Nursing and Interprofessional Teamwork on Inpatient Units in an Academic Medical Center

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Abstract

Background. Effective nursing teamwork on inpatient units is essential. In order for nursing teamwork to be truly effective, nurses must also learn how to work well within their interprofessional (IP) team. Although nurses tout the importance and necessity of teamwork as vital work-related factors, definitions and measurements of nursing teamwork within IP teamwork are limited and exclusively defined on inpatient units in hospitals.

Purpose. 1) To explore nurses' perceptions about nursing teamwork on inpatient settings at an academic medical center (AMC) and 2) To examine whether or not nurses' perceptions regarding nursing teamwork are associated with their self-perceived abilities to function as a member of an IP team.

Design. This study presented a correlational study to determine if nursing teamwork factors are associated with nurses' self-perceived abilities to function as a member of an IP team.

Methods. A nursing teamwork survey, IP teamwork questionnaire, and modified demographic questionnaire were distributed to 1629 inpatient nursing team members on 23 inpatient units in an Academic Medical Center (AMC) in Virginia.

Results. A moderately significant relationship was identified between the overall nursing teamwork survey (NTS) mean scores and overall team skills scale (TSS) mean scores. Additionally, moderately significant correlations were found among three NTS subscales and five specific TSS items. A significant difference was found in the overall mean TSS scores for nurses having been in the nursing role between six months and two years and nurses' having been in the nursing role greater than two years.

Conclusions. This study demonstrated that there is a significant relationship that exists between nursing and IP teamwork.

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Section I – Introduction & Background

Introduction

Nursing teamwork in healthcare is essential. Several authors have indicated that effective levels of nursing teamwork result in higher quality of care (Liedtka & Whitten, 1997; Young et al., 1998), greater job satisfaction (Gifford, Zammuto, & Goodman, 2002; Kalisch, Lee, & Rochman, 2010), higher productivity (Rondeau & Wagar, 1998), fewer patient errors (Morey et al., 2002; Silen-Lipponen, Tossavainen, Turunen, & Smith, 2005), and positive patient relationships (Meterko, Mohr, & Young, 2004). In addition to nursing teamwork, a growing body of interprofessional (IP) teamwork evidence suggests that effective teams improve staff and patient outcomes (Rafferty, Ball, & Aiken, 2001; Wheelan, Burchill, & Tilin, 2003; Meterko, Mohr, &Young, 2004). Although professions in both the academic and clinical arena tout the importance and necessity of IP and nursing teamwork as vital work-related factors, definitions and measurements of nursing teamwork within IP teamwork are limited and exclusively defined. Despite the premise that nursing and IP teamwork may share a common theoretical framework (Salas et al., 2005), a practical understanding of nursing teamwork factors and how they may be interdependently related to IP teamwork factors is needed in order to develop, prioritize, and implement the necessary knowledge, skills, and values targeted toward improving nurses' and their self-perceived abilities to appropriately function as a member of an IP team. One way in which this understanding can be achieved is by using previously identified IP competencies and related frameworks. For the purposes of this study, the Interprofessional Educational Collaborative (IPEC) Core Competencies for Interprofessional Collaborative Practice (IPEC,

2011) served as the standard frame of reference for building upon nursing and IP teamwork research. This study primarily explored the research question: Are nursing teamwork factors as measured by the Nursing Teamwork Survey (NTS) associated with self-perceived abilities to function as a member of an interprofessional (IP) team as measured by the Team Skills Scale (TSS)?

Background

The American Hospital Association (AHA) (2006) indicates that nurses comprise the largest group of healthcare professionals in the United States. According to the United States Department of Labor (2014), registered nurses (RNs) accounted for approximately 3 million jobs in 2012, with 61% of registered nurses (RNs) found to work in hospitals. Additionally, the AHA (2013) identified that there are approximately 50,000 inpatient nursing teams. For that reason, the nature and quality of service provided to individuals within healthcare organizations may largely be dependent not only on individual nurses' level of performance, but by the nursing and IP team they primarily work on. This is especially true concerning nursing teams working on inpatient units in hospitals. Nursing teams are challenged to provide high quality, patient-centered care for patients with varied acuities, accompanied by an ever-decreasing length of stay (Rahn, 2014). The provision of this type of comprehensive care requires a team of skilled nursing staff members to actively engage in complex roles with their fellow IP team members. Due to the various public and private stakeholders' interested in decreasing healthcare costs and improving healthcare quality, nurse and fellow healthcare researchers focusing on nursing teamwork and its role within the IP team are at an important juncture. Although several key nursing teamwork factors on inpatient units in hospitals are clearly identified, there remain several large knowledge gaps. One large knowledge gap is a full understanding of the

relationship that exists between nursing and IP teams and their teamwork abilities. A better understanding of this relationship may help identify new strategies for improving nurses' abilities to function effectively as a member of an IP team. Therefore the purposes of this study were to 1) To explore nurses' perceptions about nursing teamwork in inpatient settings of an academic medical center (AMC) and 2) To examine whether or not nurses' perceptions regarding nursing teamwork are associated with their self-perceived abilities to function as a member of an IP team.

Theoretical Framework

The Model of Team Effectiveness (McGrath, 1964) provided the general structure and guide for this study. According to McGrath (1964), the model's structure is seen to consist of three components: Input, Process, and Outcome/Performance (figure 1). The input factors of this model represent a team's potential for productivity, not always effectiveness. With this understanding, the difference between potential and actual effectiveness is representative of the function of the team processes , i.e., factors that members do not bring to the group, but which emerge out of group interaction (e.g., communication structures, task performance strategies) (McGrath, 1964). The group interaction of a team creates what McGrath (1964) describes as "process gain" or "process loss." One example of process loss is reduced team performance caused by insufficient teamwork among team members. The interaction that occurs between group input factors and group processes leads to "process gain" or "process loss" (Kozlowski and Ilgen, 2006; Mathieu et al., 2008). Furthermore, the outcomes from the group interactions may produce performance beyond what is expected on the basis of group input factors; this is seen to occur when a team capitalizes on the opportunity to work collaboratively to correct its errors (Kozlowski and Ilgen, 2006; Mathieu et al., 2008).

For the purposes of this study, this broad theoretical framework was applied to determine whether or not nursing teamwork factors were associated with nurses' self-perceived abilities to function as a member of an IP team. The primary input factors are the nursing team members themselves. These factors point to the group interaction process between the nursing and IP team members. The nursing team members' potential for productivity refers to the individuals self-perceived abilities within the IP team that they primarily work on, suggesting either process gain or process loss. These perceptions were measured by the study's survey instruments (the nursing teamwork survey, the team skills scale, and modified demographic questionnaire). The outcome (group performance) from the study survey suggests that the nursing team member have correlated perceptions of their nursing and IP teamwork.

Section II – Review of Literature

The study examined nursing teamwork factors and their associations with nurses' self-perceived abilities to function as a member of an IP team. The literature was reviewed to identify and understand the factors associated with nursing teamwork on inpatient units in hospitals. Additionally, the pertinent literature related to IP teamwork terminology, competencies, and measures were reviewed.

Methods of Review

In order to identify and evaluate nursing teamwork studies, a systematic review of literature was conducted from April 2015 to June 2015. The goal of the review was to identify scholarly articles describing nursing teamwork factors. The search began using the electronic databases Ovid MEDLINE© and CINAHL©. Key words "nursing teamwork," "nursing team," and "patient care team" AND "nurses" AND "teamwork" were used when searching Ovid MEDLINE©. Keywords "nursing teamwork" returned 20 citations, "nursing team" returned 712

citations, and "patient care team" AND "nurses" AND "teamwork" returned 318 citations. These citations were summed, resulting in 1050 initial citations. When searching the CINAHL© database, the following key words were used: "nursing teamwork," "nursing team," and "patient care team" AND "nurses" AND "teamwork." Keywords "nursing teamwork" returned 20 citations, "nursing team" returned 456 citations, and "patient care team" AND "nurses" AND "teamwork" returned 282 citations. The citations were summed, resulting in 758 initial citations. Citations from both databases were then summed, resulting in 1808 total citations. 74 duplicates were removed resulting in 1734 citations. An ancestry search was performed on the citations meeting the inclusion and exclusion criteria at the end of the search on both databases resulting in one citation. Inclusion criteria were studies: 1) written in English, 2) studies addressing nursing teamwork and 3) studies on inpatient units in hospitals. Exclusion criteria were: 1) studies that did not address nursing teamwork, 2) studies not written in English, and 3) studies not on inpatient units in hospitals. The search was limited to studies published since 2000 because of the concept of nursing teamwork on inpatient units in hospitals emerged increasingly within nursing literature over the last 15 years. Randomized clinical trials, quasi-experimental (non-randomized comparison cohort studies), case studies, multiple case series, descriptive studies, and expert opinion studies were all evaluated for inclusion in this review. Fourteen descriptive nursing teamwork studies, six nursing teamwork intervention studies, one quality improvement project were identified that met inclusion criteria. Refer to Figure 2 for Consort flow diagram of study selection.

Review of Nursing Teamwork Literature

While the general term and concept of teamwork is not new to healthcare, the concept of nursing teamwork on inpatient units in hospitals emerged increasingly within nursing literature

over the last 15 years. This more recent focus is in response to the evolving shift in the restructuring of healthcare operational priorities both in the U.S. and abroad. The concept of nursing teamwork on inpatient units in hospitals has yet to be fully characterized. Research focusing on nursing teamwork on inpatient units in hospitals is primarily developed based off the work of Beatrice Kalisch and colleagues with the creation of the nursing teamwork survey (NTS) (Kalisch, Lee, & Salas, 2010). The following section provides a brief chronological summary of how the concept of nursing teamwork emerged and proceeds through the characteristics that descriptively promote and demote nursing teamwork. Additional discussion regarding how nursing teamwork has been described, measured, and empirically tested aside from the NTS is also discussed.

Chronology of Nursing Teamwork on Inpatient Units. Kalisch & Begeny (2005) pointed out that the lack of teamwork among nursing staff affects care delivery and unit operations. They identified numerous barriers in the typical patient care unit. The barriers identified included: large team size, lack of familiarity, instability of the work force and assignments, the absence of a common purpose and destiny, and an inhibiting physical environment (Kalisch & Begeny, 2005). Despite these bold declarations concerning the need for more effective nursing teamwork, it was not until 2009 that a qualitative study applying a theoretical based model of teamwork to determine relevant team processes among nurses was conducted (Kalisch, Weaver, & Salas, 2009). The responses from the study were analyzed through the Salas "big five" framework of teamwork (Salas, Sims, & Burke, 2005). The core teamwork components include: team leadership, mutual performance monitoring, backup behavior, adaptability, and team orientation (TO). The three coordinating mechanisms include: communication, shared mental models (SMM), and mutual trust. Results from this study

supported all the components except mutual performance monitoring, adaptability, and communication to describe teamwork among nurses working on inpatient units in hospitals (Kalisch, Lee, & Salas, 2010). One of the implications from the study indicated the need for validating this conceptual model (Kalisch, Weaver, & Salas, 2009).

Adding to Kalisch, Weaver, & Salas's (2009) qualitative study which helped better define nursing teamwork on inpatient units in acute care hospitals, Kalisch, Lee, & Salas (2010) developed and tested the nursing teamwork survey (NTS) in 2009. Prior to the development of the NTS, no acceptable, reliable, and valid survey instrument existed that differentiated between the levels of nursing teamwork on inpatient units in acute care hospitals. The content validity for the NTS index was 91.2% (on the final version of the NTS). Good test-retest reliability was identified, $r = .92$ for overall 33 items; $r = .77$ to $.87$ for the five subscales and internal consistency ($\alpha = .94$ for overall items; $\alpha = .74$ to $.85$ for the subscales). These strong psychometric property findings of the NTS concluded that future testing in hospitals with varying characteristics were needed and for further exploration of their links to clinical and operational outcomes (Kalisch, Lee, & Salas, 2010).

Nursing Teamwork - Descriptive Studies. Following the validation of the NTS, Kalisch & Lee (2009) performed a correlational study in a large academic health center and community hospital with the purpose of exploring possible associations between nursing teamwork and staff characteristics, staffing, and scheduling variables on 38 patient care units. From the 1758 nursing staff members participating in the study, a positive relationship between selected staff characteristics, aspects of work schedules, staffing, and teamwork were identified. Specifically, staff characteristics for teamwork overall and the SMM subscale scores were significantly different by gender, with men reporting lower (3.54 ± 0.61 and 3.90 ± 0.74,

respectively) and women higher teamwork (3.64 ± 0.57and 4.00 ± 0.57, respectively), t (1687) = -2.080, p <.05, and t (1687) = -2.236, p < .05, respectively. The SMM score was also different by age, with the older group reporting higher SMM scores, *F* (4,1744) = 2.720, p < .05. The study also identified significant differences between the four categories of shift worked (day, evening, night, and rotating) with the overall teamwork score, *F* (3, 1741) = 4.38, p < .01. Nursing staff indicated desires to work where teamwork is high, and perceptions of good staffing lead to higher teamwork (p < .01). Additional results were provided. The NTS was the only instrument used to capture the results.

In 2009, Kalisch sought to compare registered nurses (RNs) and nursing assistants (NAs) perceptions of elements of missed care and reasons for missing care and assess how they explained selected issues underlying teamwork between RNs and NAs. A mixed-method approach of 633 RNs and 121 NAs completed the MISSCARE survey and participated in focus groups in 18 acute care units at 1 hospital. The MISSCARE survey is a two part nursing survey, containing a total of 38 questions, using a 4-point Likert scale (Part A: *rarely* missed to *always* missed and Part B: *not a reason* to *a significant reason* for why care was being missed). The survey asked respondents their perceptions of which elements of care are being missed (and their frequency), as well as the reasons why this care is being missed. Findings indicated that the overall missed care score for RNs (mean, 1.71 [SD, 0.34]) was greater than the missed care score of NAs (mean, 1.49 [SD, 0.37]) (t752 = 6.35, p < .001). Staff/labor resources were identified as greatest reason for missed care by both RNs and NAs. RNs (mean, 3.19 [SD, 0.57]) felt that labor resources were a larger cause for missing care than did NAs (p < .01).

Kalisch, Lee, & Rochman (2010) performed a cross-sectional descriptive study in four Midwestern hospitals and one Southern hospital in 80 different patient care units seeking to

explore the influence of unit characteristics, staff characteristics, and teamwork on job satisfaction with current position and occupation on inpatient units in acute care hospitals. Up until this point, the authors indicated that previous studies provided empirical evidence that higher levels of teamwork were associated with higher levels of job satisfaction, however few studies were focused on inpatient nursing teams in acute care hospitals. The study instruments used for this study included the NTS and a staff characteristic survey. Results from the 3675 nursing staff members who participated in the study indicated that the job satisfaction variables from the survey were statistically significant, explained by teamwork and perceived staffing adequacy ($p < 0.001$). Those in pediatric intensive or intermediate level units, psychiatric units and emergency departments had higher levels of satisfaction than medical and surgical unit staff ($p < 0.05$). Also, nursing staff who cared for more patients reported a lower level of satisfaction ($p < 0.05$). Nursing staff that scored higher on teamwork and perceived adequate staffing were more likely to be satisfied with their occupation ($p < 0.001$).

Kalisch & Lee (2010) performed another cross-sectional descriptive study in 50 patient care units across 4 hospitals located in the Midwest with the purpose of determining if the level of nursing teamwork impacted the extent and nature of missed nursing care. Prior studies provided evidence that missed nursing care is a significant problem in acute care hospitals, but never in the context of being exclusively associated with nursing teamwork. The NTS, MISSCARE survey, and staff characteristic questionnaire were used to evaluate this question. Findings from the 2216 nursing staff members who participated in the study indicated that the teamwork overall score was significantly different by type of unit ($F = 29.14$, $p < .01$), with intensive care units demonstrating the highest overall score of teamwork ($F = 29.14$, $p = .00$) and rehabilitation units having the lowest overall score of teamwork (no F & p value reported). A

negative relationship between the missed care mean scores and teamwork overall scores ($r = -.37$, $p < .01$) was supported. More missed care was also significantly related to the following factors: trust ($r = -.31$, $p < .01$), backup ($r = -.31$, $p < .01$), SMM ($r = -.32$, $p < .01$), and team leadership ($r = -.29$, $p < .01$). The higher the overall teamwork and the subscales scores, the less care was missed.

In 2012, Kalisch & Lee sought to test the congruence of the perceptions of unit-based nurse leaders (managers, advanced practice nurses) and nursing staff members (RNs, NAs, USs) in 11 acute care hospitals and 124 acute care units located in the Midwest and California as to the extent and type of missed care and nursing teamwork. Using the leader-member exchange congruence framework (LMX), 4415 nursing staff members and 104 nurse leaders completed the NTS and MISSCARE survey. The findings revealed that the mean missed nursing care score for nursing staff was 1.55 (SD, 0.41) compared with 1.62 (SD, 0.34) for nursing leaders. Therefore, nurse leaders reported higher overall teamwork scores than did nursing staff, but the difference did not reach statistical significance ($t = -1.48$, $p = .140$). A lower score suggested the likelihood of more missed care.

In 2013, Kalisch, Russell, & Lee used a descriptive correlational design study with the aim of trying to determine whether or not a relationship existed between the team and unit size and level of nursing teamwork. The study was conducted in 53 acute care units in four hospitals located in the Midwest, recruiting 2265 nursing staff members to take the NTS. Using unit size variables to compare with the NTS results, findings suggested that the number of RNs and total unit staff had no significant correlation with any of the nursing unit teamwork factors, however no statistical findings were provided. There was a significant, negative correlation between number of NAs ($r = -.389$, $n = 53$, $p = .004$) and average daily census ($r = -.410$, $n = 53$, p

= .002) with the nursing unit teamwork overall mean score. In other words, as the number of NAs and average daily census (DC) increased on a unit, the nursing unit teamwork decreased. Significant measures of the DC and the number of NAs were also negatively correlated with each of the five nursing unit teamwork subscales (overall teamwork: r = .410 (DC)/.389 (No. of NAs); SMM: r = .434//424; team trust: r = .451/.459; TO: r = .505/.440; team leadership: r = .500/.511; team backup: r = .555/.580).

To help further characterize nursing teamwork, Kalisch, Lablelle, & Boqin (2013) sought to explore whether the level of nursing teamwork was correlated to call light answering time in acute care hospital inpatient units. The authors referenced several articles that referenced patient safety and satisfaction to call bells; however no studies examining the relationship with nursing teamwork were identified. Three hospitals, 14 patient care units, and an undetermined number of nursing staff members were analyzed in attempts to determine the level of nursing teamwork. Using the NTS and the hospitals call light tracking system, findings showed that there was a not a significant difference in response time among the three hospitals ($\chi 2$ (2, 14) = 3.54, p = 0.17). The medians for call light answering time were: Hospital 1 = 191 seconds, Hospital 2 = 215 seconds, and Hospital 3 = 584.5 seconds. There was no significant relationship between call light response time and teamwork overall or on the five subscales. Statistical findings were not provided. SMMs was correlated with call-light answering times, however did not reach a significant level (r = -334, p = 0.243).

In 2013, Kalisch & Lee conducted a cross-sectional study that examined the relationship among hospital, patient units, and staff characteristics and nursing teamwork. Revisiting their prior investigation from 2009, Kalisch & Lee identified that despite having found a relationship between selected characteristics and teamwork, it was limited by the study's small sample size

and gave limited value in terms of patient safety. This study sought to build upon this previous investigation by utilizing a larger sample, taking place in six hospitals and 95 patient care units located in Michigan and California. A total of 3769 nursing staff members participated in study by completing the NTS, hospital and unit characteristic questionnaire, and staff characteristic questionnaire. Findings from this study revealed that small-size hospitals scored higher on teamwork overall and on four subscales (trust: $F = 12.18$, $p < .01$), TO: $F = 14.59$, $p < .01$, backup: $F = 8.90$, $p < .01$, and SMM: $F = 16.39$, $p < .01$) than larger size hospitals. The following types of units ranged from highest to lowest on teamwork: psychiatric ($t = 3.59$, $p = .00$) and perioperative units ($t = -0.00$, $p = 1.00$) as highest; ICU and pediatric and maternity units ($t = 1.36$, $p = .18$); and medical–surgical, intermediate and rehabilitation units ($t = -3.73$, $p = .00$) and ED ($t = -1.29$, $p = .20$) and other units as lowest.

Nursing Teamwork - Interventional Studies. In attempts to improve nursing teamwork and improve patient safety, Kalisch, Xie, & Ronis (2013) sought to test the impact of a train-the-trainer intervention on the level of satisfaction with nursing teamwork and the amount of missed nursing care. Using a quasi-experimental design, the study used three pre/post measures to test the efficacy of their intervention, to include: NTS, MISSCARE survey, teamwork satisfaction and knowledge questionnaire. The study recruited 242 nursing staff members from three patient care units in three separate acute care hospitals. Only 85 participants completed all three surveys. Results revealed that significant increases of overall teamwork took place in all three hospitals after pretesting ($F = 6.91$, df = 259.01, $p = .001$; SUBSCALES: Trust – $F = 3.71$, df = 253.97, $p = .026$; TO- $F = 3.51$, df = 269.80, $p = .031$; Backup- $F = 7.85$, df = 257.59, $p = .001$; SMM- $F = 1.89$, df = 252.12, $p = .154$); missed nursing care significantly decreased after pretesting ($F = 3.59$, df = 251.29, $p = .029$); satisfaction with teamwork increased significantly

over time ($F = 6.62$, df = 283.08, p = .002); and that teamwork knowledge increased over time ($F = 5.36$, df = 263.28, p = .005). Pretesting values were not provided.

In attempts to strengthen and further illustrate the importance of nursing teamwork in inpatient units in acute care hospitals, Kalisch, et al. (2015) tested a virtual simulation method with the aim of increasing teamwork among the nursing staff on inpatient units. The authors noted that despite the call for more effective healthcare teams, there was limited research focusing on teaching methods which also fostered teamwork skills among nursing staffs, specifically in regards to acute care inpatient settings. The study's intervention included two steps: 1) podcasts on the elements of teamwork to be heard at participant leisure and 2) 1-hr virtual simulation training where the participants were exposed to three scenarios with debriefing sessions at the end of each. 43 registered nurses from one acute care inpatient patient care unit in an academic health center located in the Midwest participated in the study. The findings revealed that the overall mean teamwork scores improved from pre- (M= 3.25, SD = 0.58) to post-intervention (M = 3.49, SD =0.67, $p < .012$). The intervention also had large ($0.60 \leq d \leq 0.97$) and significant effects on the measures of three teamwork subscales (trust: $p < .042$, TO: $p < .004$, and backup: $p < .045$). Teamwork knowledge scores were not significantly different between pre and post-intervention ($t = -1.08$, $p < .301$).

In addition to the nursing teamwork studies performed primarily by Kalisch, several nurse researchers attempted to describe nursing teamwork. In 2014, Bridges, Sherwood, & Durham (2014) aimed to better understand the effect of a mutual support educational intervention on teamwork behaviors, specifically focused on an acute care nursing staff. The mutual support education intervention focused on teamwork behaviors, consisting of a one-hour interactive education session supported and adapted from the TeamSTEPPS curriculum. The

core components of teamwork that comprise TeamSTEPPS include: leadership, communication, mutual support (backup behavior), and situation monitoring (AHRQ, 2014). Twenty-two nurses completed a pre- and post- NTS as well as participated in an education intervention training at one large community hospital in the Southeast. The findings revealed that the subscale of Backup behavior illustrated the strongest improvement. Backup behavior represents, "the discretionary provision of resources and task-related effort to another…[when] there is recognition by potential backup providers that there is a workload distribution problem in their team (Porter et al., 2003, pp.391-392)." Additionally, the study demonstrated that education can have an impact on perceptions and awareness of mutual support among nursing team members. No inferential statistics were performed on the findings to determine the statistical significance.

In attempts to evaluate nurses' teamwork attitudes amongst each other, Vertino (2014) conducted a pre-experimental pretest/posttest repeated-measures design study on a single inpatient unit at a VA hospital located in an urban setting. Initially, 44 nursing staff members participated in taking a pretest TeamSTEPPS Teamwork Attitudes Questionnaire (T-TAQ) four weeks before the study intervention which included structured team training (customized version of the TeamSTEPPS teamwork training). Following the intervention, staff was asked to complete a posttest T-TAQ, but only 18 staff members participated. The findings were unclear on whether or not TeamSTEPPS improved nurses' teamwork attitudes amongst each other and the authors performed no inferential statistics regarding the differences between occupational group (RNs, LPNs, NAs) and years of clinical experience on attitudes toward teamwork.

Recently, Reed (2015) performed a mix methods study that evaluated a new work flow process improvement program for acute care inpatient nursing units and its effects on nursing staffs' perceptions of their teamwork. A convenience sample of nursing staff members (pre-

intervention NTS: n = 50/post-intervention NTS: n = 34; focus group pre-intervention: n = 6/focus group post- intervention: n = 4) was performed on acute care units at a small community hospital. The intervention included revisions of team player roles (charge nurse, RN's, LPN's, and STNA's), daily goals sheets, caregiver to caregiver report, and unit huddles to improve communication. The findings from the study indicated that six months after the new workflow changes were implemented, the average score for the NTS decreased. Before the workflow process changes were implemented, the focus group verbalized feelings of distrust with charge nurses and managers, and a lack of performance monitoring amidst the team. Six months after the changes were implemented, staff verbalized that teamwork was worse. The focus group concluded that the changes made were not followed up to verify staff understood and complied.

Nursing Teamwork - Other Studies. In 2012, Castner et al. performed a cross-sectional study in one 5-hosptial healthcare system that measured 456 RNs' perceptions of teamwork skills and behaviors in their work environment during a nursing focused organizational teamwork development initiative. To measure nursing perceptions, the authors used the Brief TeamSTEPPS Perceptions Questionnaire (Breif T-TPQ) and demographic questionnaire. Communication was the strongest component of teamwork 95.9% (n = 424). Comparing those who attended TeamSTEPPS and those who had not, only the leadership subscale demonstrated a significant difference, wherein TeamSTEPPS training related to higher leadership scores.

Estryn-Behar, et al. (2007) conducted a cross-sectional study across Europe aiming to identify factors for why nurses were leaving their jobs. Factors including nursing teamwork characteristics were evaluated. The broad scale study evaluated 28,561 nurse responses across 10 European countries, using a 260-item questionnaire. The findings from the questionnaire indicated that a low score for quality of nursing teamwork was associated with a 5-fold increased

intent-to-leave (ITL). Across countries, a low score for quality of teamwork was associated with at least a 4-fold increased ITL.

In 2013, Castner et al. conducted a cross-sectional study, using secondary analysis to measure the relationship of control over practice among Salas et al.'s five dimensions of teamwork: team structure, leadership, situation monitoring, mutual support, and communication. Four-hundred and fifty-six RNs from one 5-hosptial healthcare system completed the study survey. The brief T-TPQ and a demographic questionnaire were analyzed. The results indicated there was no relationship between years of experience in the current role and belonging to the group with high control over practice ($F_{(1, 428)}$ =2.5, p=.104) or the group that attended TeamSTEPPS® training ($F_{(1,428)}$ =.8, p = .376). The global measure of teamwork demonstrated a relationship with high control over practice and years of experience in the current role, but not with teamwork training. Only leadership was perceived as better for those who attended Teamstepps® (M=3.5, SD=1.1) than those who did not (M=3.1, SD=1.1), $F_{(1,425)}$=8.1, p=.005, partial η^2=.019. The situation monitoring subscale demonstrated an interaction effect between TeamSTEPPs® attendance and control over practice ($F_{(1,425)}$=5.2, p=.023, partial η^2=.012).

Brunetto, et al. (2013) performed a cross-sectional study attempting to explain the links between supervisor–nurse relationships, teamwork, psychological wellbeing and turnover intentions for nurses by generations in the USA. Generations were identified in terms of three generational cohorts: Baby Boomers (BB), those born between 1943 and 1960, and experienced the Vietnam War and the Civil Rights movement; Generation X (Gen X), those born between 1960 and 1980 (alternatively 1965–76) and experienced single-parent homes, the Challenger disaster and computers; and Generation Y (Gen Y), those born between 1976 and2000 (alternatively 1980–2000). A total of 695 nursing staff members from two private sectors, acute

care medium-sized hospitals participated in the study. In regards to teamwork, the findings revealed that supervisor–nurse relationships, teamwork, and wellbeing explained almost half of nurses' commitment to their hospital and their intentions to leave. The authors identified differences across nurse generations psychological wellbeing, affective commitment and turnover intention, but not for satisfaction with supervisor–nurse relationships or teamwork among Generation X and Y and Baby Boomer nurses. No p-values were reported by the authors.

West et al.'s (2012) performed a quality improvement project with the aim of improving patient safety through the implementation of crew resource management (CRM) techniques among acute care nursing teams. CRM techniques training consisted of a modular 6-hour didactic session, followed by a 2-hour simulation session using a high-fidelity patient simulator that addressed specific topics such as teamwork and communication through leadership. 47 nursing staff members from one Veteran Affairs (VA) acute care hospital were evaluated by a modified nursing questionnaire (NQ) provided pre/post training. The authors did not report any inferential statistical findings that indicated whether or not the CRM training improved nursing teamwork.

In 2014, Rahn examined the relationship of nursing teamwork to patient outcomes (nurse sensitive patient outcomes) using an exploratory, mixed methods approach. This study was conducted on acute care units located in a not-for-profit community hospital in the Northeast, analyzing 154 nursing staff members who completed a NTS and then compared to the hospitals local NDNQI nurse-sensitive patient outcomes regarding pressure ulcers, patient falls, and catheter associated urinary tract infections. Focus group findings were also included in determining outcomes for this study. The final findings described variability in teamwork constructs across two acute care units studied (Overall teamwork score: $F = 2.85$, $p = .008$;

SMM: $F = 3.853$, $p = .001$; TO: $F = 2.728$, $p = .011$; and Trust: $F = 3.039$, $p = .005$). Findings in regards to patterns existing between the two acute care units when comparing teamwork and patient outcomes identified higher levels of teamwork with fewer negative nursing outcomes ($p < 0.05$). In regards to which dimensions of nursing teamwork were found associated with nurse-sensitive patient outcomes, the relationship between the SMM and unassisted falls was the statistically significant finding ($p < .05$).

Summary of Nursing Teamwork Literature

In summary, twenty-one studies were identified that met all inclusion criteria for this review. Nursing teamwork factors were effectively described and measured using the NTS on inpatient units in hospitals. Despite the limited experimental studies in this area and the variety of factors exploring nursing teamwork, only three major themes were identified which serve to illustrate the relationship between nursing teamwork and inpatient units in hospitals: the impact of nursing teamwork on missed care, the effects of nursing staffing characteristics and nursing teamwork, and the effects of interventions on nursing teamwork. The relationship of nursing teamwork to job satisfaction and attrition was also evaluated. There were no studies identified that compared nursing teamwork factors and IP teamwork factors.

The Impact of Nursing Teamwork on Missed Care. Several of the studies by Kalisch and colleagues demonstrated the impact of missed care on nursing teamwork on inpatient units in acute care hospitals. The majority of missed care was reported to be related to RNs perceptions of missed care versus that of other nursing staff. Additionally, it identified that more missed care was associated with nursing teamwork factors (trust, backup, SMM, and team leadership). Kalisch, Xie, & Ronis (2013) demonstrated in their interventional study that missed care decreased when effective nursing teamwork was high. However, despite this data showing the

positive effects of improving nursing teamwork through team training, team training alone is not sufficient to ensure that missed care is being fully mitigated.

Perceptions of Adequate Staffing and Nursing Teamwork. Four of the studies in this review indicated effective nursing teamwork with perceived adequate staffing (Kalisch, 2009; Kalisch & Lee, 2009; Kalisch & Lee, 2013; Kalisch, Lee, & Rochman, 2010). While these findings propose that adequate staffing is related to higher levels of nursing teamwork, the evidence is limited to understanding whether adequate staffing indeed causes this phenomenon. One of the studies did identify specifically that an increase in the number of NAs and average daily census on a unit was associated with a decrease in the nursing unit teamwork (Kalisch et al., 2013).

The Effects of Interventions on Nursing Teamwork. Six interventional studies emerged from the review describing their effects on nursing teamwork. All but one (Reed, 2015) of the interventional studies revealed that nursing teamwork can improve with training (see Appendix A). The evidence from these studies all measured different aspects of nursing teamwork. More research is needed to fully understand the effects of team training.

The Relationship of Nursing Teamwork to Job Satisfaction and Attrition. Despite the limited studies describing the relationship between nursing teamwork to job satisfaction and attrition, three studies emerged. Only one of the studies in this review addressed nursing teamwork and job satisfaction on inpatient units in hospitals (Kalisch, Lee, & Rochman, 2010). Findings revealed that nursing staff who cared for more patients reported a lower level of job satisfaction. Additionally, nursing staff that scored higher on teamwork and perceived adequate staffing were more likely to be satisfied with their occupation. Further evidence is needed to better understand whether teamwork and adequate staffing indeed causes higher job satisfaction.

Two of the studies discussed the impact of nursing teamwork and job attrition (Estryn-Behar et al., 2007 & Brunetto et al., 2013). Estryn-Behar et al. (2007) reported that lower levels of nursing teamwork were associated with a 5-fold increased intent-to-leave (ITL). Brunetto et al. (2013) identified that that supervisor–nurse relationships, teamwork, and wellbeing were associated with nurses' level of commitment to their hospital and their intentions to leave.

Limitations & Strengths

There are a number of limitations to this review. There are no large meta-analysis and/or randomized controlled studies that show the effectiveness of nursing teamwork, especially in the context of inpatient units in hospitals. A majority of the studies that do exist concerning nursing teamwork on inpatient units in hospitals are descriptive correlational studies, with only a small number being quasi-experimental studies. There were no studies that evaluated nursing teamwork in the context of the possible associations between nursing teamwork and self-perceived abilities to function as a member of an IP team. Also no studies were identified that examined the relationship between nursing and IP teamwork.

One of the strengths to this review is that it provides foundational knowledge regarding how to measure nursing teams and their level of team functioning on inpatient units in hospitals. Also, the NTS provides a valid and reliable method for evaluating overall nursing teamwork.

Implications for Practice

This literature review shows that effective nursing teamwork on inpatient units in hospitals remains a challenging issue for all nurse managers and hospital administrators. Despite the limitations, growing evidence demonstrates that nursing teamwork is extremely important in relationship to the inpatient setting in several important areas, including missed-care, patient outcomes, staff satisfaction and retention, and individual perceptions of teamwork. In the given

era of time focusing on building more effective teams to improve patient safety and quality of care, the perhaps more compelling gap of knowledge exists surrounding the relationship involving IP and nursing teamwork. To date, the author has not identified any research that formerly addresses how nursing teamwork factors may be associated with nurses' and their self-perceived abilities to function as a member of an IP team. With a more formal understanding of how nurses' perceive their own teamwork and their self-perceived abilities to function as a member of an IP team, critical team competencies can be created and implemented.

Overview of Interprofessional Teamwork Literature

Like nursing teamwork, understanding individuals' perceptions of what constitutes and define IP teamwork in healthcare settings requires examination of the terminology, competencies, and measurements associated with IP teamwork on inpatient units in hospitals (Marks et al., 2001; Dickinson, et al., 1997; Ilgen et al., 2005; Salas et al., 2005). A brief literature review was conducted examining IP team-based terminology, competencies, and measurements from August, 2015 to September, 2015. The search used the Ovid MEDLINE© and Google Scholar electronic databases. Therefore, the goal of this section is to provide a brief overview of IP team-based terminology and competencies that describe IP teamwork on inpatient units in hospitals. A brief discussion regarding measuring IP teamwork is also addressed.

IP Teamwork Terminology. The author was unable to locate research literature providing consistent team-based terminology relating to IP teamwork on inpatient units in hospitals. However, the existence of team-based terminology in the U.S. and international healthcare settings is not sparse. The Interprofessional Educational Collaborative (IPEC, 2011) comprised of six national education associations of schools of the health professions is one organization that provides broad, consistent, and current IP team-based terminology. For that

reason, the terminology provided by IPEC is referred to in the methods section of this paper.

IP Teamwork Competencies. Within healthcare literature numerous competencies for how to become a successful team member in practice and learning exist. For the purposes of this study, the four domains provided by IPEC are referenced. The four domains include: 1) values/ethics for IP practice, 2) roles/responsibilities, 3) IP communication, and 4) teams and teamwork (IPEC, 2011). IP teamwork competencies are defined as the, "Integrated enactment of knowledge, skills, and values/attitudes that define working together across the professions, with other health care workers, and with patients, along with families and communities, as appropriate to improve health outcomes in specific care contexts" (IPEC, 2011).

Measuring IP Teamwork. Measurement of teamwork competencies is a rapidly expanding field of research, yet surprisingly few validated tools currently exist for evaluating IP teamwork in healthcare delivery settings. One valid and reliable tool is the Team Skills Scale (TSS) (Hepburn, Tsukuda, & Fasser, 1998; Vari et al., 2013; Robben et al., 2012; Curran et al., 2012; Grymonpre et al., 2010, Owens, 2006). A discussion of the psychometric properties of this tool is further described in the methods section of this paper.

The TSS has been used to measure self-perceived teamwork abilities in a variety of settings, including those that include nurses. One program in particular that has used extensively the TSS is The New York University Geriatric Interdisciplinary Team Training (GITT) for evaluation of their GITT program. The GITT program provides collaborative training experiences among advanced practice students from multiple disciplines to learn and observe each discipline's respective role in caring for older patients and those with complex medical and social needs (Fulmer et al., 2005). In 2006, a dissertation by Owens further validated the TSS tool.

In 2010, Grymonpre et al. performed a controlled before-after design study in three geriatric day hospitals (GDH) with the primary goal of designing, delivering, and evaluating IP clinical placements for pre-licensure learners (nursing, pharmacy, physical therapy, occupational therapy, and medical students). The study evaluated the knowledge, attitudes, and skills of 43 learner participants (32 interventions, 11 control). To evaluate the delivery of IP clinical placements, participants from both the intervention and control group completed the Attitudes Torward Health Care Teams Scale (ATHCTS), Team Skills Scale (TSS), and Knowledge Questionnaire pre-, post-, and six months post clinical placements. Findings from TSS revealed significant improvements of scores over time ($p = .000$), however no significant difference in the magnitude of change between groups ($p = .112$).

In 2012, Curran et al. performed a systematic evaluation (pre-test-post-test control group, one-group pre-test-posttest, and one-shot case study) of a curriculum approach for integrating interprofessional education (IPE) in collaborative mental health practice across the pre- to post-licensure continuum of medical education. To evaluate this curriculum approach, the participants completed the Attitudes Toward Interprofessional Health Care Teams Scale and the Perceptions of Effective Interprofessional Teams Scale (Teams Skills Scale) survey. No significant pre- to post- differences existed between the groups taking the TSS.

Robben et al. (2012) conducted a before-after study evaluating the impact of an IPE program for primary care professionals involved in the care of frail elderly. To assess the learners' reactions to an IPE program, learners' were asked to complete a demographic questionnaire, Attitudes Toward Health Care Teams Scale and the Interprofessional Attitudes Questionnaire, and the Team Skills Scale. All seventy-eight participants reported significantly higher team skills after completion of the educational program (mean = 48.1; SD = 6.8) than

before start of the educational program (mean = 45.7; SD = 6.8, p = .001).

In 2013, Vari et al. evaluated the effect of interprofessional leadership (IPL) curriculum on IP self-efficacy, knowledge, and teamwork skills in health care students using a one group pre-test, post-test design. One-hundred and seventy participants participated in a IPL course. The Self-Efficacy for Interprofessional Experimental Learning (SEIEL) Scale, the Knowledge of Healthcare Professions survey, and the Team Skills Scale were used to evaluate the effect of the IPL curriculum on IP self-efficacy. Overall (N = 105), the students TSS score indicated they were more skilled at team skills by the completion their course, with nursing students revealing the most statistical improvement (nursing pre-mean = 17.91 (3.98), post-mean = 22.73 (5.20), p = 0.00).

Summary

Clearly, the literature supports IP teamwork as being an integral component for comprehensive care in healthcare settings. There is evidence from this overview that understanding individual's perceptions of teamwork is necessary in order to promote effective patient and staff outcomes. In order for there to be effective healthcare teams in general, valid and reliable IP teamwork competencies must be developed and incorporated into every day practice. However, there remain several gaps in research literature concerning the relationship between nursing and IP teamwork factors on inpatient units in hospitals, thus leading to the methods for this study.

Section III – Methods

Definition of Terms

Interprofessional collaborative practice. "When multiple health workers from different professional backgrounds work together with patients, families, carers [sic], and

communities to deliver the highest quality of care (WHO, 2010)."

Interprofessional teamwork. The levels of cooperation, coordination and collaboration characterizing the relationships between professions in delivering patient-centered care (IPEC, 2011).

Interprofessional competencies in health care. Integrated enactment of knowledge, skills, and values/attitudes that define working together across the professions, with other health care workers, and with patients, along with families and communities, as appropriate to improve health outcomes in specific care contexts (IPEC, 2011).

Teams. Consists of two or more individuals, who have specific roles, perform interdependent tasks, are adaptable, and share a common goal (Salas et al. 1992).

Nursing teams. Nursing staff who work together on one patient care unit (Nurses [Registered Nurse or Licensed Practical Nurse], nursing assistants [NAs], and unit secretaries [USs]) excluding visitors to the unit such as physicians, physical therapists, etc (Estryn-Behar et al., 2007; Kalisch & Lee, 2009; Kalisch, Weaver, & Salas, 2009).

Nursing teamwork. A team is made of two or more people with a common purpose who work interdependently (Kalisch & Lee, 2012).

Full-time. A nursing staff member who works > 30 hours/week (Kalisch & Lee, 2012).

Part-time. A nursing staff member who works < 30 hours/week (Kalisch & Lee, 2012).

Advanced Practice Registered Nurse (APRN). An APRN is a RN who completed an advanced graduate-level education and passed a national certification examination in order to practice in one of four APRN roles: certified registered nurse anesthetist (CRNA), certified nurse-midwife (CNM), clinical nurse specialist (CNS) and certified nurse practitioner (CNP) (AACN, 2015).

Research Design

This study was a correlational study that surveyed all inpatient nursing team members at an academic medical center (AMC) using valid and reliable teamwork tools.

Setting and Sample

Setting. The setting for the study was 23 inpatient units at a 600 bed academic medical center (AMC) in the southeast United States. The hospital is a, "level I trauma center, nationally recognized cancer and heart centers and primary and specialty clinics (UVA Health Systems, 2015)." The hospital employs over 6000 employees; registered nurses (RNs) accounted for 2300 of the jobs. The NTS survey with a modified demographic questionnaire and TSS questionnaire was distributed via email using the online survey tool QuestionPro. Participants were invited by the hospital's professional nursing staff organization (PNSO) via their secured work e-mail accounts. Prior to making the surveys available, approval was acquired from the director of the PNSO (see figure 8). The surveys were made accessible to participants online from any computer with internet access. Participants who met inclusion criteria and desired to complete the surveys clicked on the link provided via their work e-mail account.

Sample. A convenience sample of 1629 inpatient nursing team members, who worked part-time or full-time on inpatient units were included for evaluation of this study. Specific inclusion criteria for this study included: a) all nursing team members (RNs, LPNs, NAs, USs) with more than 6 months experience, b) nurse leaders (nurse managers), c) advanced practice registered nurse (nurse practitioner, clinical nurse specialist) who are assigned to the inpatient unit, and d) all inpatient units in the AMC. Exclusion criteria for this study included: a) all nursing staff members with temporary unit assignments and b) agency nurses.

Measures

Nursing Teamwork Survey. The Nursing Teamwork Survey (NTS) created by Kalisch, Lee, & Salas (2010) is a questionnaire designed to specifically evaluate nursing teamwork perceptions in acute care hospital settings at the patient unit level. The NTS consists of a 33-item questionnaire, where responses are measured on a five-point Likert-type scaling system (1 = *rarely*, 2 = 25% *of the time*, 3 = 50% *of the time*, 4 = 75% *of the time*, and 5 = *always*). A higher score is reflective of a higher level of nursing teamwork. The items in the NTS demonstrate good test-retest reliability, both found to be acceptable with alpha (α) = .94 and split-half reliability (r) = .92 (Kalisch & Lee, 2011). The content validity index of the NTS was 91.2%, based on the review of the expert panels' assessment (Kalisch & Lee, 2011). See Figure 6 for the original NTS.

Modified Demographic Questionnaire. To obtain an understanding of the population being studied, the following 15 demographic characteristics were measured using a modified questionnaire format from Kalisch's NTS (Kalisch & Lee, 2011): demographic characteristics (work location, level of education, gender, and age), nursing role (job title/role), work schedules (full time equivalency, work hours, and shift), years of experience on the unit, and perceived adequacy. The variable work hours were categorized as day, evening, night, or rotating, whereas shift was labeled 8-hour, 10-hour, 12-hour, rotating, or other. Staffing adequacy was measured on a scale from 0% to 100%. The participants were asked to choose among five levels: staffing is adequate 100%, 75%, 50%, 25%, or 0% of the time. See Figure 6 for modified demographic questionnaire.

Team Skills Scale. The Team Skills Scale (TSS) created by Hepburn, Tsukuda, and Fasser (1998), is an 18-item questionnaire designed to measure self-perceived interprofessional

team skills. The TSS uses a five-point Likert scale (1 = *poor*, 2 = *fair*, 3 = *good*, 4 = *very good*, and 5 = *excellent*), with total score ranging from 15 to 75. The higher the score, the more positive assessment of self-assessment team skills. Items are summed and higher scores indicate a greater amount of the perceived skill. Internal consistency reliability is reported to be Cronbach's alpha = .94 and to be validated in its original form (Hepburn, Tsukuda, & Fasser, 1998). See Figure **7** for original TSS.

Protection of Human Subjects

Approval to conduct this study was obtained by the University Institutional Review Board for Social and Behavioral Sciences (IRB-SBS), project# 2015-0323-00 (figure 5). The survey invitation included a consent letter that stated participation in the study was voluntary and the study was not affiliated with any special interest groups. The consent on the NTS and TSS did not request or capture any personal identifiable information. The highest risk from participating in the study was loss of confidentiality of participants. The only possible personal identifiable information asked was on the demographic questionnaire which asked participants which unit they worked on, their age, and race. Individual participants were not directly compensated for participating. Participants were informed that they were able to exit the survey at any time as well as withdraw at the end of the survey if they did not want their responses being collected. Participants were also assured that there would be no efforts made to identify or contact them and that there would be no retaliation or negative consequences for declining to participate, their responses, or withdrawing from the survey.

Procedures

The survey and questionnaires were released in mid-September, 2015. Invitations with the direct link to the QuestionPro self-administered survey were electronically delivered by e-

mail to all inpatient nurses' personal work email accounts from the hospital's PNSO, entitled "Nursing and Interprofessional Teamwork." See Figure 9 for the survey invitation sent via e-mail by the PNSO, containing the researcher's contact information. The survey invitation included a brief written explanation of the study's objectives and assurance of confidentiality. To encourage response rates, follow-up emails from the PNSO and unit nurse managers occurred once a week during the duration of the study's time frame. The PNSO and nurse managers were instructed that participation was strictly voluntary. Additionally, posters about the study were placed in unit staff lounges encouraging participation and announcing that a pizza party was awarded to the unit with the highest response rate. Participants were only allowed to take the survey once. Average survey response rates from the AMC were 50% to 60%. The survey closed exactly one month after its release date. An appreciation message appeared following completion of the survey. Data from the survey and questionnaires were downloaded from QuestionPro and transferred onto the university's Hive server and analyzed.

Data Analysis

The data collected from the survey and questionnaires was captured and stored into the QuestionPro software on the university's Hive server. The data captured by the QuestionPro survey software was then transferred into the Statistical Package for the Social Science (SPSS), version 23 (SPSS, Chicago) statistical software for analysis. Demographic data was analyzed by using descriptive statistics (means, frequencies, and percentages). Spearman's rank correlation coefficient was used to address the mean overall NTS scores and its five subscales and the overall TSS mean scores ($p < 0.01$ level). NTS and TSS items which correlated at a moderate range (0.4 or above) were further analyzed. An independent samples *t* test was used to examine whether there were any differences in the overall mean TSS scores and the mean number of

years in the nursing role.

Section IV - Results and Discussion

Results

Sample Characteristics. The sample consisted of a total of 694 inpatient nursing team members that participated in taking the survey (Table 1). There was an overall 30% response rate from the entire inpatient nursing team. Among those that participated, the majority were female (88.5%), were 25 to 54 years old (67.6%), and had a bachelor's degree or higher (62.1%). A majority of the participants worked full time (88.2%) and worked day shifts (56.6%).

Nursing Perceptions of Nursing and IP Teamwork. Table 2 presents the results of the Spearman's rank correlation used to explore relationships between nurses' perceptions of their nursing and IP teamwork. A two-tailed test of significance indicated there was a moderately significant relationship between the overall NTS mean scores (M = 3.77, SD = 0.88) compared to the overall TSS mean scores (M = 3.62, SD = 0.96); $r_s = 0.477$, $p < 0.01$. As seen in Table 3, the NTS mean scores by subscales illustrated no significant differences between each other. A similar two-tailed test of significance also revealed that nurses' perceptions of their overall IP teamwork (overall TSS mean scores) was correlated with moderate significance to four of the five NTS subscales: trust, $r_s = 0.415$, $p < 0.01$; team orientation (TO), $r_s = 0.417$, $p < 0.01$; shared mental model (SMM), $r_s = 0.455$, $p < 0.01$, and team leadership, $r_s = 0.458$, $p < 0.01$ (Table 4). Other moderately significant correlations were found among three of the five NTS subscales (TO, SMM, and team leadership) and five specific TSS items (Table 5).

TSS Scores and the Number of Years in the Nursing Role. An independent samples *t*-test was conducted to compare the overall mean TSS scores for nurses' having been in the nursing role between six months and two years and nurses' having been in the nursing role greater than two years (Table 6). There was a significant difference found in the overall mean

TSS scores for nurses having been in the nursing role between six months and two years (M = 65.56, SD = 10.52) and nurses' having been in the nursing role greater than two years (M = 69.39, SD = 11.38); t (392), -2.53 p = 0.01.

Discussion

The purposes of this study was to explore nurses' perceptions about nursing teamwork in inpatient settings and to examine whether or not nurses' perceptions regarding nursing teamwork are associated with their self-perceived abilities to function as a member of an IP team. The investigators used the Nursing Teamwork Survey (NTS) and Team Skills Scale (TSS) as measurements for evaluating nursing and IP teamwork perceptions among 694 inpatient nursing team members in an AMC. As a whole, the participants' characteristics were found reflective of the AMC nursing teams. 95% of the participants met nursing team description criteria as defined by Kalisch et al. (2010). To the author's knowledge, this is the first study evaluating nursing perceptions of nursing teamwork and self-perceived abilities to function as a member of an IP team.

In addition to identifying nurses' perceptions about their nursing teamwork, the findings demonstrated that nurses' perceptions of their overall nursing teamwork are significantly related to overall IP teamwork. The nursing teamwork subscale team leadership reflected the most significant correlation to overall IP teamwork ($r_s = 0.458$, $p < 0.01$), followed by having a SMM ($r_s = 0.455$, $p < 0.01$), TO ($r_s = 0.417$, $p < 0.01$), and trust ($r_s = 0.415$, $p < 0.01$). Interestingly, there was no significant correlation between the subscale backup and overall IP teamwork. The reasons for why overall nursing teamwork and overall IP teamwork on inpatient units hold such a strong relationship may be because they require similar teamwork behaviors. Several teamwork theories show that effective teamwork behaviors include: team leadership, SMM, TO, and trust

(Salas et al., 2004; Cannon-Bowers et al., 1995; Marks et al., 2001; Driskell & Salas, 1992; Bandow, 2001).

The findings of this study also demonstrated that nurses' perceptions in three of the five nursing teamwork subscales (team leadership, TO, & SMM) positively correlated to five specific IP teamwork items. Specifically, nurses' perceptions of their team leadership capabilities correlated to one's abilities to intervene effectively to improve team functioning ($r_s = 0.401$, $p < 0.01$). Team leadership ($r_s = 0.414$, $p < 0.01$), SMM $r_s = 0.414$, $p < 0.01$), and TO $r_s = 0.414$, $p < 0.01$) was correlated with adjusting one's care to support team goals. Having a strong sense of TO ($r_s = 0.425$, $p < 0.01$) and a SMM ($r_s = 0.425$, $p < 0.01$) correlated to treating team members as colleagues. TO correlated to developing intervention strategies that help patients attain their goals ($r_s = 0.410$, $p < 0.01$) and attitudes ($r_s = 0.407$, $p < 0.01$) about practicing in a team care environment.

Another important finding from this study appeared when comparing the levels of IP teamwork and the years of nursing experience. The findings demonstrated that the overall IP teamwork scores for nurses having been in the nursing role between six months and two years to be significantly lower than for nurses having been in the role for greater than two years. The reasons for why IP teamwork is lower in nurses that have been in the role between six months and two years may be because of the fact that they have inadequate IP team skills. This may also be the result of limited IP teamwork training.

Nursing Practice Implications

Nurses' perceptions of their overall nursing teamwork were found significantly related to their overall IP teamwork. In addition, there were similarities in trust, TO, SMM, and team leadership when compared to overall IP teamwork. Pointedly, nurses' perceptions of three

nursing teamwork subscales (team leadership, TO, & SMM) positively correlated with five specific IP teamwork items. Additional studies need to be conducted to further evaluate these relationships; however, these findings provide baseline knowledge for how nurse managers and nursing administrators can better promote, support, lead, and/or organize their nursing team in more effective IP care. One way in which nurse managers and nursing administrators can use these findings is by building them into team competencies. These team competencies can be further implemented and tested in teamwork training events that will give nurses opportunities to practice these skills.

Considering the similarities that exist between nursing and IP teamwork, the findings also suggest that nurse managers and nursing administrators should focus their nursing team members on adopting an IP teamwork posture in their units. One approach for how nurse managers and nursing administrators can orient their nursing team members in adopting this IP teamwork posture is by role-modeling appropriate IP team behaviors. According to Belinsky and Tataronis (2007), role models teach professional thinking, behaviors, and attitudes. We cannot expect nursing team members to practice IP team behaviors if we do not practice IP team behaviors ourselves.

Taking into consideration the levels of IP teamwork and the years of nursing experience, this finding demonstrates that nurses having been in the nursing role between six months and two years lack essential IP teamwork skills for their unit. This finding perhaps explains why nurse attrition rates are seen highest in the second year (Twibell et al., 2012). Larger studies are needed to further confirm these findings. In addition, we need to study skill acquisition dynamics in relationship to IP teamwork. Are there specific IP teamwork skills that we can implement earlier in a nurse's career that will improve their perceptions in being a part of an IP

team? Understanding these dynamics will not only help better identify IP teamwork skills needed by less experienced nursing team members, but perhaps decrease nurse attrition rates.

Strengths and Limitations of the Study

The strengths of this study included the use of established, valid and reliable survey tools to measure nursing and IP teamwork on inpatient units in hospitals. In addition, these tools have the ability to mirror participants' characteristics with those of the AMC nursing teams is key. Therefore, it more clearly represents the AMC team and makes the results more generalizable to that team as a whole. Since there has been no identifiable literature found that describes the possible associations of nursing teamwork factors and nurse's self-perceived abilities to function as a member of an IP team on inpatient units in hospitals, the results from the study provide foundational evidence for future IP teamwork studies.

The limitations of this study include the use of a survey approach to obtain information about nursing and IP teamwork. Therefore, the results reflected the perceptions of the respondents as opposed to an observation of the actual nursing and IP teamwork. Another limitation of this study includes that it was conducted in a single academic medical center with only a 30% response rate. As a result, the respondents of the survey may not have reflected the larger nursing population in some way. This study did include nurses' perceptions from nursing teams that did not meet nursing team description criteria as defined by Kalisch et al. (2010).

Conclusions

This study demonstrated a significant relationship exists between nursing and IP teamwork, bringing more clarity as to what nurses' expectations are of their professional relationship and the interdependencies that exist both within and across the numerous healthcare teams. This has specific implications for nurse managers and hospital administrators in regards

to better understanding what specific IP teamwork competencies are perhaps necessary that support both team and patient goals. This study also provides baseline knowledge to be built upon for future IP teamwork intervention studies.

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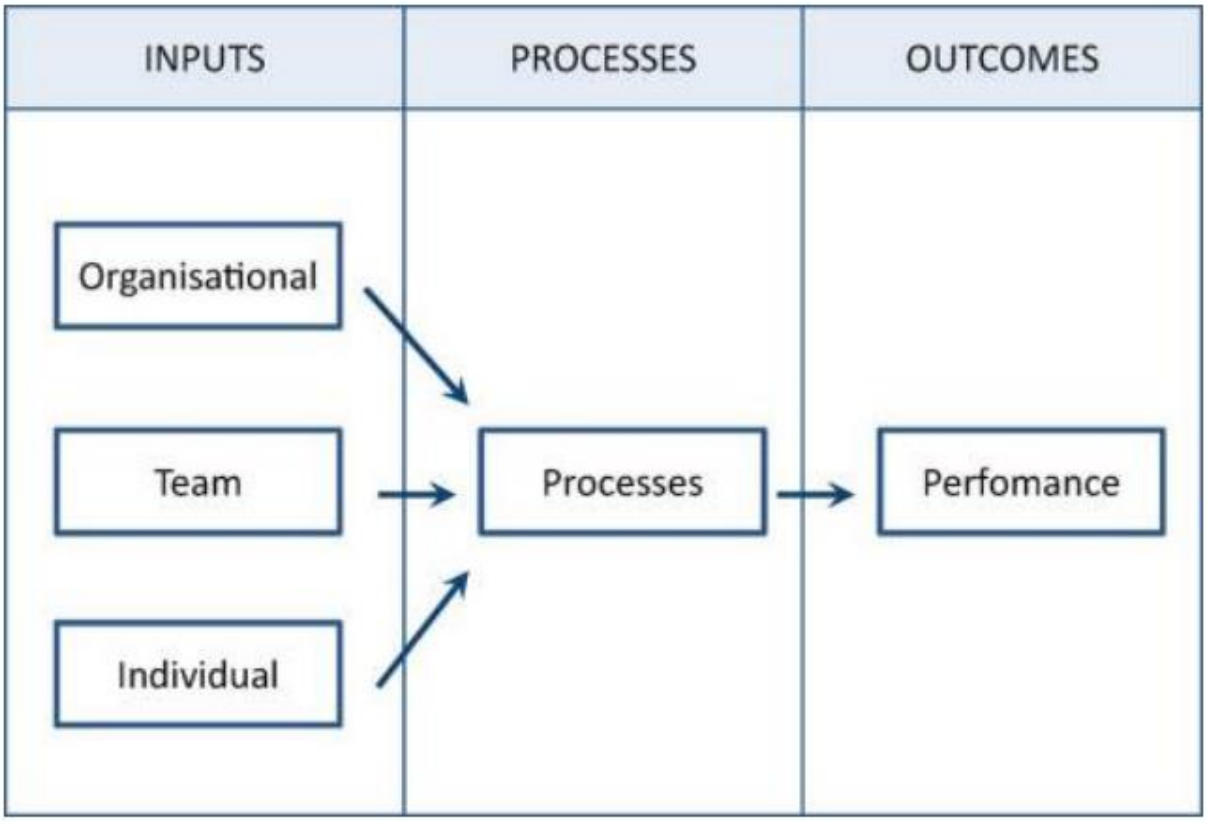


Figure 1. Input-Process-Outcomes Team Effectiveness Model.

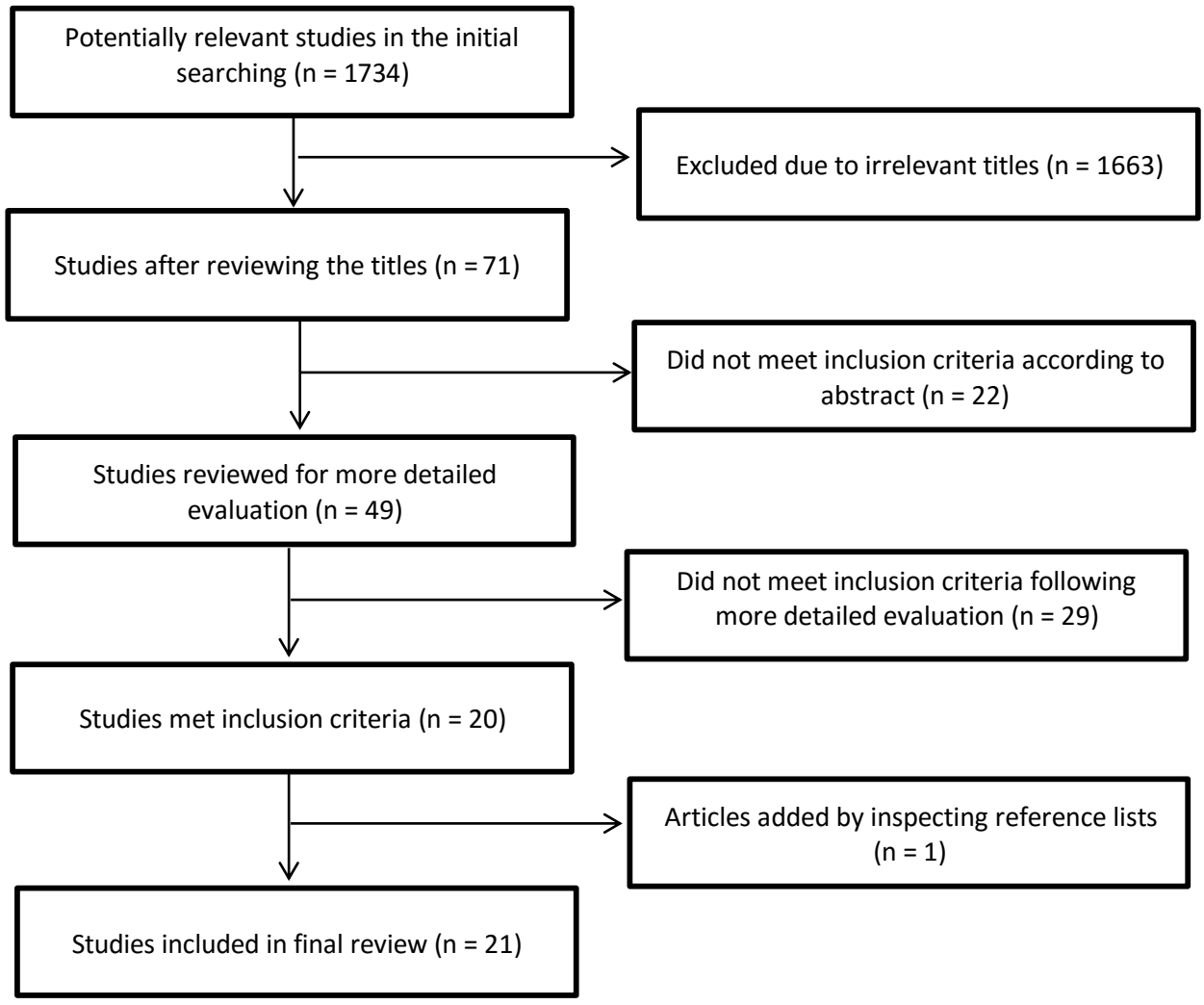
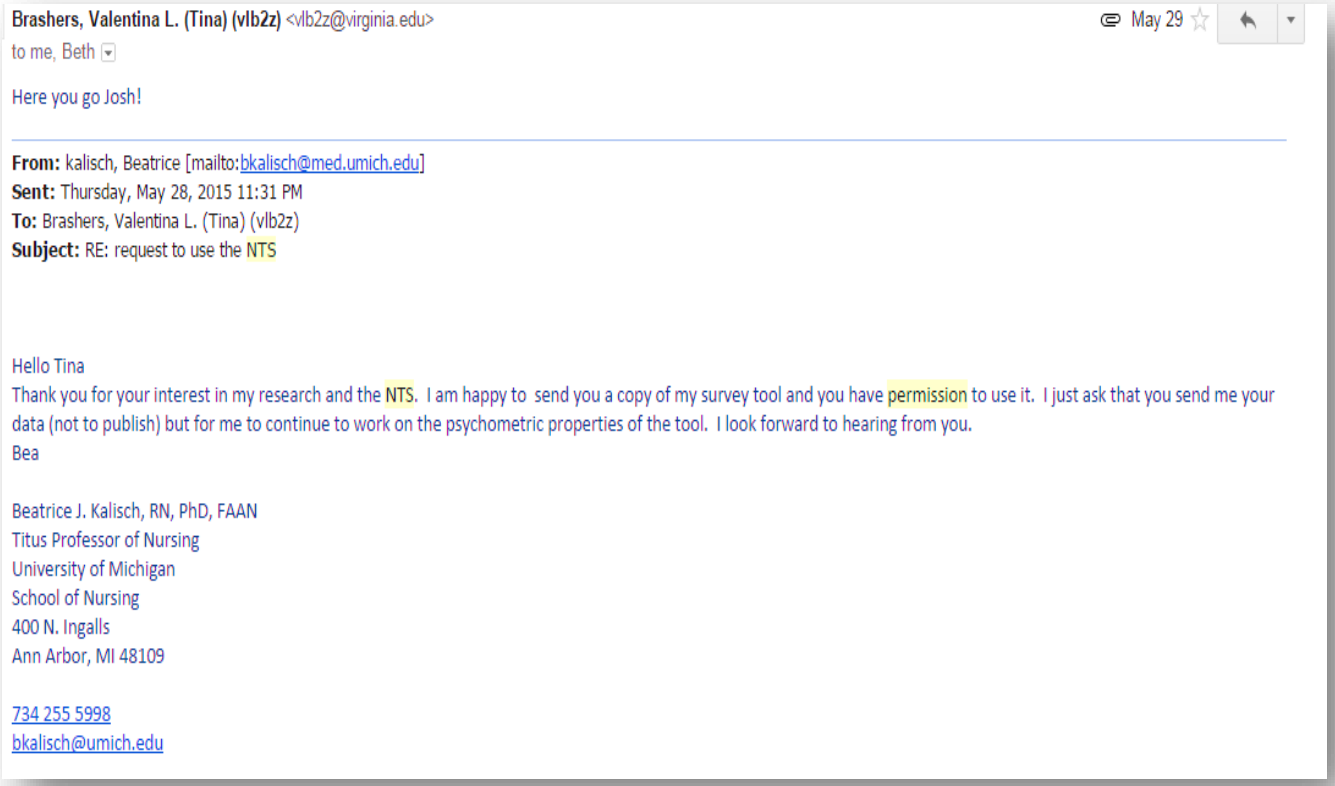


Figure 2. Consort flow diagram of Study Selection



Brashers, Valentina L. (Tina) (vlb2z) <vlb2z@virginia.edu> May 29

to me, Beth

Here you go Josh!

From: kalisch, Beatrice [mailto:bkalisch@med.umich.edu]
Sent: Thursday, May 28, 2015 11:31 PM
To: Brashers, Valentina L. (Tina) (vlb2z)
Subject: RE: request to use the NTS

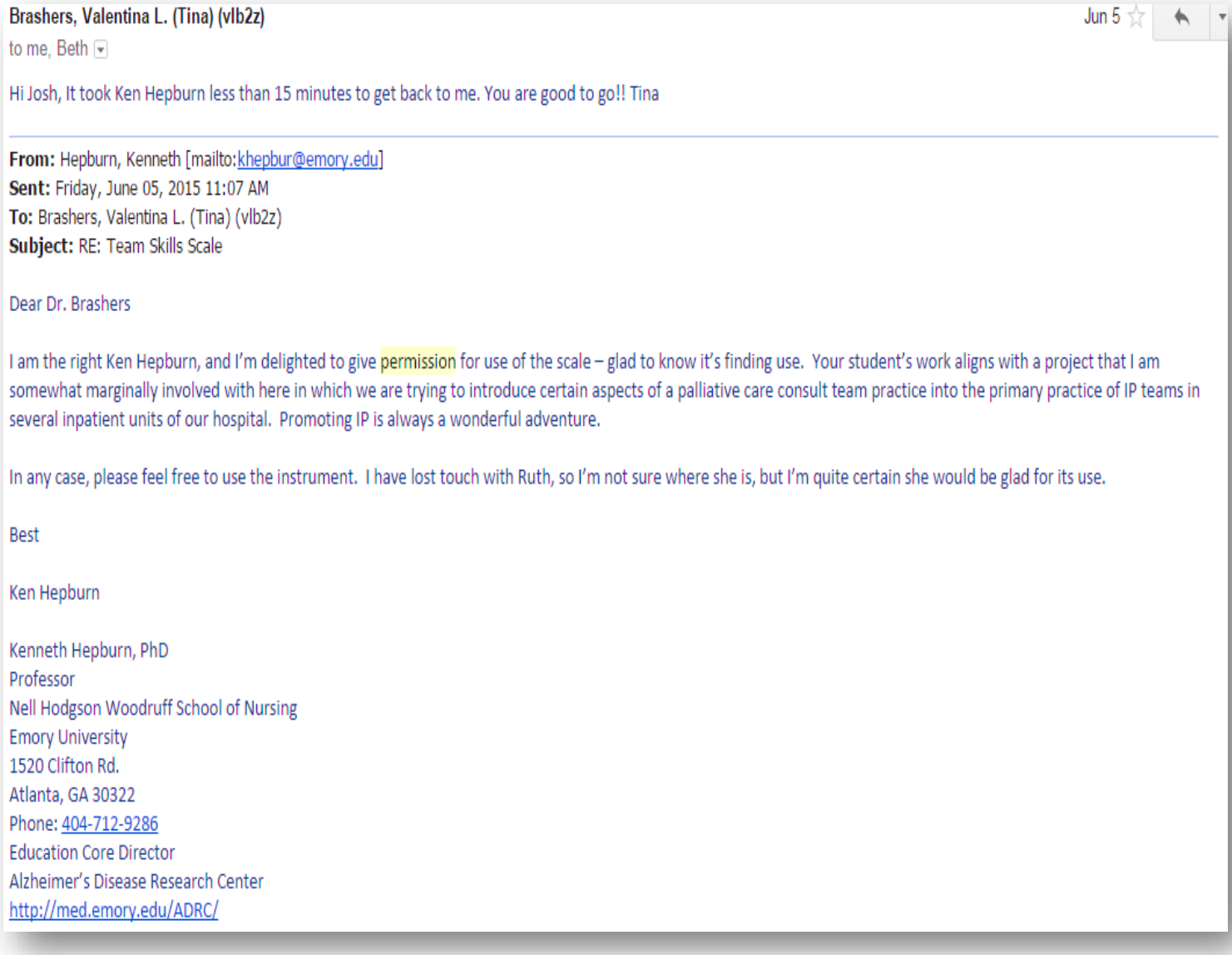
Hello Tina
Thank you for your interest in my research and the NTS. I am happy to send you a copy of my survey tool and you have permission to use it. I just ask that you send me your data (not to publish) but for me to continue to work on the psychometric properties of the tool. I look forward to hearing from you.
Bea

Beatrice J. Kalisch, RN, PhD, FAAN
Titus Professor of Nursing
University of Michigan
School of Nursing
400 N. Ingalls
Ann Arbor, MI 48109

734 255 5998
bkalisch@umich.edu

Figure 3. Approval Letter to use Nursing Teamwork Survey (NTS)

Figure 4. Approval Letter to use Team Skills Scale (TSS).



Brashers, Valentina L. (Tina) (vlb2z) Jun 5

to me, Beth

Hi Josh, It took Ken Hepburn less than 15 minutes to get back to me. You are good to go!! Tina

---

From: Hepburn, Kenneth [mailto:khepbur@emory.edu]
Sent: Friday, June 05, 2015 11:07 AM
To: Brashers, Valentina L. (Tina) (vlb2z)
Subject: RE: Team Skills Scale

Dear Dr. Brashers

I am the right Ken Hepburn, and I'm delighted to give permission for use of the scale – glad to know it's finding use. Your student's work aligns with a project that I am somewhat marginally involved with here in which we are trying to introduce certain aspects of a palliative care consult team practice into the primary practice of IP teams in several inpatient units of our hospital. Promoting IP is always a wonderful adventure.

In any case, please feel free to use the instrument. I have lost touch with Ruth, so I'm not sure where she is, but I'm quite certain she would be glad for its use.

Best

Ken Hepburn

Kenneth Hepburn, PhD
Professor
Nell Hodgson Woodruff School of Nursing
Emory University
1520 Clifton Rd.
Atlanta, GA 30322
Phone: 404-712-9286
Education Core Director
Alzheimer's Disease Research Center
http://med.emory.edu/ADRC/

IRB Proposal: Approved 8/27/2015 SBS #2015-0323-00

In reply, please refer to: Project # 2015-0323-00

August 27, 2015

Joshua Gadd and Beth Ann Quatrara
Academic Divisions
475 Justin Dr.
Palmyra, VA 22963

Dear Joshua Gadd and Beth Ann Quatrara:

Thank you for submitting your project entitled: "Nursing and Interprofessional Teamwork on Inpatient Units in an Academic Medical Center" for review by the Institutional Review Board for the Social & Behavioral Sciences. The Board reviewed your Protocol on August 27, 2015.

The first action that the Board takes with a new project is to decide whether the project is exempt from a more detailed review by the Board because the project may fall into one of the categories of research described as "exempt" in the Code of Federal Regulations. Since the Board, and not individual researchers, is authorized to classify a project as exempt, we requested that you submit the materials describing your project so that we could make this initial decision.

As a result of this request, we have reviewed your project and classified it as exempt from further review by the Board for a period of four years. This means that you may conduct the study as planned and you are not required to submit requests for continuation until the end of the fourth year.

This project # 2015-0323-00 has been exempted for the period August 27, 2015 to August 26, 2019. If the study continues beyond the approval period, you will need to submit a continuation request to the Board. If you make changes in the study, you will need to notify the Board of the changes.

Sincerely,

Tonya R. Moon, Ph.D.
Chair, Institutional Review Board for the Social and Behavioral Sciences

Figure 5.

Section One: Survey Invitation/Implied Consent/Recruitment Letter

Dear Highly Valued UVa Nursing Team Member,

In efforts to improve the level of interprofessional (IP) teamwork practices in the hospital, DNP student Josh Gadd MSN, RN from the University of Virginia's School of Nursing and the Professional Nursing Staff Organization (PNSO) invite you to participate our research study. The purpose of this study is to evaluate your perceptions regarding nursing teamwork and whether or not they are associated with your self-perceived abilities to function as a member of an interprofessional (IP) team. You will be asked to provide answers to questions that:

1) Identify your nursing background.
2) Identify your current perceptions about the level of nursing teamwork within the unit you work on.
3) Identify your current perceptions as a nursing staff member about the level of interprofessional (IP) teamwork within the unit you work on.

The information that you provide by answering the following survey and questionnaires will be handled confidentially. Your information will be anonymous which means that your name will not be collected or linked to you.

By selecting "Agree" (below) you are doing so voluntarily, implying consent to participate in the study. Your participation or nonparticipation will have NO effect on your current or future employment status.

In order to participate in the study, please complete the following survey and two questionnaires. Participation in this study will require 20 minutes of your time.

Thank you!

Josh Gadd, MSN, RN, PHN
Email: jdg6ru@virginia.edu
Phone: 510-432-8543

Figure 9.

Section Two: Modified Demographic Information & Nursing Teamwork Survey (NTS)
Please fill out the following questions related to your nursing background. After answering your questions concerning your nursing background, please answer the questions related to your perceptions as a nursing staff member about the level of nursing teamwork within the unit you work on.
For the purposes of this survey:
A nursing staff member is registered nurse (RN), licensed practical nurse (LPN), Nursing Assistant (NA) OR Patient Care Assistant (PCA), or advanced practice registered nurse (Nurse practitioner or Clinical Nurse Specialist).

Modified Demographic Questionnaire

1. **Name of the unit** you work on: _____

- **8C/8N/8E-Women's (OB/L&D/GYN surgery)**
- **8W- oncology**
- **8W- Stem Cell Unit**
- **7C/7N/7W- acute care peds**
- **Newborn ICU**
- **Peds ICU**
- **Neuro ICU**
- **6W- Neurosurgery**
- **6C- Neurology/Epilepsy**
- **6E- Ortho/Trauma**
- **Surgical/Trauma/Burn ICU**
- **5N- Surgical Intermediate care**
- **5W- Surgery**
- **5C- Surgery**
- **5E- inpatient Psychiatry**

- **TCVPO ICU**
- **4W- TCV surgery**
- **4C- Cardiology/Vascular**
- **4E- Cardiology**
- **Medical ICU**
- **3W- Medicine**
- **3C- Medicine**
- **3E- Geriatric/Palliative**

2. **What best describes your job title/role? (choose one):**
    1) _____ Staff Nurse (RN)
    2) _____ Staff Nurse (LPN)
    3) _____ Nursing Assistant (e.g., nurse aides/tech)
    4) _____ Nurse manager, assistant manager (e.g. administrators on the unit)
    5) _____ Unit Clerk/Secretary
    6) _____ APRN (Clinical nurse specialist, Nurse practitioner)

3. **If you are a nurse, what is the highest degree:**
    1) _____ LPN Diploma
    2) _____ RN Diploma
    3) _____ Associate's degree in nursing (ADN)
    4) _____ Bachelor's degree in nursing (BSN)
    5) _____ Bachelor's degree **outside** of nursing (e.g. Bachelor's of Arts (BA) or Bachelor's of Science (BS)
    6) _____ Master's degree (MSN) or higher in nursing
    7) _____ Master's degree or higher **outside** of nursing (e.g. Master's in Business)

4. Do you hold a professional nursing certification?
   1) _____ Yes
   2) _____ No

5. Gender: _____ Female _____ Male

6. **Age:**
   3) _____ Under 25 years old (<25)
   4) _____ 25 to 34 years old (25-34)
   5) _____ 35 to 44 years old (35-44)
   6) _____ 45 to 54 years old (45-54)
   7) _____ 55 to 64 years old (55-64)
   8) _____ Over 65 years old (65+)

7. Number of **hours usually worked per week** (check only one)
   1) _____ less than 30 hours per week
   2) _____ 30 hours or more per week

8. **Work hours** (check the one that is most descriptive of the hours you work)
   1) _____ Days (8 or 12 hour shift)
   2) _____ Evenings (8 or12 hour shift)
   3) _____ Nights (8 or 12 hour shift)
   4) _____ Rotates between days, nights or evenings

9. **Experience in your role:**
   1) _____ Up to 6 months
   2) _____ Greater than 6 months to 2 years
   3) _____ Greater than 2 years to 5 years
   4) _____ Greater than 5 year to 10 years

5) _____ Greater than 10 years

10. **Experience** on your **current patient care unit:**
    1) _____ Up to 6 months
    2) _____ Greater than 6 months to 2 years
    3) _____ Greater than 2 years to 5 years
    4) _____ Greater than 5 year to 10 years
    5) _____ Greater than 10 years

11. How often do you feel **the unit staffing is adequate?**
    1) _____ 100% of the time
    2) _____ 75% of the time
    3) _____ 50% of the time
    4) _____ 25% of the time
    5) _____ 0% of the time

12. **On the current or last shift** you worked, how many **patients** did you care for?
_____

    11-a. how many **patient-admissions** did you have (i.e. includes transfers into the unit)? _____

    11-b. how many **patient-discharges** did you have (i.e. includes transfers out of the unit)? _____

Please check one **response for each question.**

	Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied
13. **How satisfied** are you in your **current position**?					
14. Independent of your current job, **how satisfied** are you with **being a nurse or a nurse assistant or a unit clerk/secretary?**					
15. **How satisfied** are you with **the level of teamwork on this unit?**					

Please turn over to page 4

NURSING TEAMWORK SURVEY

Please fill in all the following items regarding **YOUR TEAM**. Team is defined as the group of people working on a patient care unit (or a section of a unit such as a wing) including **nurses, nursing assistants/aides/techs and unit clerks/secretaries**. It does **NOT** refer to individuals **who visit the unit** such as pharmacists, physicians, physical therapists etc.

ITEM	Rarely	**25%** of the time	**50%** of the time	**75%** of the time	Always
1) All team members understand what their responsibilities are throughout the shift.					

2) The nurses who serve as charge nurses or team leaders monitor the progress of the staff members throughout the shift.					
3) Team members frequently know when another team member needs assistance before that person asks for it.					
4) Team members communicate clearly what their expectations are of others.					
5) Team members ignore many mistakes and annoying behavior of teammates rather than discussing these with them.					
6) When changes in the workload occur during the shift (admissions, discharges, patients problems etc.), a plan is made to deal with these changes.					
7) Team members know that other members of their team follow through on their commitment.					
8) The nurses who serve as charge nurses or team leaders balance workload within the team.					
9) My team believes that to do a quality job, all of the members need to work together.					
10) The shift change reports contain the information needed to care for the patients.					
11) Some team members spend extra time on breaks.					

Please turn over to page 5

Team is defined as the group of people working on a patient care unit (or a section of a unit such as a wing) including **nurses, nursing assistants/aides/techs and unit clerks/secretaries**. It does **NOT** refer to individuals **who visit the unit** such as pharmacists, physicians, physical therapists etc.

ITEM	Rarely	**25%** of the time	**50%** of the time	**75%** of the time	Always
12) Team members respect one another.					

13) When a team member points out to another team member an area for improvement, the response is often defensive.					
14) Team members are aware of the strengths and weaknesses of other team members they work with most often.					
15) If the staff on one shift is unable to complete their work, the staff on the on-coming shift complains about it.					
16) Staff members with strong personalities dominate the decisions of the team.					
17) Most team members tend to avoid conflict rather than dealing with it.					
18) Nursing assistants and nurses do <u>not</u> work well together as a team.					
19) The nurses who serve as charge nurses or team leaders are available and willing to assist team members throughout the shift.					
20) Team members notice when a member is falling behind in their work.					
21) When the workload becomes extremely heavy, team members pitch in and work together to get the work done.					
22) Feedback from team members is often judgmental rather than helpful.					
23) My team readily engages in changes in order to make improvements and new methods of practice.					
24) Team members readily share ideas and information with each other.					

Please ***turn over*** *to page 6*

Team is defined as the group of people working on a patient care unit (or a section of a unit such as a wing) including **nurses, nursing assistants/aides/techs and unit clerks/secretaries**. It does **NOT** refer to individuals **who visit the unit** such as pharmacists, physicians, physical therapists etc.

ITEM	Rarely	25% of the time	50% of the time	75% of the time	Always
25) Team members clarify with one another what was said to be sure that what was heard is the same as the intended message.					
26) Team members are more focused on their own work than working together to achieve the total work of the team.					
27) The nurses who serve as charge nurses or team leaders give clear and relevant directions as to what needs to be done and how to do it.					
28) Within our team, members are able to keep an eye out for each other without falling behind in our own individual work.					
29) Team members understand the role and responsibilities of each other.					
30) Team members willingly respond to patients other than their own when other team members are busy or overloaded.					
31) Team members value, seek and give each other constructive feedback.					
32) When someone does not report to work or someone is pulled to another unit, we reallocate responsibilities fairly among the remaining team members.					
33) Team members trust each other.					

THANK YOU FOR YOUR PARTICIPATION!!

Figure 6. Modified Demographic Questionnaire and Nursing Teamwork Survey (NTS)

Section Four: Team Skills Scale (TSS)
Please answer the following questions related to identify your current perceptions as a nursing staff member about the level of interprofessional (IP) teamwork within the unit you work on.

For the purposes of this questionnaire, the following terms are defined:

Interprofessional (IP) teamwork: "The levels of cooperation, coordination and collaboration characterizing the relationships between professions in delivering patient-centered care (IPEC, 2011)."
Interprofessional collaborative practice: "When multiple health workers from different professional backgrounds work together with patients, families, carers [sic], and communities to deliver the highest quality of care (WHO, 2010)."

Team Skills Scale[1]

Please rate your ability to carry out each of the following tasks at this point in your training using a five-point scale:

	Poor	Fair	Good	Very Good	Excellent
1. Function effectively in an interdisciplinary team	o	o	o	o	o
2. Treat team members as colleagues	o	o	o	o	o
3. Identify contributions to patient care that different disciplines can offer	o	o	o	o	o
4. Ensure that patient/family preferences/goals are considered when developing the team's care plan	o	o	o	o	o
5. Handle disagreements effectively	o	o	o	o	o
6. Strengthen cooperation among disciplines	o	o	o	o	o
7. Carry out responsibilities specific to your discipline's role on a team	o	o	o	o	o
8. Address clinical issues succinctly in interdisciplinary meetings	o	o	o	o	o
9. Participate actively at team meetings	o	o	o	o	o
10. Develop an interdisciplinary care plan	o	o	o	o	o
11. Adjust your care to support the team goals	o	o	o	o	o
12. Develop intervention strategies that help patients attain goals	o	o	o	o	o
13. Raise appropriate issues at team meetings	o	o	o	o	o
14. Recognize when the team is not functioning well	o	o	o	o	o
15. Intervene effectively to improve team functioning	o	o	o	o	o
16. Help draw out team members who are not participating actively in meetings	o	o	o	o	o
17. Toward other disciplines working in the team setting	o	o	o	o	o
18. About practicing in a team care environment	o	o	o	o	o

[1] Hepburn, Tsukuda, and Fasser (1996), Team Skills Scale, all rights reserved

Figure 7. Interprofessional Teamwork Tool: Team Skills Scale (TSS)

Figure 8. Professional Nursing Staff Organization (PNSO) Permission Letter

Appendix A

Interventional Studies that had positive effects on nursing teamwork.

Study	Intervention	Key Findings
Kalisch, Xie, & Ronis (2013)	*Train-the-trainer intervention:* A training program that taught teamwork skills and knowledge. Methods included: role-playing scenarios and debriefings.	• Significant increases of overall teamwork took place in all three hospitals after pretesting. • Missed nursing care significantly decreased after pretesting • Satisfaction with teamwork increased significantly over time • Teamwork knowledge increased over time. • Pretesting values were not provided.
Bridges, Sherwood, & Durham (2014)	*Mutual support educational intervention:* 1) A total of twelve, one-hour education sessions focused on teamwork behaviors and collaboration describing mutual support was adapted from the TeamSTEPPS curriculum and presented in PowerPoint and videos.	• The TeamSTEPPS's subscale of backup behavior illustrated the strongest improvement.
Vertino (2014)	*TeamSTEPPS teamwork training* 1) Web-based TeamSTEPPS training (four hours) 2) Face-to-face training (five training sessions)	• TeamSTEPPS training improved nurses' teamwork attitudes amongst each other in relation to all five TeamSTEPPS components (team structure, leadership, situation monitoring, mutual support, and communication).
Kalisch, et al. (2015)	*Virtual simulation method:* 1) Podcasts discussing teamwork elements. 2) 1-hr virtual simulation training where the participants were exposed to three scenarios with debriefing sessions at the end of each.	• The overall mean teamwork scores improved from pre- ($M= 3.25$, $SD = 0.58$) to post-intervention ($M = 3.49$, $SD =0.67$, $p < .012$). • The intervention had large ($0.60 \leq d \leq 0.97$) and significant effects on the measures of three teamwork subscales (trust: $p < .042$, TO: $p < .004$, and backup: $p < .045$). • Teamwork knowledge scores were not significantly different between pre and post-intervention ($t = -1.08$, $p < .301$).

Table 1

Characteristics of study sample (*N* = 694)

Variable	Category	%
Gender		
	Male	11.5
	Female	88.5
Age		
	< 25 years	15.2
	25-34 years	32.6
	35- 44 years	15.2
	45-54 years	19.8
	55-64 years	15.6
	≥ 65 years	1.6
Highest education level		
	N/A	17.9
	LPN Diploma	0.2
	RN Diploma	3.5
	Associate's degree in nursing (ADN)	16.4
	Bachelor's degree in nursing (BSN)	44.7
	Bachelor's degree outside of nursing (e.g. Bachelor's of Arts (BA) or Bachelor's of Science (BS)	4.1
	Master's degree (MSN) or higher in nursing	10.9
	Master's degree or higher outside of nursing (e.g. Master's in Business)	2.4
Nursing role		
	Staff Nurse RN or LPN	71.0
	Nursing Assistant	17.9
	Nurse Manager or Administrator	3.1
	Unit Clerk	5.8
	APRN: CNS or NP	2.1
Years of experience in nursing role		
	N/A	18.8
	Up to 6 months	6.1
	Greater than 6 months to 2 years	7.6
	Greater than 2 years to 5 years	17.4
	Greater than 5 year to 10 years	13.3
	Greater than 10 years	36.7
Employment status		
	less than 30 hours per week	11.8
	30 hours or more per week	88.2
Shift worked		
	Days (8 or 12 hour shift)	56.6
	Evenings (8 or12 hour shift)	5.8
	Nights (8 or 12 hour shift)	17.9
	Rotates between days, nights or evenings	19.7
Type of working unit		
	Intensive care (7)	24.7
	Medical-Surgical, intermediate, and specialty (14)	33.9
	Pediatric/Maternity (2)	9.1
	Psychiatric (1)	1.2
	Perioperative and operating room (2)	15.0
	ED and other (3)	16.0

Table 2

TSS scores by NTS domains

	NTS Total
TSS Total	**.477****

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3

Overall NTS mean scores to subscales

NTS Subscales					
NTS Overall	**Trust**	**Team Orientation**	**Backup**	**Shared Mental Model**	**Team Leadership**
M ± SD	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD
3.616 ± 0.9632	3.68 ± 0.928	3.57 ± 0.988	3.62 ± 0.988	3.62 ± 0.939	3.59 ± 0.973

Table 4

TSS scores by NTS subscale

	NTS Subscales				
	Trust	**Team Orientation**	**Backup**	**Shared Mental Model**	**Team Leadership**
TSS Total score	**.415****	**.417****	**.344****	**.455****	**.458****

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5

TSS Specific Items by NTS Subscales.

	NTS Subscales				
	Trust	**Team Orientation**	**Backup**	**Shared Mental Model**	**Team Leadership**
TSS Items		2. Treat team members as colleagues (.425)		2. Treat team members as colleagues (.425)	
		11. Adjust your care to support team goals (.414)		11. Adjust your care to support team goals (.414)	11. Adjust your care to support team goals (.414)
		12. Develop intervention strategies that help patient attain goals (.410)			
					15. Intervene effectively to improve team functioning (.401)
		18. About practicing in a team care environment (.407)*			

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6

Independent Samples *t-test* between TSS scores and the number of years in the nursing role

Mean TSS Scores			
	Mean	Standard Deviation	*t-test*
Up to 2 years	65.56	10.52159	-2.536*
Greater than 2 years	69.39	11.38	

**Note: P = < 0.01*

Section V – **Manuscript**

Manuscript for Publication: Journal of Nursing Administration

Nursing and Interprofessional Teamwork on Inpatient Units in an Academic Medical Center

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Abstract

OBJECTIVE: This study examined nurses' perceptions regarding nursing teamwork and their associations with their self-perceived abilities to function as a member of an interprofessional (IP) team.

BACKGROUND: Although nurses tout the importance and necessity of teamwork as vital work-related factors, definitions and measurements of nursing teamwork within IP teamwork are limited.

METHODS**:** This correlational study invited all inpatient nursing team members in 23 inpatient settings at a 600 bed academic medical center (AMC) in the southeast United States to participate in a survey. All nursing team members (registered nurses, licensed practical nurses, nursing assistants, unit secretaries) with more than 6 months of experience as well as nurse managers and advanced practice registered nurses who were assigned to the inpatient unit were included for better understanding their perceptions about their nursing and IP teamwork. The Nursing Teamwork Survey (NTS) and Team Skills Scale (TSS) were used to quantify nurse's perceptions about their nursing and IP teamwork abilities.

RESULTS**:** A moderately significant relationship was identified between the overall nursing teamwork survey (NTS) mean scores (M = 3.77, SD = 0.88) compared to the overall team skills scale (TSS) mean scores (M = 3.62, SD = 0.96); $r_s = 0.477$, $p < 0.01$. A significant difference was found in the overall mean TSS scores for nurses having been in the nursing role between six months and two years (M = 65.56, SD = 10.52) and nurses' having been in the nursing role greater than two years (M = 69.39, SD = 11.38); t (392), -2.53 p = 0.01.

CONCLUSIONS**:** Nurses' perceptions regarding their overall nursing teamwork showed that higher levels of overall nursing teamwork were significantly related to their self-perceived abilities to function as a member of an IP team. The overall IP teamwork scores for nurses having been in the nursing role between six months and two years were found to be significantly lower than for nurses having been in the role for greater than two years, indicating their lack of IP team skills. Incorporating these findings into team competencies that train clinicians in necessary teamwork skills may assist nurse leaders in building more cohesive teams that are better prepared to provide quality care in a healthier work environment.

Introduction

Nursing teamwork in healthcare is essential. Several authors indicate that effective levels of nursing teamwork result in higher quality of care (1-2), greater job satisfaction (3-4), higher productivity (5), fewer patient errors (6-7),

and positive patient relationships (8). In addition to nursing teamwork, a growing body of interprofessional (IP) teamwork evidence suggests that effective teams improve staff and patient outcomes (9-11). Although professions in both the academic and clinical arena tout the importance and necessity of IP and nursing teamwork as vital work-related factors, definitions and measurements of nursing teamwork within IP teamwork are limited and exclusively defined. Despite the premise that nursing and IP teamwork may share a common theoretical framework (12), a practical understanding of nursing teamwork factors and how they may be interdependently related to IP teamwork factors is needed in order to develop, prioritize, and implement the necessary knowledge, skills, and values targeted toward improving nurses' and their self-perceived abilities to appropriately function as a member of an IP team. One way in which this understanding can be achieved is by using previously identified IP competencies and related frameworks.

Background

The American Hospital Association (AHA) (14) indicates that nurses comprise the largest group of healthcare professionals in the United States. According to the United States Department of Labor (2014), registered nurses (RNs) accounted for approximately 3 million jobs in 2012, with 61% of registered nurses (RNs) found to work in hospitals. Additionally, the AHA (15) identified that there are approximately 50,000 inpatient nursing teams. For that reason, the nature and quality of service provided to individuals within healthcare organizations may largely be dependent not only on individual nurses' level of performance, but by the nursing and IP team they primarily work on. This is especially true concerning nursing teams working on inpatient units in hospitals. Nursing teams are challenged to provide high quality, patient-centered care for patients with varied acuities, accompanied by an ever-decreasing length of stay (16). The provision of this type of comprehensive care requires a team of skilled nursing staff members to actively engage in complex roles with their fellow IP team members. Due to the various public and private stakeholders' interested in decreasing healthcare costs and improving healthcare quality, nurse and fellow healthcare researchers focusing on nursing teamwork and its role within the IP team are at an important juncture. Although several key nursing teamwork factors on inpatient units in hospitals are clearly identified, there remain several large knowledge gaps. One large knowledge gap is a full understanding of the relationship that exists between nursing and IP teams and their teamwork abilities. A better understanding of this relationship may help identify new strategies for improving nurses' abilities to function effectively as a member of an IP team. Therefore,

the purpose of this study was to examine whether or not nurses' perceptions regarding nursing teamwork were associated with their self-perceived abilities to function as a member of an IP team.

Research Question

This study explored the research question: Are nursing teamwork factors as measured by the Nursing Teamwork Survey (NTS) associated with self-perceived abilities to function as a member of an interprofessional (IP) team as measured by the Team Skills Scale (TSS)?

Methods

Design, Sample, and Setting

This correlational study invited all inpatient nursing team members working in 23 inpatient units at a 600 bed academic medical center (AMC) in the southeast United States to participate in a survey. All nursing team members (registered nurses, licensed practical nurses, nursing assistants, unit secretaries) with more than 6 months of experience as well as nurse managers and advanced practice registered nurses who were assigned to the inpatient unit were surveyed for better understanding their perceptions about their nursing and IP teamwork.

Measures

Nursing Teamwork Survey

The Nursing Teamwork Survey (NTS) created by Kalisch, Lee, & Salas (17) is a questionnaire designed to specifically evaluate nursing teamwork perceptions in acute care hospital settings at the patient unit level. The NTS consists of a 33-item questionnaire, where responses are measured on a five-point Likert-type scaling system (1 = *rarely*, 2 = 25% *of the time*, 3 = 50% *of the time*, 4 = 75% *of the time*, and 5 = *always*). A higher score is reflective of a higher level of nursing teamwork. The items in the NTS demonstrate good test-retest reliability, both found to be acceptable with alpha (α) = .94 and split-half reliability (r) = .92 (18). The content validity index of the NTS was 91.2%, based on the review of the expert panels' assessment (18). The NTS is comprised of five teamwork subscales as defined by Salas et al. (18) which include: (1) trust (ie, shared perception that members will perform actions necessary to reach interdependent goals and act in the interest of the team), (2) team orientation (ie, cohesiveness, individuals see the team's success as taking precedence over individual needs and performance), (3)

backup (ie, helping one another with their tasks and responsibilities), (4) shared mental model (ie, mutual conceptualizations of the task, roles, strengths/weaknesses, and processes and strategy necessary to attain interdependent goals) and (5) team leadership (ie, structure, direction and support).

Modified Demographic Questionnaire

To obtain an understanding of the population being studied, the following 15 demographic characteristics were measured using a modified questionnaire format from Kalisch's NTS (18): demographic characteristics (work location, level of education, gender, and age), nursing role (job title/role), work schedules (full time equivalency, work hours, and shift), years of experience on the unit, and perceived adequacy. The variable work hours were categorized as day, evening, night, or rotating, whereas shift was labeled 8-hour, 10-hour, 12-hour, rotating, or other. Staffing adequacy was measured on a scale from 0% to 100%. The participants were asked to choose among five levels: staffing is adequate 100%, 75%, 50%, 25%, or 0% of the time.

Team Skills Scale

The Team Skills Scale (TSS) created by Hepburn, Tsukuda, and Fasser (19), is an 18-item questionnaire designed to measure self-perceived interprofessional team skills. The TSS uses a five-point Likert scale (1 = *poor*, 2 = *fair*, 3 = *good*, 4 = *very good*, and 5 = *excellent*), with total score ranging from 15 to 75. The higher the score, the more positive assessment of self-assessment team skills. Items are summed and higher scores indicate a greater amount of the perceived skill. Internal consistency reliability is reported to be Cronbach's alpha = .94 and to be validated in its original form (19).

Procedures

Approval to conduct this study was obtained by the Institutional Review Board for Social and Behavioral Sciences (IRB-SBS). After approval, a survey invitation was released over a 4-week period to all inpatient unit nursing team members. Invitations with the direct link to the QuestionPro© self-administered survey were electronically delivered by e-mail to all inpatient nurses' work email accounts from the hospital's nursing department, entitled "Nursing and Interprofessional Teamwork." The survey invitation included a brief written explanation of the study's objectives and an assurance of confidentiality.

Data Analysis

The data collected from the survey and questionnaires was captured and stored into the QuestionPro© software on the university's server. The data captured by the QuestionPro© software was then transferred into the Statistical Package for the Social Science (SPSS), version 23 (SPSS Inc, Chicago, Illiniois) statistical software for analysis. Demographic data was analyzed by using descriptive statistics to summarize the inpatient nursing team members. Spearman's rank correlation coefficient was used to address the mean overall NTS scores and its five subscales and the overall TSS mean scores ($p < 0.01$ level). Spearman's rank correlation coefficient was chosen because there was not a linear relationship identified between the NTS scores and the TSS scores. NTS and TSS items which correlated at a moderate range (0.4 or above) were further analyzed. An independent samples *t* test was used to examine whether there were any differences in the overall mean TSS scores and the mean number of years in the nursing role.

Study results

Sample Characteristics

The sample consisted of a total of 694 inpatient nursing team members that participated in taking the survey (Table 1). There was an overall 30% response rate from the entire inpatient nursing team. Among those that participated, the majority were female (88.5%), were 25 to 54 years old (67.6%), and had a bachelor's degree or higher (62.1%). A majority of the participants worked full time (88.2%) and worked day shifts (56.6%).

Nursing Perceptions of Nursing and IP Teamwork

Table 2 presents the results of the Spearman's rank correlation used to explore relationships between nurses' perceptions of their nursing and IP teamwork. A two-tailed test of significance indicated there was a moderately significant relationship between the overall NTS mean scores ($M = 3.77$, $SD = 0.88$) compared to the overall TSS mean scores ($M = 3.62$, $SD = 0.96$); $r_s = 0.477$, $p < 0.01$. A similar two-tailed test of significance also revealed that nurses' perceptions of their overall IP teamwork (overall TSS mean scores) was correlated with moderate significance to four of the five NTS subscales: trust, $r_s = 0.415$, $p < 0.01$; team orientation (TO), $r_s = 0.417$, $p < 0.01$; shared mental model (SMM), $r_s = 0.455$, $p < 0.01$, and team leadership, $r_s = 0.458$, $p < 0.01$ (Table 3). Other moderately significant correlations were found among three of the five NTS subscales (TO, SMM, and team

leadership) and five specific TSS items (Table 4).

TSS Scores and the Number of Years in the Nursing Role

An independent samples *t*-test was conducted to compare the overall mean TSS scores for nurses' having been in the nursing role between six months and two years and nurses' having been in the nursing role greater than two years (Table 5). There was a significant difference found in the overall mean TSS scores for nurses having been in the nursing role between six months and two years (M = 65.56, SD = 10.52) and nurses' having been in the nursing role greater than two years (M = 69.39, SD = 11.38); t (392), -2.53 p = 0.01.

Discussion

The purpose of this study was to examine whether or not nurses' perceptions regarding nursing teamwork were associated with their self-perceived abilities to function as a member of an IP team. The investigators used the Nursing Teamwork Survey (NTS) and Team Skills Scale (TSS) as measurements for evaluating nursing and IP teamwork perceptions among 694 inpatient nursing team members in an AMC. As a whole, the sample participants' characteristics were found reflective of the AMC nursing team. Furthermore, 95% of the participants met nursing team description criteria as defined by Kalisch et al. (17).

Nurses' perceptions regarding their overall nursing teamwork showed that higher levels of overall nursing teamwork were significantly related to their self-perceived abilities to function as a member of an IP team. The nursing teamwork subscale team leadership reflected the most significant correlation to overall IP teamwork ($r_s = 0.458$, $p < 0.01$), followed by having a SMM ($r_s = 0.455$, $p < 0.01$), TO ($r_s = 0.417$, $p < 0.01$), and trust ($r_s = 0.415$, $p < 0.01$). Interestingly, there was no significant correlation between the subscale backup and overall IP teamwork.

Perhaps, the nurses' perceptions of their overall nursing teamwork are significantly related to their self-perceived abilities to function as a member of an IP team because of the organizational culture and structure at study site. The nurse leaders in the inpatient units have regular, visible meetings with IP team leaders. It might be hypothesized that the role modeling demonstrated through these meeting and the positive outcomes achieved through the connection are contributing to an emphasis on nurse leadership within IP teams. Effective nursing team leadership may be creating and providing trusting work settings that incorporate SMMs and TO that collaboratively include the perspectives and values of their IP colleagues and most importantly their organization.

The findings of this study also demonstrated that nurses' perceptions in three of the five nursing teamwork subscales (team leadership, TO, & SMM) positively correlated to five specific IP teamwork items. Specifically, nurses' perceptions of their team leadership capabilities correlated to one's abilities to intervene effectively to improve team functioning ($r_s = 0.401$, $p < 0.01$). Team leadership ($r_s = 0.414$, $p < 0.01$), SMM $r_s = 0.414$, $p < 0.01$), and TO $r_s = 0.414$, $p < 0.01$) was correlated with adjusting one's care to support team goals. Having a strong sense of TO ($r_s = 0.425$, $p < 0.01$) and a SMM ($r_s = 0.425$, $p < 0.01$) correlated to treating team members as colleagues. TO correlated to developing intervention strategies that help patients attain their goals ($r_s = 0.410$, $p < 0.01$) and attitudes ($r_s = 0.407$, $p < 0.01$) about practicing in a team care environment. The reasons for these specific similarities may be because team leadership traditionally is viewed responsible for affecting a team's orientation and for also creating effective SMMs for achieving the desired team goal(s) (18).

Another important finding from this study appeared when comparing the levels of IP teamwork and the years of nursing experience. The findings demonstrated that the overall IP teamwork scores for nurses having been in the nursing role between six months and two years to be significantly lower than for nurses having been in the role for greater than two years. The reasons for why IP teamwork is lower in nurses that have been in the role between six months and two years may be because of the fact that they have under-developed IP team skills. This may also be the result of limited IP teamwork training that the newer nurse has experienced and the protective nature and focus of the nursing orientation process.

Implications

Nurses' perceptions of their overall nursing teamwork were found significantly related to their overall IP teamwork. In addition, there were similarities in trust, TO, SMM, and team leadership when compared to overall IP teamwork. Pointedly, nurses' perceptions of three nursing teamwork subscales (team leadership, TO, & SMM) positively correlated with five specific IP teamwork items. Additional studies need to be conducted to further evaluate these relationships; however, these findings provide baseline knowledge for how nurse managers and nursing administrators can better promote, support, lead, and/or organize their nursing team in more effective IP care. Incorporating these findings into team competencies that train clinicians in necessary teamwork skills may assist nurse leaders in building more cohesive teams that are better prepared to provide quality care in a healthier work

environment. TeamSTEPPS© is one tool that can provide these teamwork skills. Furthermore, these team competencies can be implemented and tested in teamwork training events (ie, simulations) that will give nurses opportunities to practice these skills. We cannot expect team members to learn these skills without proper training and support.

Considering the similarities that exist between nursing and IP teamwork, the findings also suggest that nurse managers and nursing administrators should focus their nursing team members on adopting an IP teamwork posture in their units. One approach for how nurse managers and nursing administrators can orient their nursing team members in adopting this IP teamwork posture is by role-modeling appropriate IP team behaviors. According to Belinsky and Tataronis (20), role models teach professional thinking, behaviors, and attitudes. We cannot expect nursing team members to practice IP team behaviors if we do not practice IP team behaviors ourselves.
Taking into consideration the levels of IP teamwork and the years of nursing experience, this finding demonstrates that nurses having been in the nursing role between six months and two years lack perceived IP teamwork skills for their unit. This finding perhaps explains why nurse attrition rates are seen highest in the second year (21). Larger studies are needed to further confirm these findings. In addition, studies including skill acquisition dynamics in relationship to IP teamwork are needed. Are there specific IP teamwork skills that we can implement earlier in a nurse's career that will improve their perceptions in being a part of an IP team? Understanding these dynamics will not only help better identify IP teamwork skills needed by less experienced nursing team members, but perhaps decrease nurse attrition rates. One strategy for possibly improving these younger nurses' perceptions about their IP teamwork skills is by creating a work setting culture that is open, transparent, and supportive to practicing IP teamwork.

Strengths and Limitations of the Study

The strengths of this study included the use of established, valid and reliable survey tools to measure nursing and IP teamwork on inpatient units in hospitals. In addition, these tools have the ability to mirror participants' characteristics with those of the AMC nursing teams is key. Therefore, it more clearly represents the AMC team and makes the results more generalizable to that team as a whole. Since there has been no identifiable literature found that describes the possible associations of nursing teamwork factors and nurse's self-perceived abilities to function

as a member of an IP team on inpatient units in hospitals, the results from the study provide foundational evidence for future IP teamwork studies.

The limitations of this study include the use of a survey approach to obtain information about nursing and IP teamwork. Therefore, the results reflected the perceptions of the respondents as opposed to an observation of the actual nursing and IP teamwork. Another limitation of this study includes that it was conducted in a single academic medical center with only a 30% response rate. As a result, the respondents of the survey may not have reflected the larger nursing population in some way. This study did include nurses' perceptions from nursing teams (ie, special procedures, OR) that did not meet nursing team description criteria as defined by Kalisch et al. (22).

Conclusions

This study demonstrates that a significant relationship exists between nursing and IP teamwork, perhaps further describing what nurses' expectations are of their professional relationship and the interdependencies that exist both within and across the numerous healthcare teams. To the author's knowledge, this is the first study evaluating nursing perceptions of nursing teamwork and self-perceived abilities to function as a member of an IP team. This has specific implications for nurse managers and hospital administrators in regards to better understanding what specific IP teamwork competencies are perhaps necessary that support both team and patient goals. This study also provides baseline knowledge to be built upon for future IP teamwork intervention studies.

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Table 1

Characteristics of study sample (*N* = 694)

Variable	Category	%
Gender		
	Male	11.5
	Female	88.5
Age		
	< 25 years	15.2
	25-34 years	32.6
	35- 44 years	15.2
	45-54 years	19.8
	55-64 years	15.6
	≥ 65 years	1.6
Highest education level		
	N/A	17.9
	LPN Diploma	0.2
	RN Diploma	3.5
	Associate's degree in nursing (ADN)	16.4
	Bachelor's degree in nursing (BSN)	44.7
	Bachelor's degree outside of nursing (e.g. Bachelor's of Arts (BA) or Bachelor's of Science (BS)	4.1
	Master's degree (MSN) or higher in nursing	10.9
	Master's degree or higher outside of nursing (e.g. Master's in Business)	2.4
Nursing role		
	Staff Nurse RN or LPN	71.0
	Nursing Assistant	17.9
	Nurse Manager or Administrator	3.1
	Unit Clerk	5.8
	APRN: CNS or NP	2.1
Years of experience in nursing role		
	N/A	18.8
	Up to 6 months	6.1
	Greater than 6 months to 2 years	7.6
	Greater than 2 years to 5 years	17.4
	Greater than 5 year to 10 years	13.3
	Greater than 10 years	36.7
Employment status		
	less than 30 hours per week	11.8
	30 hours or more per week	88.2
Shift worked		
	Days (8 or 12 hour shift)	56.6
	Evenings (8 or12 hour shift)	5.8
	Nights (8 or 12 hour shift)	17.9
	Rotates between days, nights or evenings	19.7
Type of working unit		
	Intensive care (7)	24.7
	Medical-Surgical, intermediate, and specialty (14)	33.9
	Pediatric/Maternity (2)	9.1
	Psychiatric (1)	1.2
	Perioperative and operating room (2)	15.0
	ED and other (3)	16.0

Table 2

TSS scores by NTS domains

	NTS Total
TSS Total	**.477****

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3

TSS scores by NTS subscale

	NTS Subscales				
	Trust	**Team Orientation**	**Backup**	**Shared Mental Model**	**Team Leadership**
TSS Total score	**.415****	**.417****	**.344****	**.455****	**.458****

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4

TSS Specific Items by NTS Subscales.

	NTS Subscales				
	Trust	**Team Orientation**	**Backup**	**Shared Mental Model**	**Team Leadership**
TSS Items		2. Treat team members as colleagues (.425)		2. Treat team members as colleagues (.425)	
		11. Adjust your care to support team goals (.414)		11. Adjust your care to support team goals (.414)	11. Adjust your care to support team goals (.414)
		12. Develop intervention strategies that help patient attain goals (.410)			
					15. Intervene effectively to improve team functioning (.401)
		18. About practicing in a team care environment (.407)*			

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5

Independent Samples *t-test* between TSS scores and the number of years in the nursing role

Mean TSS Scores			
	Mean	Standard Deviation	*t-test*
Up to 2 years	65.56	10.52159	-2.536*
Greater than 2 years	69.39	11.38	

**Note: P = < 0.01*

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