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The Impact of Relational Coordination and the Nurse on Patient Outcomes

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THE IMPACT OF RELATIONAL COORDINATION AND THE NURSE ON PATIENT OUTCOMES

by

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ABSTRACT

Healthcare quality remains a significant issue due to fragmentation of care in our complex U.S. healthcare systems. While coordination of care is foundational to healthcare quality as well as identified as a National Priority, fragmentation and uncoordinated care continues to afflict our systems. The purpose of this study was to explore the relationship between relational coordination and adverse nurse sensitive patient outcomes, namely hospital acquired pressure ulcers, patient falls with injury, catheter- associated urinary tract infection, and central line-associated blood stream infection. A retrospective correlational survey design using cross sectional data was used to conduct this quantitative study. An electronic relational coordination survey was sent to 1124 eligible registered nurses from 43 nursing units within a 5-hospital magnet-designated healthcare system to gather their perception of the strength of relationship and communication ties of their work team. The nurse practice environment as well as nurse education were control variables. With 406 nurses who completed the survey (36% response rate), findings revealed that the stronger relational coordination ties are amongst the healthcare team, the lower the rate of adverse nurse sensitive patient outcomes as indicated by their inverse relationship. (r_s=-.31, p=.050). In a Negative Binomial Regression model, relational coordination was a significant predictor (β-1.890, p=.034) of nurse sensitive patient outcomes whereas nurse education level (p=.859) and nurse practice environment (p=.230) were not. Data affirms that relational coordination, a relationship and communication intensive form of coordination does impact patient outcomes. This research provides significant information to health care leaders and institutions with goals of improving patient care outcomes through enhancement of coordination of care and optimization of healthcare teams.

To my lord and savior whose grace, love, and peace kept me grounded and made this journey possible.

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LIST OF ACRONYMS

AACN	American Association of Colleges of Nursing
AACN	American Association of Critical Care Nurses
AHRQ	Agency for Healthcare Research and Quality
ANA	American Nurses Association
CAUTI	Catheter-Associated Urinary Tract Infection
CLABSI	Central Line-Associated Blood Stream Infection
CMS	Center for Medicare and Medicaid
FCN	Florida Center for Nursing
HAPU	Hospital-Acquired Pressure Ulcer
IHI	Institute for Healthcare Improvement
IOM	Institute of Medicine
NDNQI	National Database of Nursing Quality Indicators
NQF	National Quality Forum
NQS	National Quality Strategy
RC	Relational Coordination
RWJF	Robert Wood Johnson Foundation
UHC	University Health Center Consortium
USDHHS	U.S. Department of Health and Human Services

CHAPTER ONE: INTRODUCTION

Coordination of care has long been considered important within organizations for achievement of desired performance outcomes of quality patient care and efficiency in care delivery (Gittell & Weiss, 2004). Care coordination, a familiar and frequently used concept in healthcare, is defined as the deliberate organization of patient care activities between two or more participants involved in a patient's care to facilitate the appropriate delivery of healthcare services (McDonald et al., 2007). Expressly, Relational Coordination, a form of coordination, introduces coordination of care with a specific focus on communication and the relationship ties of the work team. Nurses work with the healthcare team to coordinate and facilitate care for the patient. How these nurses and the healthcare team function interdependently for the coordination of patient care is inconsistent at best and varies from setting to setting. relational Coordination focuses on the relationships of work teams and the interdependent work they do in an effort to complete tasks (Gittell, 2009b). Relational coordination is more clearly defined by Gittell, referencing her earlier work in 2002, as a mutually reinforcing process of interactions between communication and relationships carried out for the purpose of task integration. Work teams demonstrating relational coordination are teams that experience high levels of communication that is frequent, accurate, timely, and problem-solving. They also function in an atmosphere of shared goals, shared knowledge, and mutual respect. Relational coordination is purported to be most effective in environments with a high degree of uncertainty, task interdependence, and time constraints such as what is seen in healthcare institutions.

This chapter presents a brief overview of the problem with healthcare quality and patient outcomes. A specific focus will be on coordination of care, which is believed to impact quality.

Specifically, relational coordination, a form of coordination will be introduced as the key focus of this study. Further, the nurses' role in healthcare quality along with characteristics such as nurse education level and nurse practice environment will be explored as they have both historically been shown to impact coordination or care, quality and patient care outcomes. Discussion will link the need for further research using the theoretical framework of relational coordination with its key concepts of communication and relationship characteristics of work teams. Lastly, this chapter will identify the purpose and aims guiding this doctoral study.

Significance

Quality issues facing United States' healthcare systems have resulted in widespread interest in solutions to improve the loosely coordinated care of current complex systems. This effort to address fragmentation of healthcare services is to positively affect quality and patient outcomes (American Nurses Association [ANA], 2012 ; McDonald et al., 2007). *In Crossing the Quality Chasm: A New Health System for the 21st Century*, The Institute of Medicine (2001) describes quality healthcare as that which is safe, timely, effective, efficient, equitable, and patient-centered. Further, coordination of care, a proactive and conscious effort in meeting patients' needs, has been identified as a key strategy for addressing these issues with healthcare quality because it addresses each of these six domains (ANA, 2012). Not only has coordination of care been proposed as a solution to the fragmentation and complexity of the U.S. healthcare systems (ANA, 2012), it has also been foundational to current healthcare reform initiatives for improving healthcare. Additionally quality care is the focus of healthcare policy such as what is announced through Center for Medicare and Medicaid with its discussion of Value Based

Purchasing initiatives, where efforts are made to motivate quality outcomes from hospitals through financial rewards and penalties based on quality care rendered (CMS, 2014)

It is believed that patients entering U.S. healthcare systems benefit from coordinated care as they steer their way through very complex healthcare systems. Unfortunately, uncoordinated care negatively affects quality care and patient outcomes especially for those more vulnerable (patients with chronic conditions) (National Quality Forum [NQF], 2010). The United States, spending more per capita than any other nation (16% GDP), not only experiences quality issues in its healthcare systems, but also endures financial strain due to inefficiencies and poor quality of care (ANA, 2012). Nearly 20% of patients discharged from hospitals suffer an adverse event within three weeks due to poorly coordinated care and/or lack of communication (NQF, 2010).

Although widely regarded and acknowledged as a necessary key step in patient-care outcomes, coordination of care remains fragmented (ANA, 2012). Adequate coordination of care not only benefits patients by improving outcomes and adding value to care, but also by controlling costs. The IOM has identified coordination of care as one of 20 national priorities for quality improvement (IOM, 2003b; NQF, 2004) with the directive of affecting quality and efficiency outcomes. Likewise, the National Quality Forum assembled a 52 member *National Priorities Partnership* to establish a National Quality Strategy (NQS), now overseen by the Secretary of Health and Human Services. The NQS identifies coordination of care as one of six national priorities to improve patient outcomes (National Priorities Partnership, 2008; NQF, 2010). Moreover, coordination of care is an identified solution believed to support the initiatives of the Center for Medicare and Medicaid Services (CMS) in meeting the goals of the Institute for Healthcare Improvement (IHI) recommended 'Triple Aim': (1) Improve the individual's

[patient] experience; (2) Improve the health of populations; and (3) Reduce the per capita cost of healthcare (ANA, 2012, p. 5; IHI, 2014b).

Statement of Purpose

Relational coordination, an informal form of coordination, addresses relational connections of work teams and reflects the concepts of coordination as a network of communication and relationship ties among participants in a work process that impacts quality and efficiency outcomes (Gittell, 2009b). Therefore, the purpose of this study is to explore relational coordination and its association to quality as measured by nurse sensitive patient outcomes (hospital-acquired pressure ulcers, patient falls with injury, catheter-associated urinary tract infection, and central line-associated blood stream infection). The study aims are:

AIM 1: To describe the level of relational coordination (measured by Relational Coordination Survey), the nurse practice environment (measured by NDNQI RN Survey with Job Satisfaction Scales-R©), and the frequencies of adverse nurse sensitive patient outcomes (hospital-acquired pressure ulcer, patient falls with injury, catheter-associated urinary tract infection, and central line-associated blood stream infection) in a five hospital acute care healthcare system.

AIM 2: To determine the effect of relational coordination on adverse nurse-sensitive patient outcomes when controlling for nurse practice environment and nurse level of education.

Theoretical Framework

Relational coordination is an emerging theory with its focus rooted in relational dynamics and the coordination of work (Gittell, 2009a). This theory asserts that organizations that employ relational coordination influence their ability to achieve desired outcomes. The theory of relational coordination (Figure 1) is comprised of seven dimensions grouped into two concepts: 1) Communication concept (frequent, timely, accurate, and problem solving); and 2) Relationship concept (shared knowledge, share goals, and mutual respect).

The seven dimensions were developed through inductive field research (Gittell, 2009a) and have since been tested in two major studies involving air travel and surgical care (Gittell, 2001; Gittell et al., 2000). The initial nine-airline study explored relational coordination and the association with quality (customer complaints, mishandled bags, and late arrivals) and efficiency (gate-time per passenger and staff-time per passenger) outcomes of flight departures. The study found that relational coordination enabled shorter turnaround times, greater employee productivity, less lost luggage, and fewer flight delays (Gittell, 2003).

Likewise, the initial testing of the theory in the healthcare setting with postoperative orthopedic patients in a nine-hospital study revealed that increases in relational coordination were associated with quality (increased postoperative functioning, decreased postoperative pain, and increased patient-perceived quality of care) and efficiency (decreased length of stay) outcomes (Gittell et al., 2000).

Theoretical Underpinnings

Relational coordination theory, a relationship and communication intensive philosophy, was developed in 1990 and tested beginning in 2000. It maintains its theoretical underpinnings

from various theories including organization design theory, social capital theory, and sense-making theory (Gittell, 2009b). Other influential theoretical perspectives include coping theory, contingency theory, theory of requisite variety, expertise coordination theory, human capital theory, and appreciative inquiry theory (Gittell, 2000; Gittell, 2001; Gittell, 2002; Gittell, Weinberg, Pfefferle, & Bishop, 2008; Lee, 2013). Gittell credits all of these theories for their relevance to the researcher's foundational work and identified the similarities and differences between those theories and relational coordination theory (Gittell, 2009b, 2011a).

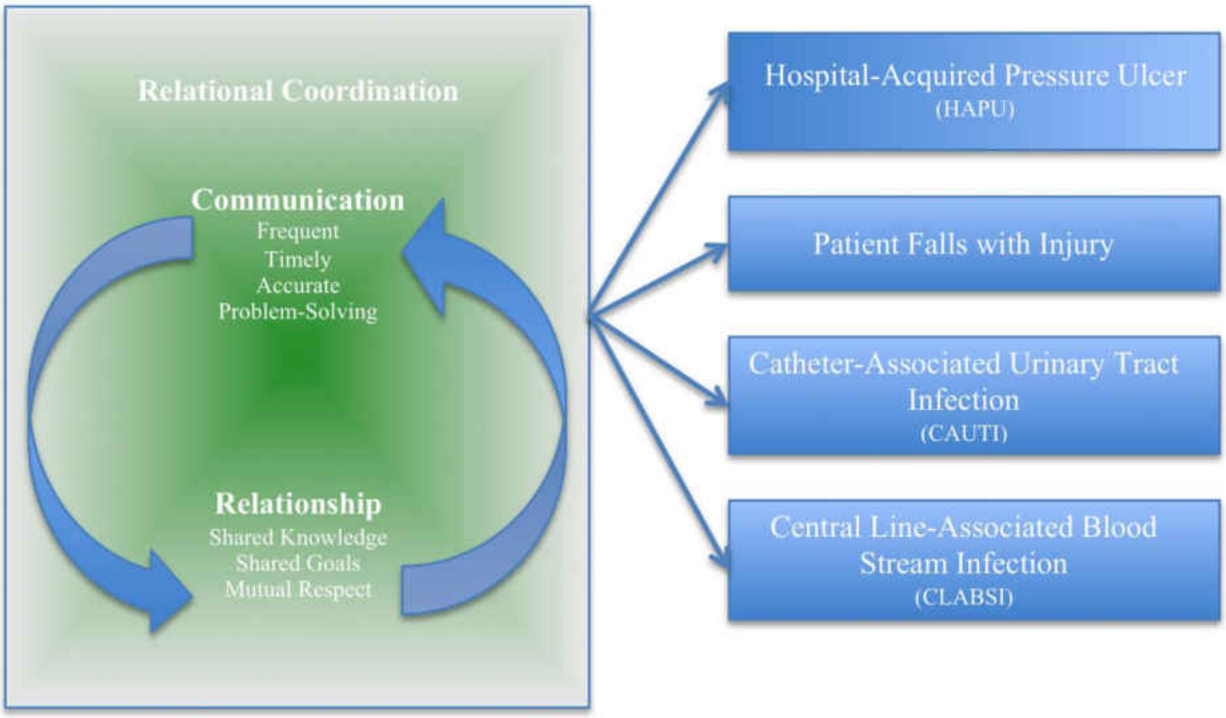

Figure 1. Relational Coordination and Nurse-Sensitive Patient Outcomes adapted from (Gittell, 2009b; Havens, et al., 2010)

Primarily, the two seminal works, which influenced relational coordination theory, were the theory of coordination by Mary Parker Follett, written in 1947, and the theory of organization

design by James D. Thompson, written in 1967 (Gittell, 2009b). Follett (1987) proposed a model involving organization of businesses and the coordination that takes place via the cross-functional nature of work teams and cooperation in a unifying manner in an effort to get work done. Thompson (1968) proposed a model highlighting mutual adjustment as part of organizational design and a way of coordinating interdependent work. In adaptation of these other theories, relational coordination has the distinguishing characteristic of focus, not only on the coordination of work but also on the team relationships in an environment of shared goals, shared knowledge, and mutual respect, which capitalizes on accurate, timely, frequent, and problem-solving communication (Gittell, 2009b). Another equally important and distinguishable characteristic of relational coordination is the focus on coordination between various "roles" of the work team (i.e. nurse, physician, pharmacist) versus coordination between individual team members (i.e. Jane Doe RN, John Doe M.D., Jim Doe, pharmacist, etc.). Gittell reports that the "role" is key since coordination generally involves managing interdependencies of tasks and since those assigned tasks are generally "role-based" (2009b, p. 14). The interest and focus of this research is on the role of registered nurses as key team members versus individual nurses.

Theoretical Concepts

Communication

One of the two key concepts of the relational coordination theory is communication (Gittell, 2009b). Within this concept lie four of the seven dimensions of the relational coordination theory: (a) frequent communication; (b) timely communication; (c) accurate communication; and (d) problem-solving communication. These dimensions are vitally important to the process of achieving high-quality communication among teams. Gittell

describes frequent communication as recurring interactions, which the author believes influence relationship-building through repetition of interaction. Additionally, the author describes timely communication as communication without delays that interfere with completion of tasks. Gittell acknowledges that delays can result in errors or other adverse outcomes. Gittell describes accurate communication as sharing information that does not contain inaccurate information, which, in turn, helps prevent errors. Accurate information can improve work efficiencies by minimizing the need for rework to correct errors. Gittell describes problem-solving communication as communication that occurs among engaged team members for the sake of solving problems rather than engaging in negative actions such as blaming.

Relationships

Coupled with communication, relationship is the second of the two key concepts of the relational coordination theory (Gittell, 2009b). Within this concept lies the remaining three of the seven dimensions of the relational coordination theory: (a) shared goals; (b) shared knowledge; and (c) mutual respect. Gittell explains these dimensions as follows. Shared goals are exhibited when the work team shares global goals as opposed to members maintaining their own individual or departmental goals. Gittell further explains that if the individual's goals superordinate the goals of the work team, this is referred to as functional goals, as described by March and Simon in 1958. Shared knowledge, is exhibited when each team member is aware of the work that is being done by other members and understands how his or her work fits with the work of others. Mutual respect, is exhibited when members of the team respect the contribution of each other and recognize contributions toward getting the work done through overall work processes.

Applicability of Theoretical Framework

The theory of relational coordination addresses concepts that are significant to the work that nurses do. Communication amongst the healthcare team and relational dynamics are needed in the nurses' work world (Gittell, 2009a). Nurses generally serve as the coordinators of their patients' care while facilitating patients' plans of care in partnership with other members of the healthcare team (IOM, 2010). Additionally, registered nurses are often viewed by patients as the most suitable provider to manage their coordination needs (ANA, 2012). Research suggests that using the theory of relational coordination can change the way nurses carry out their interventions while on the job (Gittell, 2009a). The theory of relational coordination has the potential to guide nurses in becoming more effective and efficient in their work relationships with other members of the healthcare team by highlighting two key focus areas of effective work teams (communication and relationships). Moreover, Gittell purports that the theory of relational coordination can also serve as a platform for managers in providing a useful research tool to improve relationships of healthcare workers and communication for quality-care outcomes (Havens et al., 2010). Several tools identified in the literature as ways to improve relational coordination of work teams include TeamSTEPPS®, a national, evidenced-based program designed for healthcare professionals to improve patient safety, communication, and teamwork (Agency for Healthcare Research and Quality [AHRQ], n.d.; Havens et al., 2010) and SBAR, a nationally recognized evidenced-based practice for standardized communication (Havens et al., 2010; IHI, 2014). relational coordination and TeamSTEPPS® are believed to be complimentary of each other since relational coordination has been identified to be a validated "measure" of teamwork and TeamSTEPPS® has been identified as being a validated "intervention" to building teamwork (Gittell, Beswick, Goldmann, & Wallack, 2015).

The theory of relational coordination is relevant to nursing as healthcare is continuing to increase in complexity (Gittell, 2009b). Healthcare institutions are challenged with maintaining a high level of quality care despite limited resources. Economically, cutbacks are very common in healthcare environments as providers try to do more with fewer resources. Institutions often participate in efforts to operate in a lean environment while maximizing their limited resources. This dilemma forces healthcare providers to determine ways to work more efficiently as a team and to coordinate the work of teams to achieve desired outcomes. The theory of relational coordination identifies key concepts of communication and relationships that, when optimized, allow teams to achieve desired outcomes of quality and efficiency.

CHAPTER TWO: LITERATURE REVIEW

This chapter presents current research on the effects of coordination of care, specifically relational coordination, on quality of care and efficiency outcomes. This chapter provides an overview of relational coordination along with nurse sensitive patient outcomes as quality indicators in the hospital setting. Further this section highlights the role of the nurse in health care quality and coordination of care. With nurses being identified as key team members in the healthcare setting affecting patient care quality, other pertinent items related to nurses and quality outcomes will be discussed (nurse education level and nurse practice environment). Lastly, this section will discuss how relational coordination can serve as a framework to influence quality of care, and nurse sensitive patient outcomes.

Literature Review Strategy

A comprehensive literature review on the topic of relational coordination with key search terms (nurse AND relational coordination, task interdependence, coordination, care coordination) was explored through nursing and non-nursing databases (PubMed, CINAHL, Business Source Premier, and Human Resource Abstracts). Articles were reviewed and evaluated for the strength of their evidence utilizing criteria suggested by Leedy and Ormrod (2013, pp. 64-65) including evaluation of (1) research purpose and question; (2) evidence supporting the results; (3) data collection methods; (4) relevance of information; and (5) limitations of the study. The electronic literature search of the four databases yielded a total of 27 articles with no restrictions on date range. Articles were included if they were related to relational coordination, available in full text, published in a peer-reviewed journal, and written in English language and were excluded if they did not include measureable quality or efficiency outcomes (Appendix A). Retained articles are

included in the evidence summary table of reviewed literature on relational coordination (Appendix B).

Coordination of Care

Coordination of care, an expansive and complex concept, is a function that is necessary for the health of populations (IHI, 2014b) and is foundational to healthcare quality (NQF, 2010). More specifically defined, "care coordination is the deliberate organization of patient care activities between two or more participants involved in a patient's care to facilitate the appropriate delivery of health care services" (McDonald et al., 2007, p. 5). In a focused review of over 43 systematic reviews on care coordination, McDonald et al. reviewed over 40 definitions of care coordination in their quest to add clarity to the concept of care coordination. However broad the concept, all identified definitions in this review included one or more of these key elements coined as characteristic of care coordination:

1) numerous participants involved in coordination of care- [work teams];
2) coordination necessary when participants depended on each other for activities to be completed for the patient- [interdependent work processes];
3) participants needed adequate knowledge of each other's work to carry out activities in a coordinated way- [shared knowledge];
4) participants relied on exchange of information to carry out activities for the patient - [communication]; and
5) care activities needed to be integrated to facilitate care delivery- [shared goals] (McDonald et al., 2007, pp. 4-5).

Table 1 displays two key definitions of care coordination discovered in this focused review. One definition was offered by NQF, a governing body forging national standards on quality outcomes and one definition offered by Gittell, the theorist whose framework guides this research.

Table 1 *Definitions of care coordination*

Definition	**Source**
Care coordination is a function that helps ensure that the patient's need and preferences for health services and information sharing across people, functions, and sites are met over time…is foundational to healthcare quality	(NQF, 2010)
Relational coordination is a mutually reinforcing process of interaction between communication and relationships carried out for the purpose of task integration	(Gittell, 2009b)

The registered nurse is essential to the coordination of care process and the patient's experience. The ANA (2012) emphasizes that care coordination is a basic competency for registered nurses' professional practice. The ANA also recommends that education on coordination of care be enhanced in nursing schools.

Relational Coordination

Refining coordination from the broad scope to more specific attention to the healthcare team, relational coordination focuses on the coordination of care that happens within and between work teams with their interdependent work. This coordination is vastly important as each role of the healthcare team plays a part in the coordinating efforts on behalf of the patient in to contribute to patient centered care. Review of the literature revealed three themes that will serve as guided discussion for this review of relational coordination: (1) relational coordination and work teams (Bae, Mark, & Fried, 2010; Gittell, 2008; Gittell, Godfrey, & Thistlethwaite,

2013; Gittell, Seidner, & Wimbush, 2010; Gittell et al., 2008; Weinberg, Miner, & Rivlin, 2009); (2) relational coordination and coordinating mechanisms (Gittell, 2000; Gittell, 2001; Gittell, 2002; Lee, 2013); and (3) relational coordination and quality (Cramm & Nieboer, 2012; Gittell et al., 2000; Havens et al., 2010) (Appendix A).

Relational Coordination and Work Teams

Relational coordination is acknowledged in the literature as a relationship and communication intensive work process of teams that function best in conditions with a high level of uncertainty, time constraints, and task interdependence (Bae et al., 2010; Cramm & Nieboer, 2012; Gittell, 2000; Gittell, 2001; Gittell, 2002, 2008; Gittell et al., 2000; Gittell et al., 2013; Gittell et al., 2010; Gittell et al., 2008; Havens et al., 2010; Lee, 2013; Weinberg et al., 2009). All of these characteristics (uncertainty, time constraints, task interdependence) are present in the healthcare setting and paves the way for healthcare teams to develop so that they are sustainable in this type environment where they must perform at a high level in an era of diminishing resources.

Several studies examined relational coordination and aspects of the work team (Bae et al., 2010; Gittell, 2008; Gittell et al., 2013; Gittell et al., 2010; Gittell et al., 2008; Weinberg et al., 2009) as relational Coordination is described as a "resilient response" to external pressures faced by healthcare workers (Gittell, 2008). These pressures can be from outside sources in the manner of managed care or insurance companies but more simply stated, can be external pressures for employees to perform in uncertainty, with limited resources, under a time crunch to such as what is seen with bueauracratic pressures to treat patients more efficiently and effectively as to not prolong hospital stays.

Of the studies on relational coordination examining work teams, only one reviewed turnover rate and possible associations with relational coordination. In this study, performing a secondary data analysis of 268 nursing units from 161 hospitals, Bae et al. (2010) shared that when valued employees leave their job, relationships that were once established become disrupted, making it increasingly difficult to achieve relational coordination. Nevertheless, in their study of turnover rate and workgroup processes, the relationship between nurse turnover rate and relational coordination was insignificant. Because the theory of relational coordination focuses on interdependent tasks coordinated between "roles" within work teams versus "individual," team members, it allows for the interchangeability of individuals without affecting performance (Gittell, 2009b).

Considering the "role" of members of the healthcare team, it is well recognized that the nurse and the physician are core members of the healthcare team. Several studies focusing specifically on relationships among these key members of the healthcare team (Cramm & Nieboer, 2012; Havens et al., 2010; Weinberg et al., 2009) were similar in that they all reported this relationship as being significant to the team and to the coordination of patient care. Nurses working in areas where the relationships were strong between the nurse and physician also perceived quality of care to be higher in their units as studied by Havens et al. (2010) in their study of 747 nurses in six type nursing units. In comparing the rating of their strength of relationships, in this study, nurses rated their relationship with physician as third highest in comparison to their relationships with (1) nurses working on the same units, (2) nurses working on different units, (3) nurses and physical therapists, and (4) nurses and support staff. Moreover, the higher the level of relational coordination between these roles, the higher the nurse ratings of quality care in their unit. In areas with high levels of relational coordination, nurses reported less

frequent patient complaints, less frequent medication errors, fewer hospital-acquired infections, and fewer patient falls with injury. This strong relationship was again realized in a cross sectional study 188 healthcare professionals Cramm and Nieboer (2012). Similarly, in this study, physicians also rated their relationship with nurses higher than their relationship with other physicians. These physicians, like the nurses, were able to report higher quality of care for their patients due to this strong relationship with nurses.

The healthcare industry and the patients it serves benefit from work teams characterized by high levels of communication and relationship characteristics that reflect shared goals, shared knowledge, and mutual respect as indicated by the relational coordination theory (Gittell et al., 2000). Further acknowledging that nurse-physician relationship was a key component in caring for patients, Weinberg et al. (2009) explored this relationship further through use of the relational coordination survey administered in a qualitative fashion with interviews of 20 medical resident staff. The researchers noted that the relational component was grossly affected by the quality of nurse-physician relationship as evidenced by the qualitative study's interview results from medical residents whose reports of their relationship with the nurse invariantly included a disclaimer of "it depends," referring to variable characteristics of the nurse such as competence, willingness to collaborate, education level, and years of experience. Ultimately, study findings did support the significance of the work team, specifically the nurse and the physician, to form positive communication and relationships for the sake of the patient and achievement of positive outcomes. Further, the researcher recommended that there be focus placed on changing the views of how medical residents see nurses and focus on addressing obstacles (the style and ability to communicate for physician residents and nurses, the lack of standardization in nursing education, and lack of shared goals and shared knowledge of each other's role) as identified through the

structured qualitative interview responses to the seven open-ended questions in the interview (Weinberg et al., 2009).

Considering the characteristics of relational coordination, work teams can either be significantly affected by or have a significant impact on relational coordination (Gittell, 2009a, 2009b). Organizational structures, such as those that connect work teams versus those that encourage work in silos, provide support of increased levels of relational coordination (Gittell et al., 2010). This type of strength of relational ties in an organization indicates the need to replace bureaucratic structures with more relational structures (Gittell, 2011a; Gittell et al., 2013). Nurses represent the largest group of workers in the healthcare field; yet, it still takes not only their efforts, but also the collective efforts of the healthcare team to achieve success with quality outcomes (Lacey & Cox, 2009). Nurse and physician relationships, in addition to the relationships shared with the healthcare team, benefits patients with quality outcomes when the relationships are strong (Cramm & Nieboer, 2012; Havens et al., 2010; Weinberg et al., 2009).

Relational Coordination and Coordinating Mechanisms

In addition to aspects of the work team, coordinating mechanisms are aspects of the work environment believed to be associated with the coordination of work processes (Gittell, 2000; Gittell, 2001; Gittell, 2002; Lee, 2013). In the healthcare setting, these processes are inclusive of boundary spanners/cross-functional liaisons (case managers or primary nurses whose role it is to integrate the work of others), team meetings (patient rounds), routines (standardized and repeated tasks), and supervisory span (the vastness of responsibility of a supervisor) (Gittell, 2000, 2002). Coordinating mechanisms were first field tested in the airline industry with the initial testing of

the relational coordination theory of high quality relationships and communication for purpose of task integration.

In this foundational study conducted by Gittell (2001) with nine airlines exploring the effects of supervisory span on relational coordination affecting group performance, coordinating mechanisms were significantly related to relational coordination. Supervisory span (coordinating mechanism) was reflected by the number of full-time equivalents (FTEs) a supervisor was responsible for, and group performance was measured by the efficiency of flight departure process as rendered by work teams (gate, ticketing, ramp, baggage, and operations). Broad supervisory span (supervisors responsible for more FTEs) was significantly associated with lower levels of group performance (flight departure process), and vice-versa, narrow supervisory span (supervisors responsible for fewer FTEs) was associated with higher levels of group performance. In addition, narrow supervisory spans were significantly related to increased frequency of communication and shared goals, knowledge, and mutual respect across functions or roles of work teams. Supervisory span is applicable to the healthcare industry where there is an increased demand for quality and a decrease in the amount of resources (Gittell, 2008). Even so, hospitals and supervisors are held to a high level of accountability to facilitate quality services that will produce positive patient outcomes. Supervisory span as well as other boundary spanners is worth review in the healthcare setting as efforts are made to make an impact on care coordination and in turn, patient care outcomes in environments of limited resources.

Relational Coordination and Quality

Quality is of utmost importance in the healthcare industry (AHRQ, 2008; Kurtzman & Corrigan, 2007), and has a critical association with relational coordination (Gittell, 2009a;

Havens et al., 2010). Relational coordination steers work teams toward high levels of quality and efficiency by motivating staffs' ability to manage their interdependent work with fewer gaps in service (Gittell et al., 2013). In the first study testing relational coordination in a healthcare setting, a nine-hospital study of 878 orthopedic surgery patients and 338 healthcare providers showed an association between increased levels of relational coordination and quality (reduced postoperative pain, increased postoperative functioning) and efficiency (reduced length of stay) outcomes, similar to the study conducted in the airline industry. (Gittell et al., 2000). When loaded into a linear regression model, the components of relational coordination most predictive of the quality outcomes were frequency of communication, shared goals, and mutual respect among caregivers while all seven components (frequent, timely, accurate, problem-solving communication, shared goals, shared knowledge, and mutual respect) were predictive of the efficiency outcome. In this study, the overall relational coordination as a single index (mean average of all scores) accounted for 81% variation in LOS demonstrating that when work teams are facilitated by high levels of strong communication and relationship ties, they stand to achieve quality and efficiency outcomes such as what was seen with shorter LOS in this study (Gittell et al., 2000). Moreover, an increase in relational coordination by one point was associated with a decrease in length of stay by 53%.

Similar to the study testing relational coordination and its link to quality outcomes, a nursing home study affirmed this correlation as previously tested in a hospital setting. In this study 105 nursing home residents (85% response rate) participated in an interview providing responses to a 30-question survey on quality of life foci. Relational coordination again, was significantly associated with quality outcomes (increased patient report of quality of life) where results showed a higher rating of quality of life as rated by the residents in nursing homes where

there were higher levels of relational coordination of the work team. (Gittell et al., 2008). In this same study, 215 nursing assistants (99% response rate) answered an 82-question survey on job satisfaction and work environment. Results showed a higher level of job satisfaction in nursing homes where there was a higher level of relational coordination (Gittell et al., 2008). Relational coordination is shown to impact quality and efficiency outcomes in the healthcare setting when work teams experience relationships that are strong. Patients in the hospital setting experience work teams during their hospital stay that can impact their outcomes.

Role of Nurse in Healthcare Quality and Coordination of Care

Registered nurses, making up the largest profession in healthcare and occupying 2.7 million jobs (Bureau of Labor Statistics, 2014-2015), are considered key to quality in health care delivery (IOM, 2011; Montalvo, 2007). Nurses are recognized by the National Quality Forum as principal caregivers in the healthcare setting (NQF, 2006). As critical members of the team, nurses often are the drivers of quality care as they interact with the patient while delivering care, performing prescribed interventions, communicating with the team, and coordinating care (IOM, 2010). Subsequently, this quality care translates to outcomes that the patient experiences. Nurses work in conjunction with other members of the healthcare team consisting of the physician, nurse assistant, pharmacist, social worker, physical therapist, and other members of the healthcare team. Nurses are generally at the center of the healthcare delivery team, guiding and facilitating care to the patient in an effort to achieve optimal outcomes (AACN, 2012).

Nurse-Sensitive Outcomes in Hospital Settings

Quality is a broad term indicating a reflection of nursing care through measurable patient outcomes (Montalvo, 2007). Facilitated by funding through the Robert Wood Johnson Foundation (RWJF) and Department of Veteran Affairs, nurse-sensitive patient outcomes, were created following the work completed and offered through the 2004 initiation of the NQF. This focus group was able to reach a consensus on 15 voluntary standards of measure (NQF-15) believed to be affected directly by the work that nurses do (NQF, 2004b). Additionally, these 15 standards were considered a quantification of nurses' contribution to patient safety, patient outcomes, and professional work environment (Kurtzman & Corrigan, 2007; Lacey & Cox, 2009; NQF, 2004b). The 15 nurse-sensitive patient outcomes are further broken down into three categories: (1) patient-centered outcomes (failure to rescue, pressure ulcer prevalence, falls prevalence, falls with injury, restraint prevalence, catheter-associated urinary tract infection, central line-associated bloodstream infection, and ventilator-associated pneumonia); (2) nursing-centered intervention measures (smoking cessation counseling for myocardial infarction, heart failure, and pneumonia); and (3) system-centered measures (nursing caregiver skills, mix of licensed staff to unlicensed staff, nursing care hour per patient day, Practice Environment Scale-Nursing Work Index, and voluntary turnover) (NQF, 2004b). The National Quality Forum conveyed the intentions of the NQF 15 standards for use by the public and healthcare consumer as well as other stakeholders for the evaluation of healthcare quality and how nurses contribute to this quality and professional work environment (2004b).

Nurse-sensitive patient outcomes are quality data collected and reported to the National Database of Nursing Quality Indicators (NDNQI), the only national reporting agency of its kind with measureable benchmark data from over 1100 participating hospitals in the United States

(Montalvo, 2007). Twenty percent of hospitals participating in data reporting to NDNQI are magnet-designated hospitals (Montalvo, 2007). Nurse-sensitive indicators gain the distinction of being nurse-sensitive if the outcome indicator has a correlation or association between the indicator and an aspect of the nursing process or workforce. Some of these same conditions identified as nurse-sensitive patient outcomes (catheter-associated urinary tract infection and central line-associated bloodstream infection) are also considered a healthcare-acquired infection (HAI), defined by the Center for Disease Control (CDC) as "a localized or systemic condition resulting from adverse reaction to the presence of an infectious agent(s) or toxin(s), which was not present on admission to the acute care facility" (2014). Quality improvement has far-reaching effects; therefore, it is incumbent on the nation to recognize the basic principles of quality and apply these principles to healthcare (Lacey & Cox, 2009).

Nurse Education

Nurse level of education has been found to be significantly related to healthcare quality and patient outcomes (Aiken, Clarke, Cheung, Sloane & Silber, 2003; American Association of Colleges of Nursing [AACN], 2012; ANA, 2007; Gittell et al., 2008; IOM, 2010; Kurtzman & Corrigan, 2007). Presently, three entry levels of nursing education (Diploma, Associate's Degree [ADN], and Bachelor's Degree [BSN]) remain. Regardless of the variation between education preparation and curriculum content, all three levels of nursing education lead to entry into the nursing profession and qualify the candidate to sit for the state board examination by the National Council for Licensure Examination (NCLEX) (AACN, 2012).

A nurse is considered competent when he or she can effectively manage the physical care needs of the patient through utilization of the nursing process. Upon entry into practice, newly

graduated nurses need only possess a minimal level of knowledge regarding safe nursing practice as evidenced by passing the national licensure exam (NCLEX). Passage is only one indication of fitness to practice (AACN, 2004). According to Benner (1982), nurses, at this point, are considered novices or advanced beginners and won't achieve competence until approximately three years into practice when they are able to identify importance of situations and independently develop individualized plans of care for their patients. Considering the nurses' journey towards competency, the AACN partnered with University Health Center Consortium (UHC) to identify ways to assist nurses' transition from novice to competency through formation of nursing residency programs (AACN, 2008). The IOM (2011) also supports and recommends nurses ability to complete a transition-to-practice program such as nurse residency programs

In addition to efforts that support the newly graduated nurses' ability to attain competency, national efforts are underway to promote the education of the nursing workforce at the undergraduate and graduate level regarding quality and patient care safety (IOM, 2011). A Committee formed by partnership between IOM and RWJF purposes to transform nursing as it relates to education and practice in an effort to impact quality care by preparing nurses to be better equipped to serve as equal partners while meeting the needs of patients of the 21st century (IOM, 2011). Also funded by the RWJF, an expert panel of 17 national nursing leaders led a movement to enhance nursing school curricula regarding patient care quality and safety (QSEN, 2014). The panel was charged to identify the core knowledge, skills and attitudes needed to promote patient care quality and safety. This expert panel defined six quality and safety competencies for nursing (patient-centered care, teamwork, evidence based practice, quality improvement, safety, informatics) and joined in partnership with schools of nursing to incorporate these critical elements into nursing curricula. QSEN efforts along with other efforts

to increase education level of nurses addresses the concern that nurses are considered undereducated in comparison to masters and doctorate-educated healthcare providers and team (physical therapist, physicians, social workers, pharmacists) with whom they must partner to achieve desired patient outcomes (AACN, 2012; IOM, 2011).

Nurse Education and Outcomes

Aiken et al. (2003) examined the relationship between mortality rate of surgical patients, failure to rescue and the education level of the nurse. This cross sectional study consisted of 232,000 patients discharged from over 168 hospitals. Findings from the study revealed a decreased odds ratio of patient mortality and failure to rescue in hospitals with a higher proportion of nurses with BSN education level. Further, the researchers claimed that for every 10% increase in the number of nurses with a BSN degree, there was a 5% reduction of the risk of patient mortality and failure to rescue. This study was replicated in 2011, when Aiken et al. studied the effects of nursing education and nurse staffing on patient mortality and failure to rescue in various work environments. This large-scale study consisted of 1,262,120 patients from 665 hospitals and 39,038 staff nurses in Pennsylvania, Florida, California, and New Jersey. Study results revealed that for every 10% increase of BSN prepared nurses, there was a 4% risk reduction in surgical mortality and failure to rescue in the presence of any type of work environment (poor, average, and good). However, nurse staffing (decrease of nurse patient ratios by one patient per nurse) only affected surgical mortality in average work environments (4% reduction in odds of mortality and failure to rescue) and in good work environments (9-10% reduction in odds of mortality and failure to rescue). Likewise, Estabrooks, Midodzi, Cummings,

Ricker, and Giovannetti (2005) found that an acute care hospital with a higher proportion of BSN nurses was associated with lower 30-day mortality rates.

Kendall-Gallagher, Aiken, Sloane, and Cimiotti (2011) further explored nursing and patient mortality by studying the relationship between nurse-specialty certification and patient deaths. Nurse-specialty alone did not affect mortality, but, coupled with a higher percentage of BSN nurses, the relationship was significant. For every 10% increase in BSN, there was a 6% decreased odds of mortality, and for every 10% increase in a BSN educated nurse who was also certified, there was a 2% decreased odds of mortality.

In a cross-sectional analysis, McHugh and Lake (2010) found that although the professional practice environment and experience was not significantly related to nurse expertise as expected, nurse education was a significant factor, both at the individual level with the BSN showing more of a likelihood of reporting themselves with a higher expertise level and at the contextual level with nurses working in hospitals with a higher percentage of BSN nurses showing more of a likelihood of reporting higher levels of expertise.

Nursing education has been evidenced to make an impact on patient mortality and failure to rescue. Scant research exists for all other nurse-sensitive patient outcomes warranting the need for further research for these other outcomes (hospital-acquired pressure ulcer, patient falls with injury, catheter-associated urinary tract infections, and catheter-associated blood stream infections).

Nurse Experience

Although a different concept from nursing expertise, nurse experience along with education is considered a characteristic of a nurse that could influence expertise (McHugh &

Lake, 2010). Benner, (1982) explains the levels of skill acquisition (novice, advanced beginner, competent, proficient, expert) and purports that "experience teaches the proficient nurse what typical events to expect in a given situation and how to modify plans in response to these events (p. 405). Other researchers, while studying different key variables related to patient care outcomes have acknowledged that there is debate and controversy related to experience and any possible impact it has on patient care quality and outcomes (Cho, Hwang, & Kim, 2008). While there is literature that supports a relationship between experience and outcomes (Blegen, Vaughn, & Goode, 2001; Dunton, Gajewski, Klaus, & Pierson, 2007), there is also literature that contradicts any association (Sasichay-Akkadechanunt, Scalzi, & Jawad, 2003).

Nurse Experience and Outcomes

In a study consisting of 1610 nursing units (critical care, step down, medical, surgical, medical/surgical, rehab units), researchers explored the relationship between hospital characteristic of nursing experience and nurse sensitive patient outcomes (falls and hospital-acquired pressure ulcers). Using exploratory and regression analysis, Dunton et al. (2007) found that for every one year increase in a nurse's experience, there was a 1.0% decrease in patient fall rate and a 1.9% decrease in hospital-acquired pressure ulcers. Similarly, in one of the first studies examining nurse experience and patient outcomes, Blegen et al. (2001) conducted a secondary data analysis with a two part study consisting of 42 nursing units in one large tertiary hospital in the first study and 39 nursing units in 11 hospitals in the second study. Aggregating data at the unit level, they found that nursing units with higher level of nursing experience showed a decrease in medication error rates in the first study and a decrease in both medication error rate and reduction of fall rates in the second study. Contrastingly, Saisichay-

Akkadechanunt et al. (2003) reviewed data from 2531 patients in 17 nursing units in a large 2300 bed facility in Thailand in a study exploring nurse experience. The author found no significant relationship between nurse experience and mortality.

Nurse Practice Environment

Having its theoretical foundation in sociology, organization, and work, the nursing practice environment is a very complex concept (Lake, 2002). Nurses' work is laborious and their environment is very complicated and challenging. The literature describing nurse-practice environment is varied and includes elements such as staffing, nursing leadership, nurse turnover rates, nurse job satisfaction (Child & IOM, 2004), interprofessional collaborative relationships, quality of care, and patient safety (Lake, 2007). Nonetheless, professional nursing practice is described by Lake (2007) as being the cornerstone of nursing's influence on quality care. Further, AACN (2002) coined eight specific characteristics as the hallmarks of the professional nursing practice environment:

(1) manifest a philosophy of clinical practice with emphasis on quality, safety, interdisciplinary collaboration, continuity of care, and professional accountability;
(2) recognize contributions of nurse knowledge and expertise to quality and outcomes;
(3) promote executive-level nursing leadership;
(4) empower nurses' participation in clinical and organizational decisions;
(5) maintain clinical advancement programs on education, certification, and advanced preparation;
(6) support nurses' professional development;
(7) create collaborative relationships within the healthcare provider team; and

(8) use technological advances in clinical care and information systems.

The nursing practice environment is described by Lake (2002) as the organizational characteristics of the work environment that "can either constrain or facilitate professional nursing practice" (p. 178). Due to the importance of the nursing practice environment to quality and outcomes, national leaders are engaged in efforts focusing on improving the nurse practice environment to achieve the desired quality outcomes expected (RWJF, 2014).

In a RWJF (2014) report, researchers reported that in spite of significant achievements in healthcare quality, such as *Transforming Care at the Bedside Project* started in 2003, patients continue to remain at risk of harm. The researchers discussed patient safety topics and posed questions about inter-collaborative practice and its effect on patient safety: (1) how do health professionals communicate with each other; (2) do health professionals know and respect each other's roles; and (3) do processes exist that facilitate patient care by teams of healthcare providers? (RWJF, 2014, p. 6). The relational coordination theory offers solutions to these questions. The relational coordination theory comprises some of these same focal points inclusive of relationship and communication aspects of the interdependent work team, which adds clarity to benefits of inter-collaborative practice (Gittell, 2009a). Specifically, relational coordination theory highlights work team relationships which are facilitated by high levels of communication (frequent, timely, accurate, and problem-solving) and shared goals, shared knowledge, and mutual respect (Gittell, 2009a, 2009b). Relatedly, *Keeping Patients Safe* serves as documentation of recommendations for work teams to benefit from inter-professional collaboration as a means of impacting patient safety (Child & IOM, 2004; RWJF, 2014), since the nurses work environment is characterized by serious threats to patient safety (2004).

Like the nurse practice environment, healthy work environments describe work environments believed to affect quality care and patient outcomes (American Association of Critical Care Nurses [AACN], 2005). Consistent with the professional practice environment, AACN developed six standards of healthy work environments (skilled communication, true collaboration, effective decision-making, appropriate staffing, meaningful recognition, and authentic leadership. (AACN, 2005). These six standards are purported by the authors to facilitate excellence in professional practice for acute care and critical care nurses while facilitating optimal care for patients.

Nurse-Practice Environment and Outcomes

In a survey of nurses working in 49 hospitals in Canada, the relationship between the practice environment and patient mortality was examined (Estabrooks et al., 2005). Elements of the nurse practice environment measured in this study were nurse education, staff skill mix, nurse-physician relationships, and employment status. The researchers found that higher proportions of BSN-prepared nurses, higher RN (licensed) to unlicensed skill mix, and higher scores on nurse-physician collaborative relationship subscale were associated with lower 30-day patient mortality rates. Higher proportions of casual and temporary nurses were associated with higher 30-day patient mortality rates. Although the average response rate of this study was 52% (6,526 participants returned surveys), the individual participating hospitals' response rates ranged from 18% to 100%.

Likewise, Aiken et al. (2011), in her study of 665 hospitals in four large states (Pennsylvania, Florida, New Jersey, and California), found that a higher nurse-to-patient ratio

(staffing) was associated with an increased odds of patient mortality and failure to rescue in average work environments [4%] and in exceptional work environments [9% and 10%]).

Although the practice environment has been reviewed and measured to study patient outcomes, (i.e., patient satisfaction and surgical mortality) (Lake, 2007), research is scant for studies reviewing possible associations between the practice environment and nurse-sensitive patient outcomes, specifically hospital-acquired pressure ulcers, patient falls with injury, catheter-associated urinary tract infections, and central line-associated bloodstream infections. Figure 2 depicts a proposed model reflective of the nurse practice environment and the potential relationship with five nurse-sensitive patient outcomes.

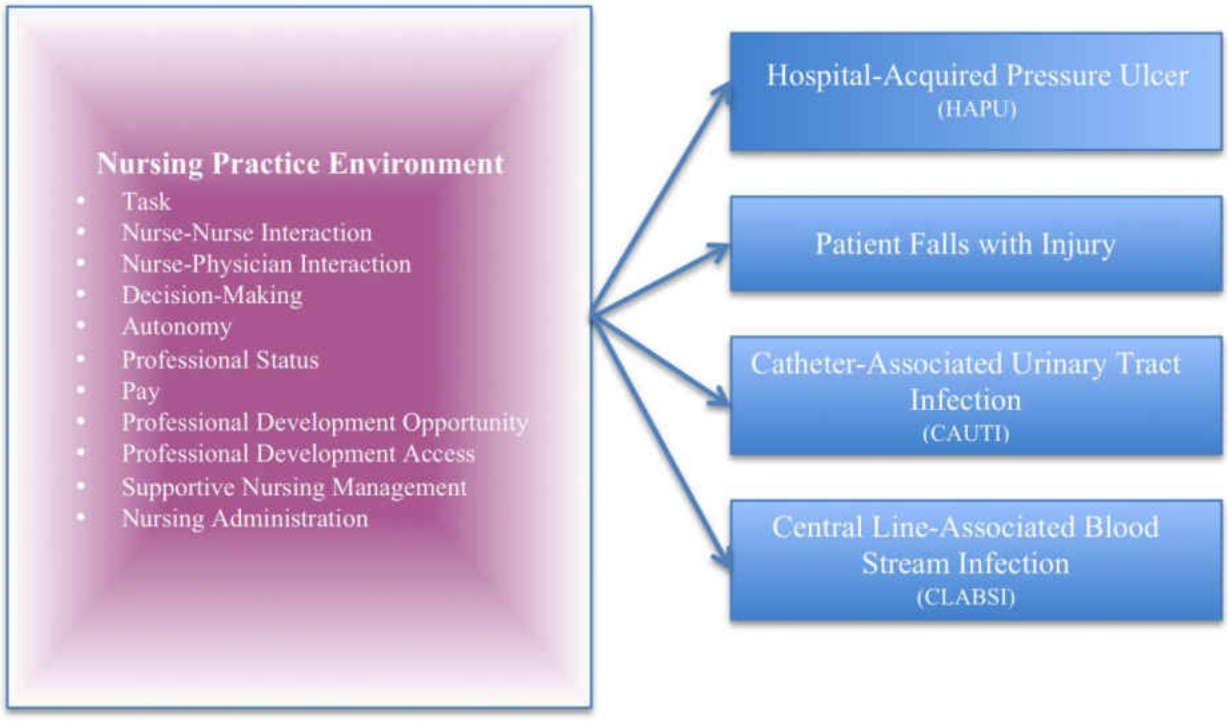

Figure 2. Practice Environment and Nurse Sensitive Patient Outcomes

Needs of the Healthcare Consumer

As hospitals move toward an age of transparency, information about quality performance measures such as nurse sensitive patient outcomes is being made more readily available to the general public. The community has high demands for quality care, and so do regulatory agencies. The healthcare environment has become increasingly complex with technological advances, worsening healthcare conditions of the public, longer lifespans of patients, and increasing regulations and pressures to treat and discharge patients within a short span of time. Ultimately, consumers want quality care from their nurses and the healthcare team (IOM, 2001). The 21st century presents patients with more complex and chronic conditions which is different from the acute illness of the past (Florida Center for Nursing [FCN], 2011). In addition to chronic illnesses, nearly 1.7 million hospital acquired infections (nursing-sensitive) occur each year in U.S. hospitals leading to 100,000 deaths (AHRQ, 2013). These challenges with health care quality calls for a nurse who is more educated and better able to handle the sicker patient and broader healthcare needs of the community.

Gaps in the Evidence

Although promising, further exploration of relational coordination and its association with the variables known to affect patient care quality and safety is warranted. Relationship and communication intensive coordination efforts are positioned to benefit patients petitioning the healthcare system and expecting concerted efforts in their care (Gittell, 2009a). However, the nurse's role in relational coordination has not been substantially explored, nor has it been established whether or how relational coordination affects nurse-sensitive patient outcomes such as hospital-acquired pressure ulcers, patient falls with injury, catheter-related urinary tract

infections, and central line-associated bloodstream infections. Additionally, although the nurse practice environment has been reviewed for the relationship it has with quality outcomes, it has not been explored substantially for the impact it may have on nurse sensitive patient outcomes, nor has it been studied in relationship to relational coordination in assessment of potential effect on relational coordination's impact on nurse sensitive patient outcomes.

Wholly, the literature supports the assertion that nurses are key to quality and the coordination of patient care; therefore, understanding their particular role in guiding the coordination efforts of patient care for the sake of positive patient outcomes will provide key evidence to nursing leaders and healthcare policy-makers interested in improving patient-care quality outcomes.

Practice and Policy Influences

Healthcare organizations strive to maintain adequate levels of quality care to patients despite the current fragmented healthcare systems and constrained resources (IOM, 2010). Regulatory bodies such as The Joint Commission demand quality for patient care (2014) that will influence positive patient outcomes and patient safety. Meanwhile, nursing leaders work to hire the most qualified workforce to care for patients (IOM, 2010) and achieve the expected positive patient outcomes following appropriately coordinated care. Although ANA emphasizes the point that care coordination is a basic competency for registered nurses' professional practice, it also suggests that education on coordination of care should be enhanced in nursing schools considering the registered nurse is essential to the coordination of care process and the patient's experience (ANA, 2012). Since the 21st century presents patients with more complex and chronic conditions that is different from the acute illness of the past, (FCN, 2011), the healthcare

work environment would benefit from capitalizing on items that can influence the coordination of work processes in a manner consistent with best practice, leading to positive patient outcomes.

Although some adverse patient outcomes are unavoidable, skilled nurses rendering quality care can prevent many of them through coordinating patient care with the healthcare team as no one group of healthcare professionals can do this work alone (Lacey & Cox, 2009). Opportunely, relational coordination has been introduced as a framework offering a pragmatic solution to the fragmented healthcare systems as a way to increase the efficiency of work teams through strong relationships and high levels of communication, which can steer hospitals toward quality outcomes (Gittell, 2009a). Having knowledge of how relational coordination affects patient outcomes can assist nursing leaders in healthcare settings and, ultimately, influence positive patient outcomes and quality of care. Optimizing work teams in an era of limited resources lends itself to maximum efforts in achieving quality outcomes by minimizing fragmented care and services.

CHAPTER THREE: METHODS

The purpose of this study was to examine the relationship among relational coordination, the nurse, and patient care quality, specifically, nurse sensitive patient outcomes. The theory of relational coordination provides the theoretical framework guiding this correlational, retrospective, cross sectional study. This chapter provides descriptions of the research design, setting, sample, ethical considerations, procedure, instruments, and statistical analyses used to address the research hypothesis.

AIMS and Hypothesis

Work teams functioning interdependently in an atmosphere of shared knowledge, shared goals, and mutual respect has been shown to affect quality outcomes. Therefore, this study was conducted to answer the following Aim and Hypotheses:

AIM 1: To describe the level of relational coordination (measured by Relational Coordination Survey), the nurse practice environment (measured by NDNQI RN Survey with Job Satisfaction Scales-R©), and the frequencies of adverse nurse sensitive patient outcomes (hospital-acquired pressure ulcer, patient falls with injury, catheter-associated urinary tract infection, and central line-associated blood stream infection) in a five hospital acute care healthcare system.

AIM 2: To determine the effect of relational coordination on adverse nurse-sensitive patient outcomes when controlling for the nurse practice environment and nurse level of education.

HYPOTHESIS (H_A): Nursing units with a higher relational coordination index, as measured by relational coordination survey, will exhibit lower rates of adverse nurse-sensitive patient outcomes (hospital-acquired pressure ulcer, patient falls with injury, catheter-associated urinary tract infection, and central line-associated blood stream infection) than nursing units with a lower relational coordination index score when controlling for the nurse practice environment and nurse level of education.

Design

A correlational cross-sectional survey and retrospective design was used for this quantitative study. The cross-sectional design is useful for getting a snapshot of a phenomenon and its relationship to another phenomenon at one point in time (Spector, 1981). The principal investigator approached this study with the understanding that "correlation does not prove causation" as informed by Shadish, Cook, and Campbell (2002).

A retrospective review of previously reported data from a six-month time span (October through December 2014 [fourth quarter] and January through March 2015 [first quarter]) was used for review of nurse-sensitive patient-outcome data. Additionally, a retrospective review of previously reported data from the biannual NDNQI RN Survey with Job Satisfaction Scales-R©, last taken in October 2014 was used for the review of elements of the nurse practice environment. The time period selected is consistent with the study hospitals' quarters of their "fiscal year," which is the annual cycle denoted as the time period of October 1st-of one year through September 30th the following year. This time period is relevant to the data collection as it coincides with the quality-data reporting timeframes of the hospitals' quality data (hospital-acquired pressure ulcers, patient falls with injury, catheter-associated urinary tract infection, and

central line-associated blood stream infection), such as what was reviewed as part of this study. This nurse-sensitive patient-outcome data is regularly reported on a quarterly basis (first quarter–January through March; second quarter–April through June; third quarter–July through September; fourth quarter–October through December), at both the unit level and hospital level as averages of the individual scores. Likewise, the nurse practice environment survey data is collected and reported biannually by the participating study healthcare system and is available at the unit level as well as hospital level.

In addition to the retrospective data review (nurse-sensitive patient outcome data and nurse survey data), an electronic relational coordination survey (seven-item, five-point, Likert survey) (Appendix G) was administered to eligible nurses at the five-hospital healthcare system to assess the strength of relational and communication aspects of their work teams.

Setting and Sample

The setting and sample selected for this study was 43 nursing units in a five-hospital, acute-care healthcare system in Northeast Florida. Table 2 *Facility and Unit Itemization* shows specific information about each hospital site inclusive of the number and type of nursing units as well as the number of nurses at each facility. The five participating hospitals consist of a 439-bed tertiary hospital, a 180-bed children's hospital, and three community hospitals (a 269-bed facility, a 146-bed facility, and a 54-bed facility). The five-hospital study site selected employs a large selection of registered nurses on staff (2,647) educated at various levels (Diploma, ADN, BSN, MSN, and higher). Each facility has a variety of inpatient medical and surgical units (Med/Surg); progressive care units (PCU); intensive care units (ICU); and labor and delivery. While all campuses have adult inpatients, only the children's hospital houses pediatric inpatients.

Patients from labor and delivery have been excluded due to the lesser risks for adverse nurse-sensitive patient outcomes with this patient population, which are the focal points of this study.

Table 2 *Northeast Florida's five acute-care healthcare system facility and unit itemization for study units*

Facility	Total Beds	Number of Units at Facility				
		Med/Surg	PCU	ICU	Total Units[a]	Total RNs[b]
Main Campus Adult (MCA)	439	12	4	3	19	967
Main Campus Pediatrics (MCP)	180	3	1	3	7	528
Community Campus 1 (CC1)	269	6	1	3	10	337
Community Campus 2 (CC2)	146	2	1	1	4	260
Community Campus 3[c] (CC3)	54	2	0	1	3	153
TOTAL	1088	25	7	11	43	2245

[a] Total Study Units for healthcare system=43 [b] Total Number of RNs in Study Units for healthcare system=2245

[c] Community Campus 3 has one unit identified as Acuity Adaptable Unit, which is used as both an ICU and a PCU. For purposes of this research, only ICU has been denoted as "1" in unit type/count for this campus since the majority of the patients are considered ICU patients.

Registered nurse participants consisted of registered nurses licensed to practice in the state of Florida and working in a direct care role occupying a full-time or part-time position on one of the study units. A list of eligible RNs was extracted from *Position Control* report provided by human resources to the principal investigator from each of the five hospitals participating in the study. Further, nurses were eligible for inclusion if they had at least three months of experience as an RN and had worked on their current unit for at least three months. This timeframe (90 days) is the facilities' standard for the adjustment/probationary period. Nurses

were excluded if they did not practice at the bedside or if they worked on a non-study unit. Nurses' responses to demographic questions included on the electronic nurse survey helped to confirm eligibility of the nurse participant. A total of 1124 nurses were eligible to participate in the study based on inclusion/exclusion criteria. Survey responses from nurses who did not meet inclusion criteria were excluded from survey data.

Additionally, a minimum of five participant responses from each unit was required. Data were excluded for those units with less than minimum participant responses which is consistent with internal organizational measurement criteria for study hospitals such as the same standard used with biannual nurse survey, also being analyzed as part of this study.

Ethical Considerations

The research protocol was approved by the participant healthcare system's institutional review board (IRB) as well as the educational institution where this dissertation work in part will be submitted (Appendix H). Additionally, At University of Central Florida, it was determined that the study was exempt from regulation.

All subjects were advised that completion of the survey constituted their consent to participate in the study. More importantly, each subject was advised of his or her right to withdraw from the study at any time prior to the completion and return of the survey. The relational coordination survey data were confidential. The principal investigator upheld confidentiality of participants and was the keeper and facilitator of lists developed to track participants by facility and nursing unit. The principal investigator facilitated sending eligible registered nurses an invitation to participate and tracked responses as they were returned so that data could be properly and correctly recorded. Participation in the study through electronic mail

survey allowed eligible nurses to complete the survey in the privacy of their home, work, office, or nursing unit (their choice), wherever they felt most comfortable since the hospital email system is internet-based. The principal investigator assured proper management of the data. Additionally electronic data were maintained on a password-protected laptop computer.

Study Variables

Table 3 lists variables of the study, highlighting relational coordination as the independent variable and nurse-sensitive patient outcomes as the dependent variables; covariates were listed since there was a chance they may also affect patient outcomes so were tested as either covariates, and/or mediating/moderating variables.

Table 3 *Study Variables*

Variable	Type[a]	Level of Analysis	Measurement/Instrumentation[b]
Relational Coordination	IV, Continuous	Nursing Unit	Relational Coordination Survey
Nurse Practice Environment	IV, Covariate Continuous	Nursing Unit	NDNQI RN Survey with Job Satisfaction Scales-R©
Hospital-Acquired Pressure Ulcer	DV, Continuous	Nursing Unit	NDNQI
Patient Falls with Injury	DV, Continuous	Nursing Unit	NDNQI
Catheter-Associated Urinary Tract Infection	DV, Continuous	Nursing Unit	NDNQI
Central Line-Associated Blood Stream Infection	DV, Continuous	Nursing Unit	NDNQI
Nurse Level of Education	IV, Control Covariate, Continuous	Nursing Unit	Demographics

a IV=Independent variable, DV= Dependent variables b NDNQI=National Database of Nursing Quality Indicators

Tables 4-6 list definitions (conceptual and operational) of both independent and dependent variables. Retrospective quality metrics data (hospital-acquired pressure ulcers, patient falls with

injury, catheter-associated urinary tract infection, and central line-associated blood stream infection) and nurse practice environment data have been previously reported to the National Database for Nursing Quality Indicators (NDNQI) by the participating nursing units from the five hospital healthcare system and were reviewed as part of this study. Because quality metrics for nurse sensitive patient outcomes are a combination of variables, HAPU, patient falls with injury, CAUTI, and CLABSI, were summed to create a recoded variable of QUALINDEX indicating the metric being reviewed in this research study. In addition to these study variables, demographics were also collected (Appendix C).

Table 4 *Definitions Table-Relational Coordination Concepts*

Variable	Conceptual Definition	Operational Definition[a]
Communication Concept		
Frequent Communication	Recurring interactions influencing relationship-building through repeated interactions	Frequent Communication will be measured by Responses to "Frequent Communication" question on the relational coordination survey (Appendix G)
Accurate Communication	Information that does not contain inaccurate information, minimizing the need for rework to correct errors.	Accurate Communication will be measured by Responses to "Accurate Communication" question on the relational coordination survey (Appendix G)
Timely Communication	Communication without delays	Timely Communication will be measured by Responses to "Timely Communication" question on the relational coordination survey (Appendix G)
Problem-Solving Communication	Communication among engaged team members for the sake of solving problems rather than blaming.	Problem-Solving Communication will be measured by Responses to "Problem-Solving Communication" question on the relational coordination survey (Appendix G)
Relationship Concept		
Shared Goals	Goals shared amongst the work team versus individual or departmental goals	Shared Goals will be measured by Responses to "Shared Goals" question on the relational coordination survey (Appendix G)
Shared Knowledge	Team member's awareness of the work being done by other members of the team and how	Shared Knowledge will be measured by Responses to "Shared

Variable	Conceptual Definition	Operational Definition[a]
	his/her work fits with the work with others on the team.	Knowledge" question on the relational coordination survey (Appendix G)
Mutual Respect	When team members respect and acknowledge the contributions of each other toward getting work done through the overall work process.	Mutual Respect will be measured by Responses to "Mutual Respect" question on the relational coordination survey (Appendix G)

[a]Relational coordination questions are rated using a 6 point Likert scale. Scores<3.5= weak tie, 3.5-4.0=moderate tie, >4.0= strong tie between work groups. Each dimension is scored individually as a dimension of RC and can be averaged for a RC index score.

Table 5 *Definitions Table—Nurse Sensitive Patient Outcomes*

Variable	Conceptual Definition	Operational Definition
Nurse Sensitive Patient Outcome		
Hospital-Acquired Pressure Ulcer (HAPU)	A skin breakdown over a bony prominence due to pressure over an extended amount of time (Fitzgerald, 2009).	Measured by number of Stage III, or IV pressure ulcer developed while patient in hospital; reported as number of HAPUs per 1000 patient days
Patient Falls with Injury	Unplanned descent to the floor whether or not assisted by staff, and causing injury to the patient (Currie, 2008).	Measured by total number of patient falls with injury level of minor or greater during a calendar month multiplied by 1000 and then divided by total number of patient days on the study unit. Reported as number of falls with injury per 1000 patient days.
Catheter-Associated Urinary Tract Infection (CAUTI)	Infection in the urinary tract developed in relation to the use of urinary catheter (U.S. Department of Health and Human Services [USDHHS], 2013)	Measured by total number of observed hospital-acquired CAUTI in adult in-patients in study units divided by the total number of expected CAUTIs (calculated by multiplying number of catheter days by the CAUTI rate for the same type of locations obtained) and reported as CAUTI per 1000 catheter days.
Central Line-Associated Blood Stream Infection (CLABSI)	Infection of the blood stream related to the use of a central venous line (USDHHS, 2013).	Measured by total number of observed hospital-acquired CLABSI in adult in-patients in study units divided by the total number of expected CLABSIs (calculated by multiplying number of central line device days by the CLABSI rate for the same type of locations obtained) and reported as CLABSI per 1000 central line days.

Table 6 *Definitions Table- NDNQI RN Survey with Job Satisfaction-R*[©a]

Variable	Conceptual Definition	Operational Definition
11 Subscales of Job Satisfaction		
Task	Nurses' satisfaction of activities that are completed as a usual part of a nurse's job	Measured by responses from 3 questions on the NDNQI RN Survey with Job Satisfaction-R related to nurses' satisfaction with the care they provide, having enough time to provide patient care, and having time to confer with colleagues about problems with patient care.
Nurse-Nurse Interactions	Nurses' satisfaction with the interaction between nurses while at work	Measured by responses from 3 questions on the NDNQI RN Survey with Job Satisfaction-R related to nurses' satisfaction with their interactions with other nurses while at work related to dependability of other nurses they work with, teamwork and support of and between nurses they work with.
Nurse-Physician Interactions	Nurses' satisfaction with the interaction between physicians while at work	Measured by responses from 3 questions on the NDNQI RN Survey with Job Satisfaction-R related to nurses' satisfaction with their interactions with physicians while at work related to the cooperativeness, teamwork, and appreciation by physicians they work with.
Decision-Making	Nurses' satisfaction with their involvement in decision-making while at work.	Measured by responses from 3 questions on the NDNQI RN Survey with Job Satisfaction-R related to nurses' satisfaction with their involvement in decision making related to administrative decisions, policy decisions, and having input in daily problems at work.
Autonomy	Nurses' satisfaction with the amount of autonomy they have in their work.	Measured by responses from 3 questions on the NDNQI RN Survey with Job Satisfaction-R related to nurses' satisfaction with their autonomy related to having input in their patients' care, their own work, their daily practice as needed for meeting the needs of their patients.
Professional Status	Nurses' satisfaction with the professional status of their job.	Measured by responses from 3 questions on the NDNQI RN Survey with Job Satisfaction-R related to nurses' satisfaction with their job related to nursing in their unit, their work unit being a good place to work, and their personal achievements on their unit.

Variable	Conceptual Definition	Operational Definition
Pay	Nurses' satisfaction with their pay and benefits.	Measured by responses from 3 questions on the NDNQI RN Survey with Job Satisfaction-R related to nurses' satisfaction with their pay related to having suitable, reasonable, and fair pay.
Nursing Management	Nurses' satisfaction with the Nurse Manager or management of the unit.	Measured by responses from 3 questions on the NDNQI RN Survey with Job Satisfaction-R related to nurses' satisfaction with their nurse manager or unit management related to their support, advocacy, and being a good manager.
Nursing Administration	Nurses' satisfaction with Nurse Administrator.	Measured by responses from 3 questions on the NDNQI RN Survey with Job Satisfaction-R related to nurses' satisfaction with Nursing Administration related to overall satisfaction with their role, visibility, and authority of the Nurse Administrator.
Professional Development Access	Nurses' satisfaction with their access to items that will progress their career.	Measured by responses from 3 questions on the NDNQI RN Survey with Job Satisfaction-R related to nurses' satisfaction with their access to career development items related to conferences, in-services, and continuing education.
Professional Development Opportunity	Nurses' satisfaction with their opportunities for professional development.	Measured by responses from 3 questions on the NDNQI RN Survey with Job Satisfaction-R related to nurses' satisfaction with their opportunities related to higher education, career growth, and progression.

[a](Aiken & Patrician, 2000; ANA, 2014a; Boyle, Miller, Gajewski, Hart, & Dunton, 2006; Miller & Cristopher, 2007; Taunton et al., 2004)

Instruments/Measurement

Relational Coordination Survey

The electronic relational coordination survey, a seven-item instrument with responses recorded on a 5-point Likert scale (1=never, 2=rarely, 3=occasionally, 4=often, 5=constantly) was used to gather information about the strength of work teams in this study.

This reliable tool (Cronbach's alpha .70-.97) (Gittell, 2009b), takes 20 minutes to complete and is designed to measure coordination of functional work groups (roles versus individuals) that have been identified as central to the work process believed to affect quality and efficiency. The score is calculated as a composite score and includes a mean average of each questions' responses as well as overall survey score for each of the seven dimensions (frequent, timely, accurate, and problem-solving communication and shared goal, shared knowledge, and mutual respect) (Gittell, 2009b). For the purpose of this research, the focus was on capturing relational coordination of the work team (reported as composite score) from the perspective and perception of the registered nurse as an indicator of the strength and quality of the relationship and communication shared with various functions (roles) of the healthcare team (nurse, nursing assistant, social worker and/or nurse navigator, physical therapist, pharmacist and physician). The relational coordination survey is acknowledged in the atlas for care coordination measurements as a tool for measuring care coordination having met three criteria of the atlas' reviewers and researchers: (1) clear relevance to care coordination; (2) clearly defined and reproducible measure; and (3) valid measurement properties (McDonald et al., 2010). The data from this survey were converted into a relational coordination index score (total scale score was divided by number of items completed) and reviewed at the nurse level and then aggregated at the unit level. Relational coordination index scores are reported as weak (<4.0 within groups; <3.5 between groups), moderate (4.0-4.5 within groups; 3.5-4.0 between groups), and/or strong (>4.5 within groups; >4.0 between groups) (Relational Coordination Analytics, 2014).

Although the relational coordination survey tool demonstrated strong reliability (Cronbach's alpha .86) in previous studies according to Gittell (2009b), Cronbach's alpha was calculated for relational coordination instrument prior to use in this study. In the current study,

the Cronbach's alpha coefficient was .92. This tool has also been previously validated through exploratory and confirmatory factor analysis as well as convergent and discriminant validity (Gittell, 2009b). Table 7 depicts a raw sample of the relational coordination survey tool prior to the customization for use with select functional work groups and their interdependent work.

This survey has utility in assisting in the exploration of gaps in the evidence. Gittell (2006) purports that, since relational coordination is measureable, it sets up relational coordination theory for empirical exploration. The relational coordination survey was first used in a healthcare setting in a study conducted in 2000 with a sample of orthopedic postoperative patients. The study concluded that higher levels of relational coordination was associated with improved quality of care as evidenced by a decrease in length of stay, decrease in post-operative pain, and increase in postoperative functioning (Gittell et al., 2000).

Table 7 *Relational Coordination survey*

RC dimensions	**Survey questions**[a]
1. Frequent communication	How *frequently* do people in each of these groups communicate with you about [focal work process]?
2. Timely communication	How *timely* is their communication with you about [focal work process]?
3. Accurate communication	How *accurate* is their communication with you about [focal work process]?
4. Problem-solving communication	When there is a problem in [focal work process], do people in these groups blame others or try to *solve the problem*?
5. Shared goals	How much do people in these groups *share your goals* for [focal work process]?
6. Shared knowledge	How much do people in these groups *know* about the work you do with [focal work process]?
7. Mutual respect	How much do people in these groups respect the work you do with [focal work process]?

[a] Each question was written substituting nurse, physician, nursing assistant (ACP), social worker and/or nurse navigator, physical therapist, and pharmacist as the functional group being reviewed.

Note. From *Relational coordination: Intervening to improve nurse-sensitive outcomes*. Presentation given by J.H. Gittell, 2011 (p 95) at the Indiana University School of Nursing 37th Annual Nursing Research Conference, Indiana. Reprinted with permission.

Relational Coordination Measurement Challenges

Three potential measurement challenges exist with use of the relational coordination survey. One is the potential for a less than desirable response rate (fewer than 5 responses per unit). This would present a challenge as the power of the study would be affected and could be decreased as a result of a low response rate. The principal investigator utilized strategic preparation, advertisement, and hospital leadership endorsement in efforts to avert the problem of low return rate and participation on surveys. Additionally, surveys were sent out using the electronic format through the nurses' work email address, which provided ease of access to the survey and motivation to complete.

A second potential measurement challenge was not achieving a symmetric survey result matrix as would be achieved if multiple functional groups were surveyed (physicians, nurse assistants, social workers, etc.) versus solely the nurse. Fortunately, surveying relational coordination from the perspective of the nurse, although yielding an asymmetric survey result matrix, is the focus of this study and, according to Gittell, will still provide valuable information on relational coordination (2009b). Not only is this acceptable, but Gittell further reports that with access to one functional group [nurse], one can build a matrix table identifying the strong and weak ties among research participants and rating the strength of ties between them and other functional groups (2009b).

Lastly, a key challenge to the relational coordination survey, as pointed out by Gittell, is the potential for unanswered questions [missing data]. Gittell suggests ways to address the issue based on which questions were skipped, not answered, or answered inappropriately (such as submitting "not applicable" on a response instead of rating it on the 5-point scale). Each of the

suggested ways of dealing with this issue of missing data involves recoding the unanswered question to either "missing" or entering a value such as "never," "always," etc.; the suggestions made by Gittell were based on research findings from previous studies where she detected a trend with this data, leading to her ability to advise the next scholar on how to handle this issue with the responses when reviewing survey data from use of the relational coordination survey. An example of one of the suggestions describes a respondent who answers "not applicable" when asked to rate his or her ties with a certain functional group such as a nurses being asked to rate his/her ties with the social worker. If the nurse rated this as "not applicable," Gittell reports that in the past, this generally indicated that the respondent did not have social workers in his or her work area as part of one of the functional teams in the work group. Therefore, in this instance, she advises to enter "missing" data if the functional group is truly not at this particular site or recoding it as "1" which would mean the interaction "never" occurred between the respondent and the functional group if that role really is present at the site where the respondent works.

Internal Validity

Gittell (2009b) proactively addressed social desirability and recall bias as potential threats to the relational coordination survey instrument. To minimize social desirability, the relational coordination survey instructs respondents to rate the level of communication and/or relationship process exhibited by the other functional team members toward the respondent versus respondents rating themselves and the way they communicate with other functional groups. For example, a nurse may be asked to rate how frequently physicians communicate with him/her versus asking the nurse how often he or she communicates with physicians. To minimize

recall bias, the participant is asked to describe current working conditions and the current communication and relationship ties with work teams (other members of various functional groups) versus asking him/her to recall how the relationship or communication was with these same functional groups in the past week, month, or year.

NDNQI RN Survey with Job Satisfaction Scales-R©

The NDNQI RN Survey with Job Satisfaction Scales-R©, is an instrument consisting of 51 questions with responses recorded on a 6-point Likert-type scale (1=strongly agree, 2=agree, 3=tend to disagree, 4=tend to disagree, 5=disagree, 6=strongly disagree) (ANA, 2014a). This instrument is designed to measure the nurses' satisfaction with elements of the job and nursing-practice environment by identifying the presence of certain elements in the practice environment and elements that are important to nurses. The complete tool consists of three categories: (1) job satisfaction scale accounting for 33 questions; (2) job enjoyment scale accounting for one question; and (3) RN work context accounting for 17 questions. The tool contains items from NDNQI-Adapted Index of Work Satisfaction, NDNQI-Adapted Nursing Work Index, Job Enjoyment Scale, and work context items (Aiken & Patrician, 2000; Boyle et al., 2006; Taunton et al., 2004).

The Job Satisfaction section of the survey was used in this study and was reviewed retrospectively. This section has 11 subscales (Task, Nurse-Nurse Interaction, Nurse-Physician Interaction, Decision-Making, Autonomy, Professional Status, Pay, Professional Development Opportunity, Professional Development Access, Supportive Nursing Management, and Nursing Administration). More specifically, this 11-subscale section has a total of 33 questions (3 questions in each subscale), which has elements that describes the work environment. Each of

the 11-sub scales produces a score, which is an average of the unit RNs responses, rated on a 6-point Likert scale. The higher the score, the more positive the rating is. The scores are reported as modified "T-Scores", which are standardized scores where 50 is the midpoint and 10 is the standard deviation (ANA, 2014b). The overall Job Satisfaction ratings are based on the following scale: <40=low job satisfaction, 40-60=moderate job satisfaction, and >60= high job satisfaction. This scale is used for all comparable hospitals participating in the NDNQI RN Survey with Job Satisfaction Scale-R© and allows each hospital to determine where they rank in comparison with other hospitals in the NDNQI repository (i.e. above mean, below mean, top 10%, etc). The researcher interpreted scores ranking "high job satisfaction" as having a favorable work environment, scores ranking "moderate job satisfaction" as having an average work environment, and scores ranking "low job satisfaction" as having an unfavorable work environment.

Reliability testing was conducted by assessing the coefficient of reliability for the 11-subscale section of the survey. The researcher assessed the Cronbach's Alpha for internal reliability. According to ANA (2014b), the RN Survey JSS-R has good internal consistency, with a Cronbach's alpha coefficient reported as .89. In the current study, the Cronbach's alpha coefficient was .92. Cronbach's Alpha of .70-.80 as suggested by DeVellis (2012) is a respectable range and .80-.90 is very good.

The NDNQI RN Survey with Job Satisfaction Scales-R© is widely used amongst hospitals reporting quality metrics and other nursing data to the NDNQI repository (greater than 1100 hospitals). The survey takes approximately 20 minutes to complete and is anonymous with data being reported back to constituents aggregated at the unit level and not traceable back to the individual RN who completed the survey.

NDNQI RN Survey with Job Satisfaction Scales-R© Measurement Challenges

Since the NDNQI RN Survey with Job Satisfaction Scales-R© is routinely administered biannually at the participating five-hospital healthcare system, data were to be reviewed retrospectively; therefore, minimal measurement challenges were anticipated. However, sample size and unit participation could have posed an issue if participating study units did not have nurse survey data due to minimum return. If this happened, the overall study sample size could have been affected, and the nursing unit may be excluded from study when controlling for nurse practice environment during testing of relational coordination and its association to adverse nurse sensitive patient outcomes. In this study, 3 of the 43 units were affected by minimum return rate and could not be counted in the study outcomes.

External Validity

Results from this study are anticipated to be generalizable to other populations of inpatients in acute care hospitals. Although tested in northeast Florida, the five-hospital healthcare system participating in the research is representative of various types of nursing units (Med/Surg, PCU, ICU, and Telemetry) and registered nurses (Diploma, ADN, BSN, MSN, and higher) in large (439 bed) and small (54-269 bed) hospitals inclusive of multiple level acuity patients.

Procedures

Consultation with the participating health system's chief nursing officer as well as each facility's nurse executive leadership was employed in an effort to present the research-study aims and to gain support and endorsement from leadership. The principal investigator was available to

attend staff meetings as requested by nurse managers or other leaders to help explain and advertise the study and request participation. Additional advertisement was sought by soliciting the approval of the chief nursing officer and the marketing department for approval to announce the study through the hospital's five information portals including:

- nursing blog (a highly publicized and widely used electronic media through the hospital's intranet site);
- electronic local publication at Community Campus 1;
- electronic local publication at Community Campus 2;
- health system's monthly news publication available both electronic and paper form;
- and *the* health system's quarterly publication available in electronic format.

A modified Dillman's Tailored Design Method (2000) was utilized to maximize survey response rates beyond the typical 30% response rates of internet surveys and to minimize respondent burden while assuring survey data are representative of the target population. Once permission was granted to utilize the relational coordination survey tool (Appendix F-Permission letters), eligible nurses were sent an invitation to participate in the study through their hospital-designated work email address. An explanation of the study aims along with information about confidentiality, informed consent, and right to withdraw from study accompanied the survey invitation (Appendix D- Invitation letter). The electronically mailed invitation contained a link, which allowed the participant to answer demographic questions and complete the relational coordination survey. A second email message (Appendix E-Reminder email) was sent to all registered nurses after two weeks of initial electronic survey mailing to thank nurses for completion of the survey and to encourage those who had not done so, to participate. The

principal investigator made consistent rounds during the survey period to various study sites and nursing units for encouragement of nurses to participate in the survey.

Permission for access to retrospective data (nurse-sensitive patient outcome and nurse survey) was sought from the health system's chief nursing officer and quality department coordinators. Once access granted, data were reviewed at the nursing unit-level.

The principal investigator stored deidentified survey and retrospective data in a password-protected file on the principal investigator's laptop computer. Data will be stored for seven years, which is consistent with the record retention timeframe of the participating healthcare system. Data were not linked to the subjects' identifying information, with the exception of tracking to allow data entry into proper nursing unit. The list (attained through human resources) of eligible RNs was utilized to create distribution list for the electronic mailing of study information, invitation letter, survey, and reminder emails.

Data Analysis

Prior to data or statistical analysis, data were screened to assess for accuracy, outliers, missing data, and basic statistical testing assumptions. Mertler and Vanatta (2005) informs that properly cleaned data assists the researcher in presenting data that can result in more valid conclusions to be drawn from the data. Descriptive statistics were used to check for linearity, normality, and homoscedasticity of study's variables as well as inspect for missing data and outliers. Normalizing transformations was explored for variables that exhibit more than minimal skew (i.e., more than |1.0|). Frequency tables were used to assess the means and standard deviations of variables and to further identify missing or incomplete data. Minimum and maximum values were assessed as part of the data screening process to identify potentially

inaccurate data or errors. Missing data was assessed for randomness. Since nonrandom missing data can be problematic with the researchers' ability to generalize results (Mertler & Vannatta, 2005), data was assessed for missing data greater than 10% so that it could be addressed through imputation as appropriate. Residual plots were used to assess for outliers. Additionally, due to the potential of outliers to be missed due to subtleness, Mahalanobis distance statistical procedure, was used to assess the distance of a case from the centroid or place marked by the means of the study variables, as suggested by Tabachnick and Fidell (2013) to help identify outliers that might be otherwise overlooked in multivariate analysis. Review of outliers helps to determine the best solution for correction through deletion or transformation. Normality was assessed via assessment of the probability or Q-Q plot showing the observed values of the study variables on the x-axis and the predicted values on the y-axis. Normality was assumed if the plot resembled a form of a straight line as directed by Mertlier and Vanatta (2005). Study variables should be normally distributed. Linearity was assessed by reviewing residual plots and identifying the patterns of predicted values to obtained values and seeing evidence of values being clustered around the zero line. Lastly, homoscedasticity was assessed by reviewing scatter plots for the equality of variance/covariance matrices. Homoscedascity was assumed if on the scatterplot, the collection of points on the graph were approximately the same width.

Correlational matrix and collinearity diagnostics along with Variable Inflation Factor (VIF) and Tolerance statistics was assessed for identification of multicollinearity of the predictor variables (relational coordination, nurse practice environment, and nurse education). Tolerance levels of .60 or greater and r value of .40 or less was considered acceptable. Variables were considered for centering to minimize issues with multicollinearity as suggested by Field (2013).

General Linear Modeling (GLM) statistical technique was used to address the research aims and hypothesis. GLM comprises a broad range of statistical techniques and inspires most analyses in nursing research (Polit, 2010). This statistical technique is appropriate for this research study due to its broad applicability to many research situations and its ability to accommodate non-linear dependent variables. GLM is also foundational to other statistical techniques such as ANOVA, t test, and regression analysis. Assumptions were tested for general linear modeling (linearity, multicollinearity, and homogeneity) (Field, 2013; Tabachnick & Fidell, 2013) prior to using this technique. Based on data analysis, alternate forms of GLM, Poisson regression (Generalized Linear Modeling [GLiM] was anticipated for use as indicated for the low numbers with the count data that is consistent with the expected outcome measures being assessed in this research study (nurse-sensitive patient outcomes) (Cohen, Cohen, & Aiken, 2003; Coxe, West, & Aiken, 2009). Additionally, data was assessed for violation of the assumption of equidispersion of data with the use of Poisson Regression. Over dispersion Poisson model and Negative binomial model was also explored for use as suggested by Coxe, West and Aiken (2009) due to overdispersion of residuals.

Model summary was used to evaluate overall significance of the model. The overall fit of the model was tested using a chi square likelihood ratio test (-2LL). In Poisson Regression, chi square is useful in evaluating the reduction in deviance from the addition of one or more predictors to a base model (Coxe et al., 2009). Alpha level was set at .05 for the multivariate analyses.

Establishing a prospective statistical power for Negative Binomial Regression in order to determine sample size is complex due to low anticipated count data in outcome measures. Subsequently, power analysis using programs such as G*Power (Faul, Erdfelder, Buchner, &

Lang, 2009) and NCSS PASS was not feasible due to the complexities of the negative binomial regression model not yet developed in the "off the shelf" statistical power analysis programs for this statistical method (negative binomial regression). Power analysis for negative binomial regression is recognized in the literature as very challenging; Further, more advanced Monte Carlo simulation modeling is recommended for this statistical method (Seavy, Quader, Alexander, & Ralph, 2005; Zhu & Lakkis, 2013). Since negative binomial regression is in the "regression" family, the basic rule of N=20+5k (Khamish & Kepler, 2010) as discussed in Tabachnick and Fidell (2013) was used as a general baseline of sample size anticipated for this study. This method is indicated for use in regression models when power estimates are not feasible (Khamish & Kepler, 2010). In this formula, *k* represents the number of parameters in the Negative Binomial Regression model. There were three parameters used in the model: relational coordination, RN education level, and nurse practice environment. With the three parameters in this study, the formula equated to an anticipated sample size of 35. The alpha was set at .05 and power of .80 was desired while exploring evidence relevant to the research hypothesis for this study.

Methodological Assumptions

Assumptions were tested by examining the residual for the full regression model, correlational analysis, testing for multicollinearity, and the significance test for the interaction between the relational coordination and RN education and between relational coordination and professional practice environment. Tolerance levels greater than .60 was considered as absence of multicollinearity. Descriptive statistics were reviewed for mean and variance for assessment of assumption of equidispersion for Poisson Regression. Data was reviewed to confirm count

data for the dependent variable and independence of observations. Independent variables were assessed to ensure there were one or more that could be measured on a continuous, ordinal, nominal scale. Histograms were assessed to determine normality or type of distribution of data and whether a Poisson distribution was observed. Descriptive statistics were further reviewed to assess for equidispersion and plans made for alternate methods to address over or under dispersion as needed. Data cleaning process, when completed, yielded data prepared for analysis that was then subjected to descriptive and statistical analysis using a variety of techniques as described in Chapter 4.

CHAPTER FOUR: FINDINGS

The purpose of this study was to explore the relationship between relational coordination and adverse nurse sensitive patient outcomes, namely hospital acquired pressure ulcers, patient falls with injury, catheter- associated urinary tract infection, and central line-associated blood stream infection. In this chapter, the results of descriptive and data analysis that were performed will be reported in relation to the research hypothesis. The level of relational coordination (measured by relational coordination survey), the nurse practice environment (measured by NDNQI RN Survey with Job Satisfaction Scales-R©), and the frequencies of adverse nurse sensitive patient outcomes (hospital-acquired pressure ulcer, patient falls with injury, catheter-associated urinary tract infection, and central line-associated blood stream infection) in a five hospital acute care healthcare system will be described as per research aims. Lastly, results from a negative binomial regression model in relation to the research hypothesis will conclude this chapter.

Descriptive Analysis

Nurse

The response rate for the relational coordination surveys was 36%, with 406 participants of the 1124 eligible nurses completing surveys. Registered nurses with various education levels and years of experience completed the surveys. Table 8 provides information on the characteristics of the nurses surveyed in the 43 nursing units across a five-hospital healthcare system. Overall, the majority of the nurses (91%) were female and Caucasian (63%), working full time (86%) with an average of 6 years of RN experience.

Table 8 *Characteristics of Registered Nurses who Completed Survey*

Variable	Selection	N	Percent
Total Registered Nurses		406	
Age in years			
	21-25	54	13%
	26-30	84	21%
	31-35	76	19%
	36-40	37	9%
	41-45	57	14%
	46-50	36	9%
	>50	60	15%
Gender			
	Male	38	9%
	Female	368	91%
Race			
	White	257	63%
	Black	43	11%
	Hispanic/Latino	17	4%
	Asian	56	14%
	Other	26	6%
Ethnicity			
	Hispanic	22	5%
	Non-Hispanic	380	94%
RN years of experience			
	Less than 1 year	57	14%
	1-2 years	74	18%
	3-5 years	91	22%
	6-10 years	64	16%
	11-15 years	43	11%
	>15years	78	19%
Specialty Nursing Certification			
	Yes	78	19%
	No	323	80%
RN length of time on current unit			
	Less than 1 year	110	27%
	1-2 years	117	29%
	3-5 years	82	20%
	6-10 years	58	14%
	11-15 years	18	4%
	>15 years	18	4%
RN length of service at current facility			
	Less than 1 year	85	21%
	1-2 years	99	24%
	3-5 years	94	23%
	6-10 years	70	17%
	11-15 years	29	7%
	>15 years	27	7%
Position Status			
	Full-Time	350	86%
	Part-Time Status	56	14%
Primary Shift			
	Days (7am-7pm)	225	55%
	Nights (7pm-7am)	180	44%
Highest Level Nursing Education			
	Diploma	3	1%
	ADN	128	32%
	BSN	262	65%
	MSN	10	2%
	DNP or PhD	0	0%
Currently in School pursuing Higher Degree			
	BSN	65	16%
	MSN or higher	52	13%
	Not in School	278	69%

To note, 67% of the nurses were educated at the BSN level or above, 29% were currently in school pursuing a higher degree, and 19% held a specialty certification. The majority of nurses worked in medical-surgical units (56%), followed by ICU (28%) and PCU (16%).

Relational Coordination

Table 9 reveals data collected from surveys, which shows relational coordination as perceived by registered nurses with scores ranging from 3.20 (weak relational ties) to 4.16 (strong relational ties). Data accounting for individual nurses scores for each of the seven dimensions of relational coordination, were placed in a matrix, tallied and averaged to create a relational coordination index (RCINDEX) score for the nursing unit. Exploratory factor analysis of the seven dimensions of relational coordination confirmed a single factor structure. This index score was recoded into a variable (RCINDEXWMS1) identifying the category reflective of the strength of relational coordination as indicated by relational coordination Measurement Guidelines (Gittell, 2009b). The relational coordination index can be viewed and assessed as an index score and can also be drilled down to review each of the seven dimensions of relational coordination individually (frequent, timely, accurate, problem-solving communication and shared goals, shared knowledge, and mutual respect of relationships).

Each of the seven dimension scores is depicted in Table 9 as nurses from each of the 43 study units rated them. Table 10 depicts the mean rating of each of the relational coordination dimensions aggregated at the nursing unit level. Relationships between the functional groups (roles) can also be placed in a matrix to further review and describe patterns such as strongest relational tie, weakest tie, etc. (Gittell, 2009b).

Table 9 *Relational Coordination Results Summary- 7 dimensions*

Nursing Unit	Frequency	Timeliness	Accuracy	Problem-Solving	Shared Goals	Shared Knowledge	Mutual Respect	Relational Coordination Index
1	4.06	3.46	3.58	3.64	3.89	3.38	3.79	3.69
2	3.88	3.14	3.42	3.50	3.66	3.38	3.65	3.52
3	4.20	3.50	3.74	3.84	4.01	3.49	3.80	3.80
4	4.16	3.62	3.80	3.83	3.90	3.61	3.93	3.84
5	4.43	3.77	4.14	4.24	4.29	3.46	4.06	4.06
6	4.30	3.82	4.02	3.96	4.15	3.72	4.19	4.02
7	4.30	3.45	3.71	3.51	3.63	3.39	3.72	3.67
8	3.89	3.24	3.53	3.38	3.47	2.92	3.27	3.38
9	4.08	3.51	4.08	3.88	3.76	3.31	3.96	3.80
10	4.67	3.90	4.02	4.07	4.29	3.90	4.29	4.16
11	4.45	3.63	4.05	3.79	4.05	3.48	3.66	3.87
12	4.60	3.91	4.06	4.00	4.00	3.57	3.86	4.00
13	3.90	3.36	3.50	3.43	3.21	3.02	3.10	3.36
14	4.61	3.74	4.08	3.99	4.10	3.58	4.12	4.03
15	4.38	3.55	3.76	3.68	3.79	3.27	3.72	3.74
16	4.14	3.93	4.02	4.10	3.98	3.98	4.33	4.07
17	4.34	3.65	3.69	3.90	3.74	3.35	3.71	3.77
18	4.35	3.39	3.47	4.08	3.65	3.63	4.10	3.81
19	3.79	3.05	3.17	3.43	3.40	3.21	3.21	3.32
20	4.29	3.19	3.48	3.67	3.55	3.36	3.31	3.55
21	4.33	3.78	3.92	3.82	3.92	3.47	3.65	3.84
22	4.44	3.60	3.67	3.66	3.74	3.41	3.47	3.71
23	4.17	3.86	3.98	4.33	4.48	3.43	4.21	4.06
24	4.18	3.66	3.66	3.66	4.13	3.61	3.86	3.82
25	4.04	3.47	3.61	3.98	4.43	3.76	3.80	3.87
26	4.59	3.98	4.18	3.82	4.29	3.86	4.20	4.13
27	3.92	3.78	3.90	4.10	4.43	3.63	3.78	3.93
28	3.80	2.89	2.97	3.26	3.49	2.94	3.09	3.20
29	4.24	3.47	3.66	3.66	3.84	3.31	3.87	3.72
30	3.98	3.20	3.24	3.45	3.55	3.12	3.27	3.40
31	4.12	3.65	3.80	3.69	3.98	3.27	4.20	3.82
32	4.14	3.64	3.55	3.79	3.81	3.57	3.90	3.77

Nursing Unit	Frequency	Timeliness	Accuracy	Problem-Solving	Shared Goals	Shared Knowledge	Mutual Respect	Relational Coordination Index
33	4.21	3.64	3.86	3.66	3.88	3.38	3.71	3.76
34	3.68	3.25	3.37	3.57	3.75	3.32	3.48	3.49
35	4.13	3.56	3.58	3.68	3.55	3.45	3.37	3.62
36	4.02	3.74	3.90	3.95	3.64	3.74	3.71	3.82
37	4.19	3.45	3.95	3.62	4.00	3.38	3.76	3.77
38	4.54	3.57	3.77	3.79	3.84	2.98	3.46	3.71
39	4.25	3.79	3.88	3.91	4.05	3.95	4.05	3.98
40	4.49	3.73	3.80	4.00	3.90	3.49	4.24	3.95
41	4.07	3.64	3.95	3.54	3.75	3.28	3.76	3.71
42	4.50	3.88	3.88	3.62	3.83	3.62	3.76	3.87
43	4.27	3.41	3.59	3.48	3.75	3.13	3.57	3.60
Total	43	43	43	43	43	43	43	43
Mean	4. 2122	3.5689	3.7437	3.7659	3.8729	3.4439	3.7668	3.7678

[a] Seven dimensions of relational coordination- Frequency of Communication; Timeliness of communication; Accuracy of communication, Problem-Solving nature of communication; Shared Knowledge aspect of relationships, Shared Goals aspect of relationships; Mutual Respect aspect of Relationships

Table 10 *Overall Relational Coordination Results Summary by Dimension*[a]

Relational Coordination Dimension	Mean	SD	Min	Max
Frequency	4.21	.24	3.68	4.67
Timeliness	3.57	.25	2.89	3.98
Accuracy	3.74	.27	2.97	4.18
Problem-Solving	3.77	.24	3.26	4.33
Shared Goals	3.87	.29	3.21	4.48
Shared Knowledge	3.44	.26	2.92	3.98
Mutual Respect	3.77	.33	3.09	4.33

[a] N=43 units

Table 11 shows relational coordination survey results matrix per functional group (nurse, nurse assistant, social worker/nurse navigator, physical therapist, pharmacist, physician) for each of the 43 study units.

Table 11 *Relational Coordination Results Summary- Functional Work Group*[a]

Nursing Unit	RNMU	RNDU	ACPs	SWNN	PT	Rx	MD
1	4.27	3.19	3.63	3.69	3.60	3.74	3.69
2	3.95	3.17	3.72	3.51	3.52	3.45	3.32
3	4.33	3.50	3.84	3.64	3.69	3.81	3.77
4	4.21	3.78	3.70	3.83	3.93	3.81	3.59
5	4.49	3.93	4.26	3.59	3.80	4.20	4.13
6	4.32	3.95	4.10	3.96	3.76	4.14	3.93
7	4.20	3.31	3.84	3.56	3.57	3.53	3.70
8	3.98	3.04	3.74	2.88	3.23	3.56	3.26
9	4.41	3.29	3.92	3.65	3.82	3.71	3.78
10	4.76	3.90	3.69	4.19	4.19	4.40	4.00
11	4.25	3.39	4.04	3.71	4.00	3.93	3.79
12	4.26	3.71	4.26	3.83	4.14	3.97	3.83
13	3.71	3.05	3.76	3.10	3.52	3.12	3.26
14	4.30	3.74	3.87	4.14	4.01	4.16	4.00
15	4.07	3.29	3.69	3.71	3.63	3.92	3.85
16	4.55	3.38	4.29	3.93	3.86	4.29	4.19
17	4.18	3.41	3.76	3.59	3.67	3.94	3.82
18	4.02	3.45	3.90	3.80	3.73	4.00	3.78
19	3.86	3.17	3.76	3.10	3.05	3.19	3.14
20	4.02	3.55	3.76	3.12	3.05	3.71	3.62
21	4.06	3.57	3.90	3.94	3.86	3.90	3.65
22	3.81	3.44	3.63	3.87	3.80	3.84	3.60
23	4.45	3.71	4.48	4.12	3.79	4.00	3.90
24	4.27	3.39	3.66	4.13	3.95	4.11	3.25
25	4.45	3.33	4.10	3.63	3.78	4.08	3.71
26	4.39	4.00	3.92	4.39	4.18	4.16	3.88
27	4.45	3.69	4.27	3.73	3.63	4.14	3.61
28	3.77	2.31	3.74	2.94	2.91	3.77	2.97
29	4.20	3.23	3.87	3.56	3.76	3.90	3.54

Nursing Unit	RNMU	RNDU	ACPs	SWNN	PT	Rx	MD
30	3.84	3.22	3.37	3.35	3.06	3.71	3.27
31	4.37	2.86	3.82	3.78	3.84	4.24	3.82
32	4.19	3.55	3.90	3.24	3.79	3.90	3.83
33	4.07	3.05	3.61	4.09	3.93	4.00	3.59
34	4.19	3.08	3.14	3.13	3.41	3.94	3.52
35	4.15	3.18	3.51	3.51	3.26	4.13	3.59
36	4.50	3.26	3.98	3.55	3.48	4.12	3.83
37	4.38	3.33	3.86	3.71	3.55	3.83	3.69
38	4.07	3.52	3.48	3.77	3.63	3.89	3.59
39	4.21	3.86	3.86	4.20	4.02	3.91	3.82
40	4.51	3.14	4.27	3.84	3.65	3.94	4.31
41	4.34	3.37	3.26	3.61	3.95	3.83	3.63
42	4.17	3.52	3.86	3.64	4.14	4.17	3.60
43	4.09	2.91	3.16	3.46	3.52	4.07	3.98
Total	43	43	43	43	43	43	43
	4.2112	3.3892	3.8171	3.6675	3.6890	3.9113	3.6889

[a]Work Groups- RNMU= Registered nurse working same unit as nurse participant; RNDU= Registered nurse working a different unit from nurse participant; ACP= CNA or nurse assistant; SWNN= social worker or nurse navigator; PT= physical therapist; Rx=pharmacist; MD=physician

Scores show that nurses rated their relationship with nurses working on a different unit (3.39) and with social workers/nurse navigators (3.67) as the lowest amongst the work team as depicted in Table 12, which displays the overall, mean relational coordination score by the functional work group. For the purposes of this research, an overall relational coordination index score was desired to represent each nursing unit in which data were aggregated. Each functional group's relational coordination score between work groups were assessed to determine the highest scoring functional group and lowest scoring functional group as rated by the nurse in order to identify opportunities for further development of the work team.

Table 12 *Overall Relational Coordination Results Summary by Functional Work Group*[ab]

Functional work group	Mean	SD	Min	Max
RNMU	4.21	.23	3.71	4.76
RNDU	3.39	.33	2.31	4.00
ACP	3.82	.29	3.14	4.48
SWNN	3.67	.35	2.88	4.39
PT	3.69	.31	2.91	4.19
Rx	3.91	.26	3.12	4.40
MD	3.69	.28	2.97	4.31

[a] RNMU=RN working on my unit; RNDU=RN working on different unit; ACP=nurse assistant; SWNN=social worker or nurse navigator; PT=physical therapist; Rx=pharmacist; MD=physician [b] N=43 units

Table 13 illustrates the percentage of units with weak, moderate, and strong relational ties. Table 14 illustrates an overview of relational coordination and displays both the highest and lowest scores for relational coordination ties amongst the health care team as well as the highest and lowest scoring dimension of relational coordination.

Table 13 *Frequency-Strength of Relational Coordination*

Relational Coordination Strength of Ties	Relational Coordination Score Range	N	Percent of units
Weak	< than 3.5	5	11.6%
Moderate	3.5-4.0	33	76.7%
Strong	> than 4.0	5	11.6%

Table 14 *Overview of Relational Coordination at Five-Hospital Healthcare System*

	Strengths	Opportunities
Between Workgroups	**Highest rated dimensions** • Frequent Communication (Strong) • Shared Goals (Moderate)	**Lowest rated dimensions** • Shared Knowledge (Weak) • Timely Communication (Weak)
	Highest rated workgroup(s) • Pharmacists (Moderate) • Nurse Assistants (ACP) (Moderate)	**Lowest rated workgroup(s)** • RN working on a Different Unit (Weak) • Social Workers and/or Nurse Navigators (Moderate)
Within Workgroups	**Highest rated dimensions** • Frequent Communication (Strong) • Mutual Respect (Moderate)	**Lowest rated dimensions** • Shared Knowledge (Moderate) • Problem-Solving Communication (Moderate)
	Highest rated workgroup(s) • RNs working on My Unit (Moderate)	**Lowest rated workgroup(s)** • RNs working on My Unit (Moderate)

Nurse Practice Environment

Seventy one percent (71%) of eligible nurses completed the NDNQI RN Survey with Job Satisfaction Scale-R (1734 of 2439 eligible nurses). Of the 43 nursing units included in this study, 40 units met criteria for inclusion based on NDNQI and study hospital guidelines of a minimum of five responses per unit. Additionally, 40 units had greater than 50% response rate, another criteria for inclusion from NDNQI. Three units were not included due to either low response rate or the nursing unit being temporarily closed and non- operational during the fiscal year 2014 when the survey was conducted. These units consisted of one medical surgical and two ICU units. Overall results of the 40 participating units revealed that 31 of 40 units (78%) scored >60 (high satisfaction) and 9 of 40 units (23%) scored in the range of 40-60 (moderate

satisfaction). To note, there were no units scoring <40 (low satisfaction). The lowest score on job satisfaction was a score of 45 while the highest score was 77.

Nurse Sensitive Patient Outcomes- Quality Metric

A retrospective review of nurse sensitive patient outcomes data (HAPU, patient falls with injury, CAUTI, and CLABSI) revealed incidence rates of adverse nurse sensitive patient outcomes: (1) HAPUs staged III and above per 1000 patient days ranged 0-8; (2) Patient falls with injury per 1000 patient days ranged 0-3; (3) CAUTI per 1000 catheter days ranged 0-20; and (4) CLABSI per 1000 central line days ranged 0-5. In addition to review of each nurse sensitive outcome on an individual level, descriptive and frequency statistics were employed to review the recoded variable of QUALINDEX to determine normality: Mean 4.19, median 2.00, and standard deviation 4.75 were observed with range of 0 to 24 in preparation of data analysis with QUALINDEX used as the outcome variable. Table 15 shows the study five-hospital health system's patient outcome data in comparison to benchmark. Due to proprietary information, data are reported as "at mean," "below mean," or "above mean" in benchmark comparison to the other hospitals in NDNQI repository for quality data.

Table 15 *Hospital Acquired Conditions at Study Hospital and Benchmark Comparison*

Nurse Sensitive Patient Outcome	Average rate of occurrence	Comparison to NDNQI benchmark data
HAPU stage III and above[a]	.65	Below Benchmark Mean
Patient falls with injury[a]	.64	At Benchmark Mean
CAUTI[b]	2.32	Above Benchmark Mean
CLABSI[c]	.76	Above Benchmark Mean

[a] rate per 1000 patient days; [b]rate per 1000 catheter days; [c]rate per 1000 central line days

Quality metric data were recorded for each of 43 study units with no exclusions. Five of the 43 units observed (11.6%) had zero adverse patient outcomes during the review period. Of these units with no adverse patient outcomes, two were medical surgical units, two progressive care, and one ICU. Further, two of these units had a relational coordination rating of "high" relational coordination index and three had a rating of "moderate" relational coordination index. The outcome variable was observed to have positive skew as noted in Figure 3 where variance (22.53) was greater than mean (4.19) indicating over dispersion on the data.

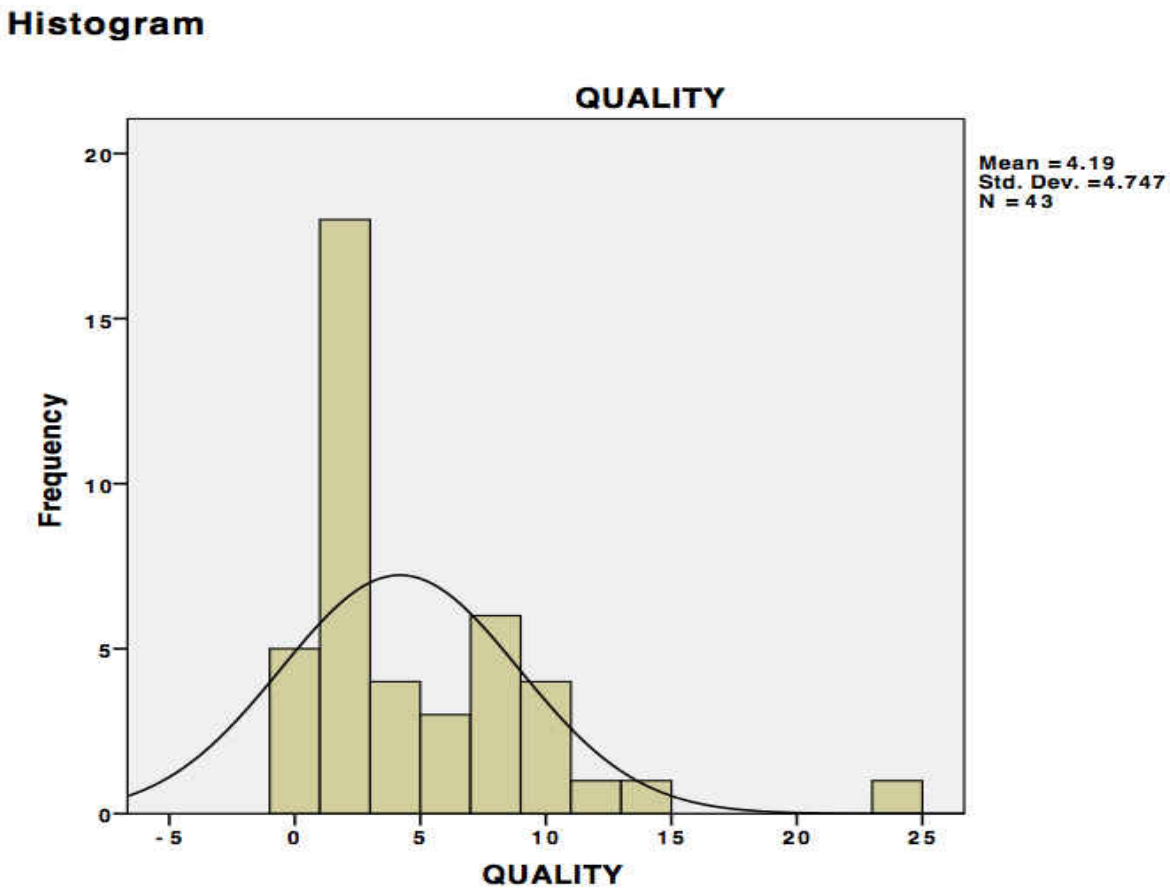

Figure 3. Histogram of Quality Metric

Data collected for the quality metrics variable indicated a non-normal distribution based on Kolmogorov-Smirnov test ($p<.05$), lending support for use of Poisson Regression to model the count data with over dispersion correction. A model comparison was made with data using Negative Binomial Regression model, a statistical test designed as an alternative to Poisson regression to address issues with over dispersion of data (Coxe et al., 2009). In comparison of the models, Negative Binomial Regression model was assessed to be a better-fitted model (Deviance 1.91, Pearson Chi Square 1.25, Full Log Likelihood -98.42, AIC 206.81, BIC 215.26) to the data over Poisson Regression (Deviance 4.86, Pearson Chi Square 5.99, Full Log Likelihood -137.32, AIC 284.65, BIC 293.09). Therefore, after assessing Goodness of Fit statistics, Negative Binomial Regression was used as the method to correct for overdisperson while predicting the variance on the dependent variable after all independent variables were loaded into the model as identified as a suitable alternative (Coxe et al., 2009; Nussbaum, Elsadat, & Khago, 2008).

Findings

Using Spearman's correlation statistics, data analysis revealed a negative correlation between relational coordination and the quality metric of adverse nurse sensitive patient outcomes ($r_s=-.31$, $p=.050$). Relational coordination, an ordinal, continuous, and normally distributed, predictor variable measured the strength of relational ties amongst the work team while QUALINDEX, a discrete, non-normally distributed response variable measured the number of adverse nurse sensitive patient outcomes (HAPU, patient falls with injury, CAUTI, CLABSI). Spearman's correlation was appropriate for use in this comparison of correlation as it

is useful in assessing ordinal and non-normally distributed data and since it is a non-parametric alternative of the widely used Pearson Correlation statistic (Field, 2013).

Two remaining predictors, RN Education level (r_s=.17, p=.421) and Nurse Practice environment (r_s=-.015, p=.929), showed low and nonsignificant correlation to the outcome variable. Predictor variables were absent of multicollinearity with explanatory variable correlations less than .60. Further, high tolerance levels (>.40) and low VIF (<10) also validated absence of multicollinearity between explanatory variables (Table 16). Missing data was not problematic and was less than 7% for the outcome variable, therefore no imputation was implemented in the analysis.

Table 16 *Collinearity Diagnostics for Explanatory Variables*

Explanatory Variable	Tolerance level	Variance Inflation Factor (VIF)
Relational Coordination	.78	1.28
Nurse Practice Environment	.87	1.15
RN Education Level	.88	1.14

When tested in a GLiM single predictor negative binomial regression model, relational coordination (β = -1.60, p=.023) showed significance in predicting adverse nurse sensitive patient outcomes. However, relational coordination showed a decrease in it's beta value (β= -1.48) and a loss of significance (p=. 057) when nursing education was added to the model as a second predictor. Both nurse education level (β=.012, p=.180), and nurse practice environment (β=.011, p=.740) were insignificant predictors of adverse nurse sensitive patient outcomes when tested as a single predictor with no other predictors in the regression model.

Results of the full negative binomial regression model as displayed in Table 17, shows relational coordination, nurse education level, and nurse practice environment as predictors and QUALINDEX (HAPU, patient falls with injury, CAUTI, CLABSI) as the outcome variable. In this model, relational coordination (β=-1.89, p=.034) demonstrated evidence of being a significant predictor. Data reveals that as relational coordination values increase, the rate of adverse outcomes decrease as depicted in Figure 4.

Table 17 *Parameter Estimates*

Parameter	Estimate	SE	Wald 95% Confidence Limits Lower	Upper	Wald ChiSquare	Pr>ChiSq
Relational Coordination	-1.890	.894	-3.642	-0.139	4.470	.034
Nurse Practice Environment	.041	.034	-.026	.109	1.440	.230
RN Education level	.002	.010	-.017	.021	.030	.859

Hypothesis Testing

The following research hypothesis was tested for this study. **HYPOTHESIS (H_A):** Nursing units with a higher relational coordination index, as measured by relational coordination survey, will exhibit lower rates of adverse nurse-sensitive patient outcomes (hospital-acquired pressure ulcer, patient falls with injury, catheter-associated urinary tract infection, and central line-associated blood stream infection) than nursing units with a lower relational coordination index score when controlling for the nurse practice environment and nurse level of education.

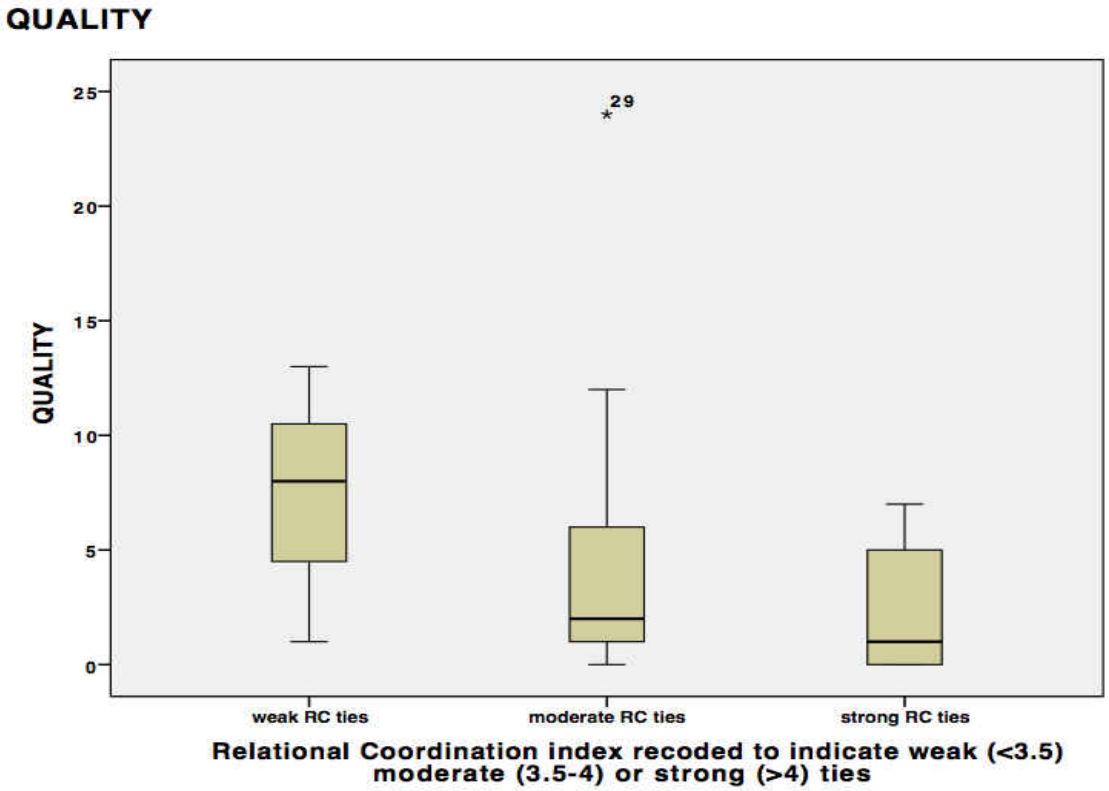

Figure 4. Relational Coordination and Quality Metric (Adverse Nurse Sensitive Patient Outcomes of HAPU, patient falls with injury, CAUTI, CLABSI)

A correlation of -.305 showed an inverse relationship between relational coordination index and adverse nursing sensitive patient outcomes quality metrics. As depicted in figure 4, as the level of relational coordination went up (stronger relational coordination ties amongst the healthcare team), the rate of adverse nurse sensitive patient outcomes when down (lower rate of adverse events). Relational coordination was a significant predictor of nurse sensitive patient outcomes (β=-1.89, p=. 034) when tested in a three-predictor negative binomial regression model. Nursing units with a higher level of relational coordination index had a lower volume of adverse nurse sensitive patient outcomes than nursing units with a lower level of relational coordination. Based upon the findings of this study, the hypothesis was supported.

CHAPTER FIVE: DISCUSSION

This chapter discusses the findings presented for this study. Implications for nursing practice and future nursing research are discussed along with limitations of the study.

Relational Coordination

This study investigated whether relational coordination impacts patient outcomes by testing the research **HYPOTHESIS (H_A):** Nursing units with a higher relational coordination index, as measured by relational coordination survey, will exhibit lower rates of adverse nurse-sensitive patient outcomes (hospital-acquired pressure ulcer, patient falls with injury, catheter-associated urinary tract infection, and central line-associated blood stream infection) than nursing units with a lower relational coordination index when controlling for the nurse practice environment and nurse level of education. The results support the research hypothesis and show that relational coordination does impact patient outcomes. The inverse relationship between relational coordination and adverse nurse sensitive patient outcomes indicate that those units with a higher level of relational coordination had a lower rate of adverse nurse sensitive patient outcomes. This finding suggests that strong relational ties amongst the healthcare team, as tested in this study, increases quality care and decreases the amount of HAPUs, patient falls with injury, CAUTI, and CLABSI for patients in the hospital setting. The most important new finding in this study reintroduces the importance of healthcare teams' communication and relationships, which are two key concepts of relational coordination. Similar to findings from Gittell et al. (2000) where relational coordination was significantly related to reduction in postoperative pain in orthopedic patients and increased patient satisfaction, relational coordination in this study was

related to a reduction of adverse nursing sensitive patient outcomes (HAPU, patient fall with injury, CAUTI, CLABSI).

Relational coordination was measured by the teams' perception of frequency, timeliness, accuracy, and problem-solving communication and relationships with shared knowledge, shared goals, and mutual respect. These dimensions are critical aspects of the healthcare team's ability to facilitate the type of quality outcomes needed for patients seeking care in acute care facilities today (Gittell, 2009a). Although each of the four communication dimensions (frequent, timely, accurate, problem-solving) are important, the highest scoring dimension amongst nurses participating in this study was *Frequency of Communication* (4.21) denoting nurses' desire to have frequent communication with members of the healthcare team about the care needed for the their patients. The lowest scoring dimension was *Timeliness of Communication* (3.57) denoting nurses' perception that the healthcare team's communication to them was not timely indicating delays were problematic in their environment while performing patient care. Considering the Joint Commission's (2015) report identifying communication as a key issue in most root cause analysis of sentinel events, nurses' communication with the team is paramount to quality.

Equally as important as communication, is the relationship nurses share with the healthcare team while delivering care to patients. Although nurses are the primary caregivers, it takes the healthcare team to care for patients in our very complex healthcare system. In reflection "care coordination is the deliberate organization of patient care activities between two or more participants involved in a patient's care to facilitate the appropriate delivery of health care services" (McDonald et al., 2007, p. 5). Assessing the strength of relational ties amongst the healthcare team, nurses in this study rated *Shared Goals* (3.87) as the highest relationship dimension of relational coordination (shared knowledge, shared goals, mutual respect). This

rating suggests that nurses recognize the benefits of sharing goals with the healthcare team in support of patient care. The lowest relationship dimension was *Shared Knowledge* (3.44), which indicates that nurses did not perceive there was a high level of understanding amongst the team for what each functional group contributed to the healthcare team while delivering care to the patient and coordinating services. Nurses being key to quality of patient care need support from the team. This support is shown to be the most beneficial to patients navigating through our healthcare system (NQF, 2010) as it lends itself to improving coordination of services.

Of the various relationships between functional work groups of the healthcare team (nurses, nurse assistant, social worker/nurse navigator, physical therapist, pharmacist, physician) in this study, nurses rated their relationship ties with nurses working on the same unit as the highest (4.21) as opposed to their rating of nurses working on a different unit (3.39) and social workers/nurse navigators (3.67) which were rated the lowest. This indicates that there is opportunity to strengthen these key connections, especially since coordination of care is a problem nationwide, hence it being named as a national priority (National Priorities Partnership, 2008). Further, this finding is similar to Haven et al.'s study (2010) of 747 bedside nurses where they also rated their relationships with nurses working on the same unit (4.19) higher than nurses working in a different unit (3.00). Although nurses interact with nurses from different units, one cause of their variation of score ratings could be because they spend more time with nurses on their own unit more so than nurses on different units. This time spent with nurses working on their own unit could help build and strengthen their relationship bond and trust that lends itself to the nurse's perception that their relationship with these nurses on the same unit is stronger.

Social workers and nurse navigators, who were also rated as the lowest "between workgroups" in this study by the nurse, are identified in the literature as "boundary spanners",

which is a coordinating mechanism identified in the literature as being beneficial to coordination (Gittell, 2000, 2002). Since social workers and nurse navigators share a critical role of coordinating patient care as boundary spanners, (Gittell, 2002), their relationship with nurses warrants attention of healthcare leaders and suggests work between these two groups to strengthen their relational tie for the benefit of the patient. In the participating study health care system, it is customary practice that the social workers and nurse navigators work during the day shift without much exposure to evening shifts where a bulk of discharge, transition, and collaboration is concluded on behalf of the patient. This could be a reason why nurses rated their relational tie as lower since this study reviewed responses from all shifts of nurses who were responsible for caring for patients at the bedside and involved in coordination of care. Strengthening communication and relationship between nurses and social workers/nurse navigators is consistent with key elements of a healthy work environment addressing skilled communication and true collaboration between these two key roles of the team.

Another important relationship is that which is shared by the nurse and the physician since both serve in key positions in the care of patients. In this study, nurses rated their relationships with physicians as fourth highest of the seven work groups that were rated (nurses working on same unit, nurses working on different unit, nurse assistant, social worker/nurse navigator, physical therapist, pharmacist, and physician). More specifically, nurses rated three work groups higher than their relationship with physicians (nurses working on same unit, pharmacist, nurse assistant) and three work groups lower (physical therapist, social worker/nurse navigator, nurse working on different unit). This finding is consistent with prior studies such as Havens et al.'s (2010) study of 747 nurses where the researchers expected nurses to rate their relationship with physicians as the lowest but instead they rated it as third highest in comparison

to their relationships with other members of the healthcare team. Although this study only included perceptions of the nurse rating their relationship with other functional work groups, prior literature such as the study conducted by Cramm and Nieboer (2012) indicated that physicians also rated their relationships with nurses higher in comparison to physician's relationships with other physicians. Additionally, in a qualitative study including 20 medical residents, they also indicated a strong relational ties with nurses but offered the qualifier of "it depends" when describing their relationships with nurses (Weinberg et al., 2009). These findings indicate that both nurses and physicians perceive their relationship with the other to be moderate to strong. As documented in the literature, when nurse and physician relationships are strong, the patient benefits with quality outcomes (Cramm & Nieboer, 2012; Havens et al., 2010; Weinberg et al., 2009).

Nurse

The nurse is central to the care patients receive in the healthcare setting. Unlike findings from Aiken et al.'s groundbreaking study with the BSN prepared nurse and surgical mortality (2003; 2011), as well as well as other studies showing a significant association between BSN and patient outcomes (Estabrooks et al., 2005; Kendall-Gallagher et al., 2011), this study did not show a significant relationship between nurse education and nurse sensitive patient care outcomes. In this study, a little over two thirds of the nurses were educated at the BSN level and above, yet, nurse education alone did not explain the variance of adverse nurse sensitive patient outcomes. Research to date has been scant in measuring the impact of nurse education to other nurse sensitive patient outcomes (HAPU, patient falls with injury, CAUTI, and CLABSI) such as the ones reviewed in this study.

Additionally, it is worth noting that the participating five-hospital healthcare system is a Magnet®-designated healthcare system and has recently (within the past year) embarked upon an initiative to increase the percent of BSN prepared nurses in keeping with the recommendations of the Institute of Medicine to increase BSN nurses from 50% to 80% by the year 2020 (IOM, 2011). This could be one reason for the large number of BSN prepared nurses practicing in the participating health system as well as the 30% of nurses who are currently matriculating through a nursing program in an effort to increase their educational level. Having nearly 70% of BSN nurses on staff and another 30% in school pursuing higher degrees suggests education excellence could be the cultural norm of this magnet healthcare system and could be the reason why education was not highlighted as a significant predictor. This would be similar to the findings from McHugh and Lake (2010) where their study found that in areas where there were a higher percentage of BSN nurses, not only did the BSN nurses report a higher level of nursing expertise, but also the non-BSN nurses also reported a higher level of nursing expertise. In this study, the percent of BSN and higher degreed nurses in the participating study health system (67%) is higher than nurses in Florida (40.3%) (FCN, 2014) and other magnet hospitals (56%), but is more consistent with magnet hospitals' BSN rate (ANCC, 2014). In addition to the high BSN rate in the study health system, this magnet environment encouraged quality care through evidenced based practice models and research driven nursing practices which were evident through noted RN-led evidenced-based clinical practice structures addressing quality issues. Since relational coordination and nursing education has not been broadly studied together, there is opportunity to explore this relationship further.

Nurse Practice Environment

The nurse practice environment is supported in the literature as being consequential to outcomes of patients (Aiken et al., 2011; Estabrooks et al., 2005). This was discovered in several studies using mortality and failure to rescue as response variables and nurse practice environment as a predictor. This study did not reveal that nurse practice environment was a significant predictor through a regression model with relational coordination, nurse practice environment, and nurse education as predictors and QUALINDEX as the outcome variable. This finding is consistent with the study conducted by McHugh and Lake (2010), where they also were unable to determine that nurse practice environment was a significant indicator while exploring nursing expertise. To note, in this study, the participating health system did not have any of the 43 units reporting low satisfaction with elements of the work environment, rather all units scored either moderate or high satisfaction with the work environment. Having a positive work environment could be characteristic and the cultural norm of the study hospital's work environment and could be the reason why the environment did not show as a significant predictor of patient outcomes. Although all study units reported moderate to high satisfaction of the work environment, relational coordination survey results indicated opportunities for increased collaboration amongst the team as indicted with the lower rating of the relationship between nurses and social workers/nurse navigators.

Creating collaborative relationships amongst the work team has been reported as one of the eight previously discussed hallmarks of professional nursing practice (AACN, 2002). Overall results of this study showing a high level of job satisfaction with elements of the work environment are consistent with the study conducted by Gittell et al. (2008) where 215 nursing

assistants in a nursing home study where there was a high level of relational coordination, also rated a high level of job satisfaction.

Nurse Sensitive Patient Outcomes

Of the three overarching categories of nurse sensitive patient outcomes (patient-centered outcomes, nursing-centered interventions, and system-centered measures) (NQF, 2004b), the outcome variables in this study are considered patient-centered outcomes. Further, they are all hospital-acquired conditions that are believed to be preventable. Although avoidable, adverse nurse sensitive patient outcomes result in nearly 1.7 million hospital-acquired infections and 100,000 patient deaths annually in the U.S. (AHRQ, 2013). In this study, HAPU, patient falls with injury, CAUTI, and CLABSI were reviewed individually and then collectively as a quality metric of adverse nurse sensitive patient outcomes. Of the four outcome variables, CAUTI was the highest occurring condition with a mean of 2.32 events per 1000 catheter days. The lowest occurring condition was patient falls with injury, which had an occurrence rate of .64 falls per 1000 patient days. These outcomes, believed to be preventable, can be avoided with healthcare team communication and collaboration (NQF, 2004b). As seen in this study, nursing units with a lower amount of adverse nurse sensitive patient outcomes also had a higher level of relational coordination amongst their team. Not only does having high quality communication and relationships amongst the health care team evident of high performing organizations (Gittell, 2009a; Gittell et al., 2000) who produce positive outcomes, it also enhances patient satisfaction (Gittell, 2009a), and the perception of quality (Gittell et al., 2000). In a nine-hospital study, nursing areas with a higher level of relational coordination amongst the healthcare team, had patients who reported reduced post pain, increased postoperative functioning and had a decrease

length of stay (Cramm & Nieboer, 2012; Gittell et al., 2008; Havens et al., 2010). Similarly, in a nursing home study, in areas where there was a higher level of relational coordination amongst the work team, residents reported higher quality of life and nursing assistants reported a higher level of job satisfaction (Gittell et al., 2000). Further, in areas where nurses and physicians rated a strong relational tie, they also reported an increase perception of quality for their patients (Gittell et al., 2008).

Since nurses are at the center of healthcare and are in a position to intercept adverse patient outcomes, nurse executives have an opportunity to optimize the healthcare teams' relationship and communication to nurses who hold a critical and centric role in patient care and quality. One way nurse executives can do this is by partnering with organizations such as RWJF, whose mission is embedded with patient care quality and safety efforts geared toward promoting quality through support of the nursing role at the bedside.

Nursing Implications

Data gathered in this study equips nurse leaders with necessary information to proactively affect patient outcomes such as minimizing or preventing hospital-acquired pressure ulcers, patient falls with injury, catheter-associated urinary tract infections, and central line-associated blood stream infection. It suggests that increasing the strength of work teams' relationships and communication processes benefit the patient through reduction of adverse outcomes. The relational coordination framework as offered by Gittell (Cramm & Nieboer, 2012; Havens et al., 2010) can be utilized to guide research on other patient outcomes such as chronic conditions and readmissions. There is an intense demand for high-quality healthcare (NQF, 2010) and relational coordination is suitable for empirical exploration as a means to improve care in complex

organizations (Gittell, 2006). Recognizing how nurses practice and how they relate to their work teams in coordination of care for patients will aid nurse leaders in building their expert workforce optimizing the role of the nurse in achieving quality patient care outcomes. The literature supports interventions such as the TeamSTEPPS® approach to building strong work teams (2006). Additionally, the IOM (AHRQ, n.d.) urges healthcare leaders and institutions to prepare nurses to deliver care for the complexities of healthcare in this 21st century. Investing in programs that enhance the relational coordination of work teams and the knowledge and ability of the nurse to effectively coordinate patients' care can drive nursing leaders closer to meeting this requirement of preparing today's nurses for tomorrow's healthcare needs.

Nursing leaders can also strengthen communication amongst the healthcare teams through meticulous handoff communication practices that could affect not only nurses communication and relationship with nurses working on the same unit but can also affect nurses ability to receive and share information with nurses working on different units as well as other members of the healthcare team whom they collaborate with for the best patient outcomes. SBAR communication, an evidenced based form of communication, (IHI, 2014a) can be used as a tool to enhance communication amongst the healthcare team. Further, it is purported to be a collaborative communication tool which enhances teamwork (Beckett & Kipnis, 2009). Nursing leaders occupy roles that require facilitation of nurses' vital work and therefore should pave the way for environments that lends itself to high quality communication and high quality relationships within and between work groups such as what is afforded with use of the relational coordination framework.

Since nurses understand nurses, and nurses are key to quality (IOM, 2011), the most appropriate person to lead quality initiatives is the nurse executive (Disch, 2008). Findings

presented in this study highlight the importance of communication and relationships shared amongst work teams while they coordinate patient care for positive patient outcomes. Nurse executives should implement programs in their facility that would target these key characteristics of a high performing organization and healthy work environment.

The American Organization of Nurse Executives (AONE), part of Healthcare Leadership Alliance, identified communication and relationship building as one of the five core competencies for a nurse executives (AONE, 2005). Since nurse executives have the platform to bring the team together in collaboration to achieve shared goals (Disch, 2008), one recommendation is for nurse executive to invest in interdisciplinary team functions to promote benefits to the team an to the patients. The team would benefit from increased team relations and stronger communication while the patients would benefit from having more coordinated care and less fragmentation of services.

Education Implications

Registered nurses, the primary caregivers in healthcare, are integral to coordination of the patient's care in the healthcare system along with their perspective work teams. The nurse is recognized by patients to be the person in the best position to coordinate their care (IHI, 2014a). Being pertinent to the coordination of care process for patients, nurses must be prepared with this basic competency starting with their pre-licensure education. In recognizing the skill of coordinating patient care as a basic competency, the ANA urges nursing education programs to incorporate this competency into their curriculum (ANA, 2012). Education on coordination of care should include key concepts of coordination such as communication and relationships. Further, the purpose and significance of functional work group roles should be reviewed so that

nurses understand the value of their work and how their work relates to and interconnects with the work of the healthcare team. This lesson would aid in the nurse's understanding of how each functional work group produce interdependent work towards meeting the needs of the patient. The basis of the curriculum should be centered around the patient and equip nurses to participate in communication that is frequent, accurate, timely, and problem-solving while fostering relationships with the team that lends itself to shared knowledge, shared goals, and mutual respect.

Additionally, nursing schools' education to prelicensure nurses should incorporate the five competencies recommended by IOM that would help bridge the gap to quality: (1) providing patient centered care; (2) working in interdisciplinary teams; (3) employing evidence based practice; (4) applying quality improvement; and (5) utilizing informatics/technology (ANA, 2012). These recommendations as noted in the IOM report *Crossing the Quality Chasm* (2001), are believed to align education with the current healthcare system of this 21st century and should continue from undergraduate to graduate to continuing education for the healthcare professional (2001).

The AACN (2008) further identifies nine essentials of nursing (baccalaureate) education. These key essentials directly relate to communication and interprofessional relationships. Essential II covers organizational and systems leadership for quality care and patient safety while Essential VI covers interprofessional communication and collaboration for improving patient outcomes. The expectation is that nurse graduates will be prepared to practice in complex healthcare systems and will be able to assume not only the role of healthcare provider, but also the role of coordinator of patient care while functioning as a member of the healthcare profession.

Other educational efforts that should be realized are RWJF funded QSEN efforts, which are geared towards identifying core knowledge, skills, and attitudes necessary for the promotion of safe patient care with quality outcomes. QSEN using the same competencies identified by the IOM has already partnered with schools of nursing to prepare pre-licensure nurses to initiate quality and safety practices. In addition to education in schools of nursing, QSEN offers workshops, which can be used as a method of continuing education for practicing nurses (QSEN, 2014) and also endorses relational coordination as a method to address teamwork and collaboration. Thus, a new vision for healthcare professionals of the 21st century as shared in IOM's report Health Profession's Education, is that:

> All health professionals should be educated to deliver patient-centered care as members of an interdisciplinary team, emphasizing evidence-based practice, quality improvement approaches, and informatics (IOM, 2003a, p. 3).

Policy Implications

Quality care for patients entering the healthcare system is necessary as the environment is extremely complex (QSEN, 2014). Patients experience fragmented care and complicated healthcare systems (IOM, 2001). As a result of the Affordable Care Act and the Triple Aim, CMS (2014) has initiated tight regulations and controls intended to dictate quality standards by imposing financial consequences if care and services do not meet the national benchmark standards and show continued improvement. CMS policies for a hospital's financial payment are, in part, based on a Value Based Purchasing standard. This standard reduces Medicare reimbursement by up to 3% for institutions, which do not meet national quality benchmarks. The potential loss of revenue has placed intense pressure upon hospitals to improve quality outcomes.

The burden of meeting this quality mandate has largely fallen to nurses who coordinate care at the unit level. As the findings of this study suggest, relational coordination may be an effective means of improving patient outcomes.

Healthcare policy also dictates that hospitals maintain a level of transparency so that patients who are healthcare consumers, have the tools they need to make informed healthcare choices including where they choose to receive their healthcare services. The Joint Commission, AHCA, and CMS requires healthcare institutions to post phone numbers in easy view of the healthcare consumer so that if they are dissatisfied with quality of their healthcare services, they can lodge their concern directly to a regulatory authority. This level of transparency is another motivator for healthcare institutions to maintain a high level of quality.

Methodological Limitations

Several limitations exist related to this study. First, cross-sectional design precludes the ability to determine causality but provides valuable information in the assessment of the relationship between relational coordination and nurse-sensitive patient outcomes. Longitudinal design is suggested for further research to better assess the relationships discovered in this study.

Second, Negative Binomial method, although designed to address count data, is a newer statistical method with limited research using this method. As a result researchers have less experience with this type regression and interpretation (Hutchinson & Holtman, 2005).

Third, the sample size of 43 nursing units did not allow for a large number of predictor variables as to keep the number of predictor variables to the least amount necessary to predict a variance on the outcome variable as informed by Tabachnick and Fidell (2013). Additionally, all 43 nursing units are located in a five hospital Magnet®-designated healthcare system. This could

affect the generalizability of the study to hospitals that are non-Magnet®- designated. Prior studies have reported that the nurse practice environment tends to be more positive in magnet-designated facilities (NQF, 2010).

Fourth, outcome variables reviewed retrospectively using previously reported nursing quality indicators were unadjusted and did not account for acuity. The NDNQI data repository, which holds the quality data obtained from all participating facilities, indicates that nursing unit and hospital type are used as a proxy for patient acuity and allows for benchmarking with like units and hospitals.

Fifth, although nurse staffing has been noted in the literature to impact patient outcomes, it was not extensively accounted for in this study due to limited sample size. However, descriptive data analysis demonstrated the majority of nurses taking the RN Survey for Job Satisfaction rated their level of satisfaction with staffing, resources, and proper adjustment of staffing as moderate (40%) to high (52.5%). Only 7.5% of nurses rated low level of satisfaction with the staffing on their nursing unit.

Sixth, the outcome variable QUALINDEX, was a summed total of HAPU, patient falls with injury, CAUTI, and CLABSI, to indicate the quality metric being reviewed in this research study. Further testing of each nurse sensitive outcome individually is suggested for future research exploration. Likewise, the control variable for nurse practice environment consisted of 11 subscales that were testable using each 3-question subscale as an individual construct due to sample size, an index was used to review the 11-subscale survey (total 33 items).

Lastly, conducting research from the perspective of nurses solely, limits the assessment of the healthcare team to one viewpoint in an asymmetrical matrix versus the full view of a symmetrical matrix with responses from each workgroup (nurses, nurse assistants, social

worker/nurse navigators, physical therapist, pharmacist, and physician). Fortunately, Gittell asserts that even from one perspective and being asymmetrical in design, valuable information could be afforded with the exploration of relational coordination in this fashion (Hutchinson & Holtman, 2005) as was found with this study.

Recommendation

Being informed by the results of this study identifying relational coordination as a significant predictor for patient outcomes and an indicator for quality, the recommendation set forth is for nurse executives to invest in programs that will enhance communication and relationships amongst the healthcare team. This can be exercised by embarking on intercollaborative initiatives that will promote patient-centered care and strengthen the relational ties of the work team.

This study revealed that nurses and social workers have opportunity to strengthen their relationships for better coordination of patient care as nurses rated their relationship lowest in review of between workgroup relational ties. Additionally research shows favorable nurse and physician relationships impact quality outcomes when their relationships are strong. However, in this study, shared knowledge was lacking indicating the healthcare team could benefit from understanding the role of each member of the healthcare team and their contribution to the patients which can minimize silos and fragmentation. This effort can be facilitated by bringing the healthcare team together for the benefit of patients through interdisciplinary teams' patient rounds.

Interdisciplinary rounding has shown to be beneficial in hospitals imitating this practice. In a recent venture, launched in 2010 and co-led by nurses and physicians, "Accountable Care

Units™" were created utilizing structured interdisciplinary bedside rounding to create an environment where the healthcare team works towards shared goals for patients being treated. This patient-centered care model affords critical elements of relational coordination to be enacted as it enables frequent, timely, accurate, and problem-solving communication to occur in intercollaborative work teams that have an opportunity to share knowledge, share goals, and achieve mutual respect for each other. This new patient care delivery model has now been implemented in over 50 U.S. hospitals with success. The initial venture started at Emory Hospital which reported that one year after implementation of the new model, they saw an unadjusted reduction in mortality and an decrease in length of stay (Stein, Mohan, & Payne, 2012; Stein et al., 2015). Further, as ACUs were implemented in another large organization, they also reported that after two years, they realized a reduction in CLABSI, CAUTIs, patient falls, and length of stay (Swinton, Payne, & Fortier, 2015). This effort of interdisciplinary rounds synchronizes patient care with the healthcare team and combats fragmentation of services while enabling care coordination.

Future Research

Although the literature provides evidence of the benefit of relational coordination for both improved patient outcomes and job satisfaction, additional research is needed on this topic. This study was conducted from the perspective of the nurses as it related to their perception of the healthcare team's communication and relationship attributes towards nurses. Future research should explore each of the work groups that comprise the healthcare team. Conducting research and exploring each of these workgroups will allow for a broader view of the healthcare team

looking at various ties amongst work teams. Part of this exploration should consider the role nurses play in establishing the relational coordination ties within the healthcare team.

Conclusion

Poorly coordinated care and fragmented healthcare services in complex systems negatively impacts quality patient care. This retrospective correlational study tested the impact of relational coordination, a relationship and communication intensive form of coordination, on patient care outcomes. Study results revealed that the higher the level of relational coordination, the better the patient's quality outcomes, as measured by lower rates of adverse nurse sensitive outcomes (HAPU, patient falls with injury, CAUTI, CLABSI). Application of the principles inherent in the theory of relational coordination can aid nurses in becoming more effective and efficient in their work relationships with other members of the healthcare team. For the healthcare leader, the theory of relational coordination can aid in optimizing teamwork. Patients benefit through enhanced quality of care and positive outcomes. This study's findings contribute to the body of evidence, affirming relational coordination as a guiding practice to increase quality and defeat challenges with fragmented and uncoordinated care. Further, this study offers next steps for enhancing intercollaborative practice models amongst healthcare teams recognizing the potential for strong relational coordination optimized through benefits of quality patient care outcomes. Recommendations from this study offers a solution to the question posed by the 2014 RWJF report reviewing the lack of progress of patient safety ten years post *Transforming Care at the Bedside* report. Successful implementation of intercollaborative teams exhibiting strong relational coordination can change health care for populations minimizing fragmentation and increasing quality outcomes.

APPENDIX A: SEARCH STRATEGY

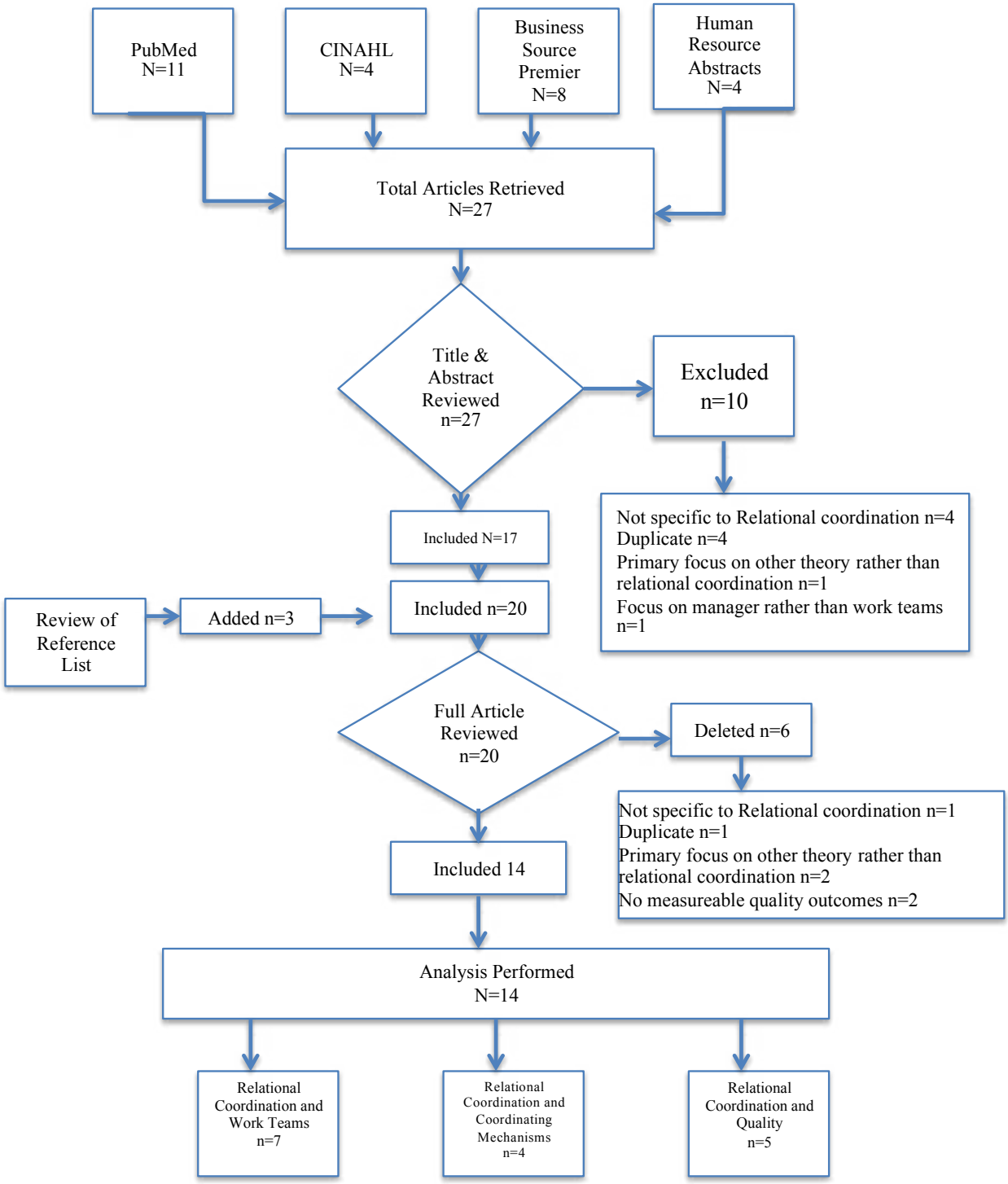

Figure 5. Search Strategy

APPENDIX B: EVIDENCE TABLE

Table 18 *Evidence Table*

Source, Sample and Design	Method and Instrument	Results	Limitations and Comments
Bae et al. (2010) N= 268 nursing units at 141 hospitals Nonexperimental Longitudinal Causal	Secondary data analysis from previously collected data utilized in conjunction with nurse turnover data to examine how nursing turnover affect workgroup processes such as relational coordination and patient outcomes	The relationship between workgroup processes such as in relational coordination and nursing turnover was not significant in this study (β=.003, p=.08) Poisson regression	Longitudinal study recommended to review lag time effect of nursing unit turnover on relational coordination Missing data from original study data set Secondary data analysis with limited data on turnover variables
Cramm & Nieboer (2012) N=188 healthcare professionals (57% response rate) 19 Disease management clinics in Netherlands Cross-sectional Study design	Relational coordination survey was utilized to examine relational coordination among professionals in primary care (disease management programs) and assess its impact on chronic illness care, Reliability and Validity Cronbach's Alpha =.96 The 34-item Assessment of Chronic Illness Care (ACIC) was utilized To examine the six elements of chronic illness care, so that each of the six elements can be assessed for correlation with relational coordination Reliability and Validity Cronbach's Alpha= .91	Chronic illness care was affected by relational coordination (β=.21, p<.01) There was a positive relationship between relational coordination and the overall ACIC (r=.23, p=.002) 6elements of ACIC organization of healthcare system community linkage self management support decision support clinical information system overall ACIC Paired t tests Multiple regression	Self Report Can only determine associations and not causality with cross-sectional correlational design study Risk of non-response bias (57% response rate of survey) Study conducted in Netherlands; may not be generalizable to other disease management programs in other locations ACIC tools reflects U.S. Healthcare systems but tested in Netherlands, may have affected data on "organizations of the healthcare delivery system

Source, Sample and Design	Method and Instrument	Results	Limitations and Comments
Gittell et al. (2010) Convenience sample of nine major urban hospitals over six-month period N=338 Care provider (51% response rate) N=878 Patient surveys (64% response rate)	Administrator interview, patient records, care provider survey, patient survey Relational coordination survey was used to measure relational coordination of individual providers Patient surveys and hospital records were used to measure patient outcomes at the individual patient level Administrator interviews were used to identify high performance work practices	Results show that high performance work practices are positively associated with relational coordination (r=.31, p<.001) Physicians are less engaged in relational coordination than nurses (r= -.16, p<.001) High performance work processes are associated with higher quality of care (r=1.93, p=.041) High performance work index – Cronbach's alpha = .93 Random effects linear regression	Convenience Sample Secondary data analysis of former study (Gittell 2000) Utilized interviews versus Survey method Self Report Response bias
Gittell (2008) Nine hospital study N=338 care providers (51% Response Rate) Cross-sectional Design	Relational Coordination survey utilized to evaluate relationships Interviews of administrators and team members were used to evaluate Relationship work processes (selection for cross-functional teamwork, rewards for cross functional teamwork, cross-functional performance, measurement, cross-functional conflict resolution, cross-functional team meetings, and cross functional boundary spanners) were measured by. Cronbach's Alpha .92	Relational coordination is described as a resilient response Results indicate that workers engage in higher levels of relational coordination when they perceive external threats such as managed care pressures (r=.12, p=.03) Random effects linear regression	Cross-section design cannot determine causality Performance not measured to test resilience

Source, Sample and Design	Method and Instrument	Results	Limitations and Comments
Gittell et al. (2008) 15 nursing homes N=105 Residents (response rate 85%) N=252 Nurse aides (response rate 99%) Cross-sectional design Massachusetts	14-item resident questionnaire (by Kane et al.) was utilized to measure resident's quality of life; conducted through interviews Cronbach's alpha= .69 Factor structure confirmed through CFA 82-item nurse aide questionnaire was utilized to measure relational coordination, job satisfaction and working conditions Cronbach's alpha=.86 EigenValue 2.73 Single factor loadings .57-.83 Researcher reports tool previously validated	Relational coordination was significantly associated with resident's quality of life (r=.37, p=.008) Relational coordination was significantly associated with nurse aide job satisfaction (r=.30, p<.001) Random effects linear regression	Low internal reliability for instrument measuring resident's quality of life Internal reliability not reported for 82-item questionnaire Study shows association versus causation due to cross-sectional design Study did not explore patient outcomes
Gittell (2002) Nine hospital study N=338 care providers (51% Response Rate) N=878 patients (64% Response Rate) N=45 hospital administrators Cross-sectional Design	Care provider survey was used to measure relational coordination Cronbach's Alpha =.80 15 item patient questionnaire used to measure patient perceived quality Cronbach's Alpha= .84 Telephone interviews of hospital administrators used to identify coordination mechanisms in use in the hospital Efficiency (LOS) measured by review of hospital records	Coordinating mechanisms are associated with increased levels of relational coordination; boundary spanners (p<.01) and team meetings (p<.01) are associated with higher levels of relational coordination. Contrarily, routines (p<.01) are also associated with higher levels of relational coordination. Relational coordination mediated both performance measures of (1) patient perceived quality and length of stay Random effects linear regression	Sample size of a nine hospital study may have limited the amount of group level variables Cross-section design cannot determine causality Perceived quality of care

Source, Sample and Design	Method and Instrument	Results	Limitations and Comments
Gittell (2001) Nine major airlines N=354 88% response rate N=5 cross functional work teams Hypothesis tested with Quantitative data and interpreted with Qualitative data	Relational Coordination Survey was used to test relationships between 5 cross functional work groups of airline industry Cronbach's Alpha .84 Quality performance measured by customer complaints, baggage handling, and late flight arrivals Efficiency performance measured by gate time per departure and staff time per passenger Cronbach's Alpha .81	Supervisors with smaller spans was associated with higher levels of relational coordination among group members ($p<.05$) while broad spans of control was associated with lower levels of relational coordination among group members ($p<.05$) Random effects linear regression	Relational coordination tested with 5 of the 12 identified cross functional work groups due to accessibility 12 functions gate agents ticketing agents ramp agents baggage handlers cabin cleaners caterers fuelers freight agents operations agents pilots flight attendants mechanics

Source, Sample and Design	Method and Instrument	Results	Limitations and Comments
Gittell (2000) Nine major airlines N=354 airline employees (Response rate 89%) Theoretical Sampling Pairwise correlation	Relational Coordination Survey was used to measure communication and relationship attributes of airline staff. Field Observations were conducted to observe airline employees at work	Results supported hypotheses 1a. Cross-functional liaisons are significantly associated with stronger relational coordination ($p<.10$, $r=.632$) 1b. The use of IT for coordination is significantly associated with less timely and less problem solving communication ($p<.05$, $r=-.692$) 2a. Cross-functional performance measurement significantly predicts more frequent and more problem solving communication ($p<.05$, $r=.735$) 2b. Smaller spans of control are significantly associated with more frequent communication ($p=.10$, r=.-.576) 3a. Selection for teamwork significantly predicts more frequent and more problem solving communication ($p<.05$, $r=.719$) 3b. Cross-functional conflict resolution is associated with more frequent and more problem solving communication ($p<.01$, $r=.811$) 4a Work role flexibility is significantly associated with more frequent communication ($p<.10$, $r=.629$) 4b. As anticipated, the extent of unionization is not associated with relational coordination ($p=.39$, $r=.328$)	Sampling error due to low sample size- Nine airport sites Questionable significance reporting with varying p values in results ranging from <.01-.10

Source, Sample and Design	Method and Instrument	Results	Limitations and Comments
Gittell et al. (2000) Nine hospital study Boston, New York, and Dallas between July and Dec 1997 N= 338 care providers (response rate 51%) N=878 patients (response rate 64%) Cross-sectional design	Relational Coordination Survey used to measure relational coordination Reliability and Validity Cronbach's Alpha .84 154-item postoperative questionnaire used to measure quality of care Instrument report by researcher as previously validated WOMAC osteoarthritis instrument was used to measure postoperative pain Instrument report by researcher as previously validated Hospital records were used to measure individual patient's length of stay	Relational coordination varied between sites (3.86-4.22, p<.001) Quality of care was improved by Relational Coordination (p<.001) For every 1% increase in RC, there was 1 point increase in quality Postoperative Pain was reduced by Relational Coordination (p=.041) Postoperative functioning was improved by dimensions of relational coordination (communication; p=.044, shared goals; p=.035, mutual respect; p=.030). Length of stay was significantly shortened (53.77%, p<.001) by each dimension of relational coordination (p<.001). For every 1 point increase in RC, there was a 53% reduction in LOs Random effects linear regression	Perceived relational coordination Nine hospitals in study; may not generalize to smaller volume hospitals Recall bias of patients reporting of preoperative pain and functioning Convenience Sample Generalizability-applicability may be limited beyond larger volume hospitals such as which study was conducted
Havens et al. (2010) N=747 direct care RNs (response rate= 64%) Non-experimental design used to explore five provider functions in six types of inpatient care units Pennsylvania Cross sectional correlational	Relational Coordination Survey was utilized to examine nurse reports of relational coordination between nurses and other healthcare providers and its impact of quality of patient care Cronbach's Alpha .93 Five-item questionnaire was used to measure nurse reports of quality Validity reported by researcher; nurse reports of quality consistent with objective quality data	Relational coordination was significantly related to overall quality; As relational coordination increased, nurses reported decreases in adverse patient outcomes/events Nurses reported highest overall relational coordination with nurses on their same unit (M=4.19 SD .55), followed by support staff (M=3.76 SD .76), then physicians (M=3.74 SD .72), and lastly therapists (M=2.98 SD .95).	Limitation- self report of perception of quality Perception of relational coordination Generalizability since this study was the first to assess relational coordination in this rural hospital setting RC was measured from the nurse perspective only Five provider functions Nurses on same unit Nurse on different unit Physician Therapist Support staff on same unit

Source, Sample and Design	Method and Instrument	Results	Limitations and Comments
Weinberg et al. (2009) N=20 medical and surgical residents Qualitative study design New York, California, Ohio, Michigan, Massachusetts	Relational Coordination Survey used to determine the quality of the nurse-physician relationship Instrument previously validated Snowball sampling technique and interviews with open ended questions Secondary data from a previous larger qualitative study was examined specifically for the areas addressing the RN and physician relationship	Residents reported issues with nurse cooperativeness and competence but did not feel it impacted quality of patient care	Self report Self selection bias

APPENDIX C: DEMOGRAPHIC DATA

Table 19 *Demographic Variables*

Variable	Selection	Type[a]
Worked on present unit at least 3 months	Yes/No	Demographic, Categorical
RN Experience in years	Time selected in years	Demographic, Continuous
Length of Time on Present Unit	Time selected in years	Demographic, Continuous
Length of Time at Current Hospital	Time selected in years	Demographic, Continuous
Gender	Male/Female	Demographic, Categorical
Age in years	21-25, 26-30, 31-35, 36-40, 41-45, 46-50, >50	Demographic, Categorical
Full-Time/Part-Time Status	Yes/No	Demographic, Categorical
Race	White, Black, Hispanic/Latino, Asian, Indian, Other	Demographic, Categorical
Ethnicity	Hispanic, Non Hispanic	Demographic, Categorical
Highest Level of Education Completed in Nursing	Diploma, ADN, BSN, MSN, DNP PhD	Demographic, Categorical
Currently in School for Higher Degree	Yes/No [BSN, MSN, DNP, PhD)	Demographic, Categorical
Specialty Nursing Certification	Yes/No [RN,C; PCCN, CCRN OCN, Other Certification]	Demographic, Categorical
Primary work shift	Days, Nights	Demographic, Categorical

APPENDIX D: INVITATION LETTER

Dear Registered Nurse,

Please accept this invitation to participate in a nursing research study designed to explore how healthcare teams communicate and relate to each other while caring for patients. This study will offer valuable information that will help in providing our patients with the best care possible by better understanding how our work teams function and what possible impact this coordinated work effort has on quality and patient-care outcomes. Thanks in advance for your consideration in participating in this study.

Your participation is voluntary and whether you choose to participate in the survey will not affect your employment. Your completion of this survey confers your consent to participate in this research study. You have the right to withdraw from the study at any time prior to your completing and returning the survey. All of your answers are strictly confidential and will be used to evaluate our current healthcare work teams communication and relationship characteristics toward you as a registered professional nurse. Data will be reviewed at the nursing unit level. This survey should take 20 minutes to complete. Thank you for your participation!

Sincerely,

Fanya DeJesus, MBA, MSN, RN, NEA-BC
Principal Investigator
PhD Nursing Student- University of Central Florida
Email- fanya.dejesus@knights.ucf.edu

APPENDIX E: REMINDER EMAIL

Dear Registered Nurse,

This is a friendly reminder of the invitation recently sent inviting you to participate in a brief survey about our healthcare work teams and how they communicate and relate to each other while caring for patients. This study will offer valuable information that will help in providing our patients with the best care possible by better understanding how our work teams function and what possible impact this coordinated work effort has on quality and patient-care outcomes. If you have taken advantage of this opportunity by providing your valuable input, please accept my gratitude of thanks. If you have not yet had the opportunity to participate, I would love to receive your input and include it as part of this nursing research study. This survey should take 20 minutes to complete. Thank you for your participation!

Sincerely,

Fanya DeJesus, MBA, MSN, RN, NEA-BC
Principal Investigator
PhD Nursing Student- University of Central Florida
Email- fanya.dejesus@knights.ucf.edu

APPENDIX F: PERMISSION LETTERS

RELATIONAL COORDINATION ANALYTICS
MEASURE · CONNECT · TRANSFORM
Transforming Relationships for High Performance

Revised February 26, 2015

Relational Coordination RN Survey

Fanya DeJesus, will be undertaking research to assess the strength of relational coordination among care teams from the perspective of nurses. Relational Coordination Analytics (RCA), located at One Broadway, 14th Floor, Cambridge, MA 02142 will provide measurement for one wave of data collection.

This agreement, made effective this 1st day of March by and between Fanya DeJesus and RCA in consideration of the mutual promises hereinafter contained, the parties agree to perform in accordance with the following conditions:

- Fanya DeJesus will have permission to use the relational coordination survey questions for the purpose of dissertation research only, subject to the conditions outlined below, pending IRB approval

Performance Period

The performance period of this agreement will extend from the effective date of March 1, 2015 – June 30, 2015, unless amended by mutual agreement.

Data Release, Ownership and Use

All data provided by Participating Health System and collected via the RC Survey 2.0 tool shall be the exclusive property of Participating Health System. Fanya DeJesus on behalf of Participating Health System shall have the right to use all data collected and developed by RCA for patient medical care, research, education, and other internal purposes during the term of this Agreement and after termination.

APPROVED AND AGREED:

Fanya DeJesus

By: _____

March 10, 2015

Date

Relational Coordination Analytics

By:
Saleema Moore
Chief Operating Officer
Relational Coordination Analytics

March 1, 2015

Date

APPENDIX G: RESEARCH INSTRUMENT

RCS: Relational Coordination among Registered Nurses

Frequent Communication

How **frequently** do the care providers in each of these groups communicate with you about **the patients you care for during your shift**?

When answering this question, be sure to consider all forms of communication, including in-person meetings, phone calls, e-mails, etc.

	Not Nearly Enough	Not Enough	Just the Right Amount	Too Often	Much Too Often
RNs working on My Unit	○	○	○	○	○
RN working on a Different Unit	○	○	○	○	○
Nurse Assistants (ACP)	○	○	○	○	○
Social Workers and/or Nurse Navigators	○	○	○	○	○
Physical Therapists	○	○	○	○	○
Pharmacists	○	○	○	○	○
Physicians	○	○	○	○	○

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RCS: Relational Coordination among Registered Nurses

Timely Communication

Do they communicate with you in a **timely** way about **the patients you care for during your shift**?

When answering this question, be sure to consider all forms of communication, including in-person meetings, phone calls, e-mails, etc.

	Never	Rarely	Sometimes	Often	Always
RNs working on My Unit	○	○	○	○	○
RN working on a Different Unit	○	○	○	○	○
Nurse Assistants (ACP)	○	○	○	○	○
Social Workers and/or Nurse Navigators	○	○	○	○	○
Physical Therapists	○	○	○	○	○
Pharmacists	○	○	○	○	○
Physicians	○	○	○	○	○

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RCS: Relational Coordination among Registered Nurses

Accurate Communication

Do they communicate with you **accurately** about **the patients you care for during your shift**?

When answering this question, be sure to consider all forms of communication, including in-person meetings, phone calls, e-mails, etc.

	Never	Rarely	Sometimes	Often	Always
RNs working on My Unit	○	○	○	○	○
RN working on a Different Unit	○	○	○	○	○
Nurse Assistants (ACP)	○	○	○	○	○
Social Workers and/or Nurse Navigators	○	○	○	○	○
Physical Therapists	○	○	○	○	○
Pharmacists	○	○	○	○	○
Physicians	○	○	○	○	○

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RCS: Relational Coordination among Registered Nurses

Problem Solving Communication

When there is a problem with **the patients you care for during your shift**, do the care providers in each of these groups blame others or work with you to **solve** the problem?

	Always blame	Mostly blame	Neither blame nor solve	Mostly solve	Always solve
RNs working on My Unit	○	○	○	○	○
RN working on a Different Unit	○	○	○	○	○
Nurse Assistants (ACP)	○	○	○	○	○
Social Workers and/or Nurse Navigators	○	○	○	○	○
Physical Therapists	○	○	○	○	○
Pharmacists	○	○	○	○	○
Physicians	○	○	○	○	○

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RCS: Relational Coordination among Registered Nurses

Shared Goals

Do the care providers in each of these groups **share your goals** for **the patients you care for during your shift**?

	Not at all	A little	Somewhat	A lot	Completely
RNs working on My Unit	○	○	○	○	○
RN working on a Different Unit	○	○	○	○	○
Nurse Assistants (ACP)	○	○	○	○	○
Social Workers and/or Nurse Navigators	○	○	○	○	○
Physical Therapists	○	○	○	○	○
Pharmacists	○	○	○	○	○
Physicians	○	○	○	○	○

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RCS: Relational Coordination among Registered Nurses

Shared Knowledge

Do the care providers in each of these groups **know** about the work you do with **the patients you care for during your shift**?

	Nothing	A little	Some	A lot	Everything
RNs working on My Unit	○	○	○	○	○
RN working on a Different Unit	○	○	○	○	○
Nurse Assistants (ACP)	○	○	○	○	○
Social Workers and/or Nurse Navigators	○	○	○	○	○
Physical Therapists	○	○	○	○	○
Pharmacists	○	○	○	○	○
Physicians	○	○	○	○	○

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RCS: Relational Coordination among Registered Nurses

Mutual Respect

Do the care providers in each of these groups **respect** the work you do with **the patients you care for during your shift**?

	Not at all	A little	Somewhat	A lot	Completely
RNs working on My Unit	○	○	○	○	○
RN working on a Different Unit	○	○	○	○	○
Nurse Assistants (ACP)	○	○	○	○	○
Social Workers and/or Nurse Navigators	○	○	○	○	○
Physical Therapists	○	○	○	○	○
Pharmacists	○	○	○	○	○
Physicians	○	○	○	○	○

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RCS: Relational Coordination among Registered Nurses

Have you worked on the unit that you are presently on for at least 3 months?

- Yes
- No

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RCS: Relational Coordination among Registered Nurses

How long have you worked as an RN?

- less than 1 year
- 1 year
- 2 years
- 3 years
- 4 years
- 5 years
- 6 years
- 7 years
- 8 years
- 9 years
- 10 years
- 11 - 15 years
- 16 - 20 years
- More than 20 years

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RCS: Relational Coordination among Registered Nurses

How long have you worked on your current unit?

- less than 1 year
- 1 year
- 2 years
- 3 years
- 4 years
- 5 years
- 6 years
- 7 years
- 8 years
- 9 years
- 10 years
- 11 - 15 years
- 16 - 20 years
- More than 20 years

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RCS: Relational Coordination among Registered Nurses

How long have you worked at this hospital?

- less than 1 year
- 1 year
- 2 years
- 3 years
- 4 years
- 5 years
- 6 years
- 7 years
- 8 years
- 9 years
- 10 years
- 11 - 15 years
- 16 - 20 years
- More than 20 years

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RCS: Relational Coordination among Registered Nurses

Select the gender you identify with.

- Male
- Female

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RCS: Relational Coordination among Registered Nurses

What is your age?

- Younger than 21 years old
- 21-25 years old
- 26-30 years old
- 31-35 years old
- 36-40 years old
- 41-45 years old
- 46-50 years old
- Older than 50 years old

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RCS: Relational Coordination among Registered Nurses

Which of the following best describes your employment status?

- Full-time
- Part-time
- PRN/Per Diem

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RCS: Relational Coordination among Registered Nurses

Which of the following best describes the primary shift that you work?

- Day-shift (e.g. 7am-7pm)
- Night-shift (e.g 7pm-7am)

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RCS: Relational Coordination among Registered Nurses

Which of the following best describes the Race you identify as.

- White
- Black or African-American
- Hispanic or Latino
- Asian
- Native American or American Indian
- Native Hawaiian or other Pacific Islander
- Other

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RCS: Relational Coordination among Registered Nurses

Which of the following best describes the Ethnicity you identify as?

- Hispanic
- Non-Hispanic

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RCS: Relational Coordination among Registered Nurses

Select the highest level of nursing education you have completed.

- Diploma
- ADN
- BSN
- MSN
- DNP
- PhD

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RCS: Relational Coordination among Registered Nurses

Are you currently in school pursuing a higher level of nursing education?

- Yes, I am pursuing a BSN
- Yes, I am pursuing an MSN
- Yes, I am pursuing a DNP
- Yes, I am pursuing a PhD
- No, I am not presently enrolled in school pursuing a higher level of nursing education.

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RCS: Relational Coordination among Registered Nurses

Do you have a national certification?

- Yes, I am an RNC
- Yes, I am a CCRN
- Yes, I am a PCCN
- Yes, I am a OCN
- Yes, I have a different certification from those listed.
- No, I do not have a national certification.

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RCS: Relational Coordination among Registered Nurses

Do you primarily practice in a staff nurse role at the bedside?

- Yes
- No

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RCS: Relational Coordination among Registered Nurses

Thank you for completing the survey. Your answers have been recorded and you can be assured that your submission will be held strictly confidential.

If you are finished with the survey, you can close your browser window.

Finished

APPENDIX H: INSTITUTIONAL REVIEW

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Fanya DeJesus**

Date: **March 26, 2015**

Dear Researcher:

On 03/26/2015, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review:	Exempt Determination
Project Title:	The Impact of Relational Coordination and the Practice Environment on Patient Outcomes
Investigator:	Fanya DeJesus
IRB Number:	SBE-15-11109
Funding Agency:	
Grant Title:	
Research ID:	N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Patria Davis on 03/26/2015 08:22:51 AM EDT

IRB Coordinator

Sponsoring Organization IRB determination letter

Available upon request.

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