nurses role is to follow physician orders.

However, to date, many characteristics of these interactions and collaborations between resident physicians and their nursing colleagues are largely unknown, representing a significant gap in our understanding and practice. Evaluating interprofessional collaborative relationships is necessary to determine which activities and interventions are effective in increasing interprofessional collaboration as well as improving the health care services provided by hospitals and clinics.[6] This is especially important for nursing, as work environment and particularly the nurse/physician relationship has a high impact on nursing satisfaction.[7, 8] High nursing satisfaction has been shown to decrease nursing turnover and burnout, as well as decrease patient mortality and increase quality of care.[9, 10]

In most studies of nurse/physician collaboration, resident physicians, if included, are not separated from seasoned, practicing physicians.[11] This represents a serious shortfall in our evaluation of these relationships because resident physician and faculty-level physician work and social interactions with nurses may differ significantly. On the one hand, resident physicians represent a source of additional physician staffing, which can result in greater attention to patients, support for nurses and an improvement in care.[12] On the other hand, because of resident physician turnover and inexperience independently providing care, an increased burden for nurses can result; however, this potentiality has not be investigated. Additionally, by investigating this dynamic, nursing and residency leaders can identify areas for improvement and training.

One reason for the lack of quantitative research into the nurse/resident physician dynamic is the absence of validated measures. We conducted a non-systematic review of nursing and medical peer-reviewed literature and did not find any measurement scales available to specifically measure nurse/resident physician collaboration. To that end, this paper pilots an interprofessional collaboration scale for use when studying interactions between nurses and resident physicians practicing in acute care settings.

The Interprofessional Collaboration-Nursing/Resident scale (IPC-NR) was adapted from the general form of the Interprofessional Collaboration Scale (IPC),[13] which was developed for multiple health provider groups. The IPC scale was created to assess the interprofessional collaboration between different health professionals and was intentionally developed to be adapted to specific relationships. Our study presents the preliminary results of an initial validation of the IPC scale we believe will be useful in studying nurse/resident physician collaboration. We hypothesize that the IPC-NR will exhibit strong reliability including internal consistency.

## Methods

Nurses from two hospitals were contacted via email and were invited to complete an anonymous online survey, using Survey Monkey that contained the IPC-NR plus additional demographic questions (**Table 1**). Local nursing leadership sent the survey link once by email to all nurses at two hospitals totaling approximately 850 nurses. There was one reminder email sent as well. The scale consisted of the thirteen questions from the general IPC,[13] which were adapted in wording to specifically address the nurse/resident physician dynamic. The range of choice for each question was: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. Importantly, some questions were negatively worded and subsequently reversed coded for analyses (3, 8, 11, 12, 13) in order to avoid response set biases. All thirteen IPC-NR items were added together to create a total score for each individual nurse.

Nurse respondents also completed three additional questions taken from the Practice Environment Scale of the Nursing Work Index (PES-NWI),[14] which is an instrument that measures the nursing practice environment—defined as factors that enhance or attenuate a nurse's ability to practice nursing skillfully and deliver high-quality care. It was included for comparison between nursing interactions with residents versus interactions with attending physicians. All three PES-NWI items were added together to create a total score for each individual nurse. Previous research has identified three subscale factors for the general Interprofessional Collaboration Scale[13] (Communication, Accommodation and Isolation); however, due to the preliminary nature of this investigation, the overall scale will be validated

**Table 1.** Survey Item Means and Standard Deviations

| Item | Mean | SD |
|---|---|---|
| Q.1 Nurses have a good understanding with the residents about our respective responsibilities. | 3.53 | 0.92 |
| Q.2 Residents are usually willing to take into account the convenience of the nurses when planning their work. | 3.00 | 1.08 |
| Q.3 I feel the patient treatment and care are not adequately discussed between nurses and residents. | 3.20 | 1.11 |
| Q.4 Nurses and residents share similar ideas about how to treat patients. | 3.25 | 1.04 |
| Q.5 Residents are willing to discuss nursing issues. | 3.20 | 1.10 |
| Q.6 Residents cooperate with the way we organize nursing. | 3.15 | 0.94 |
| Q.7 Residents would be willing to cooperate with new nursing practices. | 3.41 | 0.89 |
| Q.8 Residents do not usually ask for nurses' opinions. | 3.25 | 1.12 |
| Q.9 Residents anticipate when nurses will need their help. | 2.61 | 0.93 |
| Q.10 Important information is always passed on between nurses and residents. | 2.75 | 1.03 |
| Q.11 Disagreements with residents often remain unresolved. | 2.80 | 1.05 |
| Q.12 The residents think their work is more important than the work of nurses. | 3.05 | 1.05 |
| Q.13 Residents would not be willing to discuss their new practices with nurses. | 2.71 | 0.89 |
| Q.14 Physicians and nurses have good working relationships. | 3.81 | 0.80 |
| Q.15 There is a lot of teamwork between nurses and physicians. | 3.80 | 0.92 |
| Q.16 There is collaboration between nurses and doctors. | 3.85 | 0.78 |

1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Note 1. Questions 1-13 are from IPC-NR. Questions 14-16 are from PES-NWI.
Note 2. Questions 3, 8, 11, 12, and 13 were reverse coded.

and not the subscales. Descriptive statistics and measures of internal consistency and the range of item availability were evaluated using the R Statistical Environment.[15] All respondent data were retained for the final analyses. Expedited IRB approval (Edward Via COM IRB) was obtained with implied consent.

## Results

The survey was sent to approximately 850 nurses with 59 completing the survey, a response rate of about 7%. Respondents were 98% "20-60 years old" (36% 20-30 years old), 90% female, 66% worked in the ICU or other general medical and surgical units, and ranged from less than 1-year experience as a nurse to more than 20 years of experience (36% 1-5 years, 36% 6-20 years). Seventy-five percent of nurses reported multiple interactions with residents per day and 92% of nurses reported at least daily interaction with a resident.
A wide range of variability in responses was observed, indicating that the scale was sensitive to the unique experiences of the nurses (**Table 1**; **Figure 1**). Total IPC-NR scores were significantly positively correlated with the total PES-NWI scores ($r = 0.39$, $p < .01$) indicating that nurses that report positive interactions with residents are also likely to indicate positive interactions with faculty.

Internal consistency for the scale was very high (alpha = 0.92) with no single item dispropor-

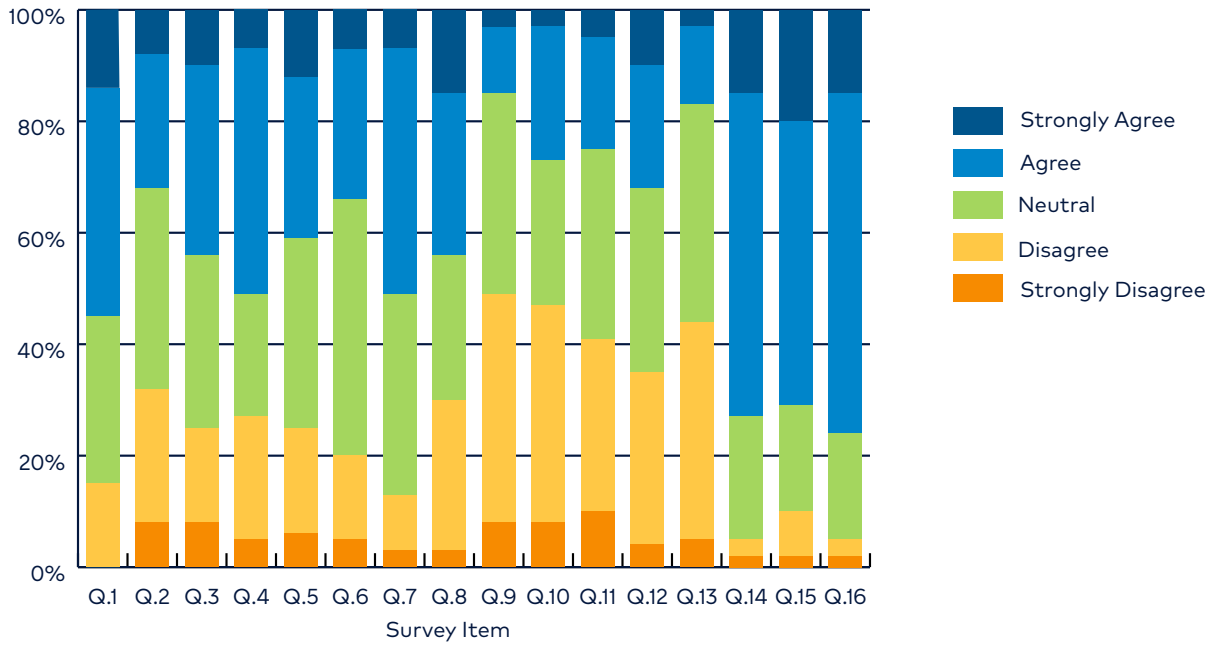


**Figure 1.** The proportion of responses for each survey item.

tionally reducing the reliability of the scale. Corrected item-total correlation (e.g., the correlation of the item with the total score, minus that item's contribution to the total score) was also strong with 15 of the 16 items producing a correlation larger than 0.55 (median correlation = 0.65). The only item with a lower correlation was Q.1 (r = 0.27). This was also the only item in which its removal increased alpha, though only by 0.01.

## Discussion

The results of from this preliminary study support the application of the IPC-NR scale for exploring the collaboration between nurses and resident physicians. We found strong internal consistency as well as desired response variability, suggesting that the items appropriately measured the nurse/resident physician collaboration. Additionally, we found that resident physician collaboration positively correlated with faculty physician collaboration, which may reflect an overall hospital-level structure that encourages positive, interprofessional collaboration. However, due to the preliminary nature of this study, a larger sample size is needed to further investigate differences in nurse experiences based on demographics including years of experience as a nurse.

## Limitations

Our study does have some limitations, including a low response rate with a small sample size of only 59 nurses and data collection limited to 2 sites. A larger sample size will be needed in order to perform a more thorough statistical validation including the replication of previously derived subscales,[13] the possible development of subscales unique to nurse/resident collaboration, and the identification of important mediators and moderators between the IPC-NR and nurse satisfaction scores. The response rate can be improved by developing greater collaboration with the stakeholders including department leaders, which would result in greater nurse participation. Another weakness is that the data is from a reaction-level, self-reported survey, which can introduce additional response biases. Future application of the IPC-NR should include concurrent validation with objective behavioral measures.

## Conclusion

The nurse/resident physician collaboration is an essential health services dynamic. Our findings reinforce that nurses and resident physicians interact daily and make important decisions together about patient care. This study represents an important step in understanding this dynamic. As our understanding grows,

improvements can be made to nurse and resident training and standards, such as shared improvement committees, that will ultimately result in improved patient care. Development of a tool for measuring this collaborative relationship is necessary for nurse and resident leaders to identify areas of focus and training, as well as measure the effectiveness of interventions designed to improve this collaboration for better outcomes for both groups. However, in alignment with Kenaszchuk et al's[13] caution of interpreting specific dyadic group results, further research and validation is needed before the practical adoption of the IPC-NR. However, this preliminary validation of the IPC-NR supports its further development.
Despite the limited sample size of the present pilot study, this scale was effective for examining nurse/resident collaboration. Further research will seek to expand our sample size and include measures of concurrent validity.

## Conflicts of Interest

The authors declare they have no conflicts of interest.

Dr. Bruce St. Amour is an employee of LewisGale Medical Center, a hospital affiliated with the journal's publisher. Dr. W. Brady DeHart is an employee of HCA Healthcare Physician Services Group, an organization affiliated with the journal's publisher.

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