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09/09/2010

Factors Impacting Staff Nurse Care Coordination

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Factors Impacting Staff Nurse Care Coordination

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An abstract

submitted to the Faculty of the James T. Laney School of Graduate Studies of Emory University
in partial fulfillment of the requirements for the degree of Doctor of Philosophy
in Nursing

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Abstract

Factors Impacting Staff Nurse Care Coordination

By Ingrid Hopkins Duva

Purpose:
This study examines relationships among the nurse practice environment, patient and hospital characteristics, and staff nurse care coordination activities in the hospital. Care coordination is a key nursing process.

Background/ Significance:
Previous research links hospitals with professional nurse practice environments to better patient outcomes, such as lower mortality and higher satisfaction. Little is known about how these work environments impact central nursing processes. Understanding the context for achieving better outcomes through nursing processes such as staff nurse care coordination is critical, particularly as the number of chronically ill patients in the hospital, who are known to benefit from care coordination, continues to rise.

Methods:
This descriptive correlation study utilized a cross-sectional survey design. The sample consisted of 337 Registered Nurses on 32 medical surgical units in four metro area hospitals. Lake's 2002 Practice Environment Scale of the Nursing Work Index (PES-NWI) measured professional practice in the work environment. Lamb et al.'s 2008 Nursing Care Coordination Inventory (NCCI) measured staff nurse care coordination, and Gittell's 2000 Relational Coordination Inventory (RCI), served as an alternate coordination measure. Analyses included aggregation of data to the unit level, correlations, regression and multilevel modeling to partition variance components.

Findings:
Significant correlations were found between the PES-NWI and the time spent on general care coordination activities ($r = -.41$, $p \leq .05$), as well as to the frequency of completing work assigned to other nursing staff ($r = -.51$, $p \leq .01$). Time spent on staff nurse care coordination activities was positively related to the RCI ($r = +.48$, $p \leq .05$). Also, a relationship between time spent on staff nurse care coordination activities and the percent of patients with ambulatory sensitive chronic conditions was noted ($r = -.89$, $p \leq .01$).

Discussion:
Study results begin to establish support for the mediating role of nursing process between the practice environment and outcomes. Findings suggest that improvements to the practice environment facilitating the work of nurses can lead to better patient outcomes. This study also supports further study of nursing process, improved process measures and the use of multi-level methods to better understand the work of hospital nurses.

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This work is dedicated to my family: Brian, Andrew, Elena Cate, and Torie

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CHAPTER I

Introduction and Specific Aims

Significance of the Problem

Due to the increasing prevalence of chronic illnesses and the aging of our society, patients cared for in our acute care hospitals are likely to have at least one chronic illness (Anderson, 2007; Boltz, et al., 2008). Many patients will have multiple co-morbidities; therefore they will be more complex to care for, require numerous medications, and be at an increased risk for adverse events and poor outcomes (Institute for Healthcare Improvement, 2004; Naylor, 2003). According to the World Health Organization, adequate care for chronically ill patients differs from the usual care provided in our health care system that has been driven by acute care needs (WHO, 2002). These patients need more attention to self care management and continuity of care. When they transition to home, patients with chronic illness, often elderly, with limited function or impaired cognitive abilities, and limited support systems, are expected to manage their own care safely and effectively. Additionally, numerous providers may be involved in their hospital care. Care coordination, when done well, decreases length of stay and reduces unnecessary readmissions, medication errors, and functional decline post discharge for these patients (Naylor, Stephens, Bowles, & Bixby, 2005).

The risk of an adverse event, including but not limited to inadequate treatment, medication errors, and functional decline, is greater for hospitalized patients with chronic illness (Hong, Melnyk, & McCann, 2004; Improving Chronic Illness Care, 2007). These patients also suffer more adverse events immediately post discharge – such as medication errors, falls and readmission to the hospital (Hong, et al., 2004; Improving Chronic Illness Care, 2007; Naylor,

2004). Care coordination is recommended to address these concerns for hospitalized chronically ill patients (Institute for Healthcare Improvement, 2004; Institute of Medicine, 2001; MedPac, 2007). Care coordination decreases adverse events, increases the efficiency and quality of care and improves patient satisfaction (McDonald, et al., 2007; Stricker, et al., 2009).

In "Keeping Patients Safe", a 2004 report by the Institute of Medicine (IOM), the critical role of staff nurses in care coordination that promotes patient safety and quality outcomes is highlighted. Recent qualitative studies of nurses in the hospital illuminate the considerable amount of time staff nurses spend coordinating their patients' care, via a broad range of activities, throughout the hospital stay and discharge (Hendrich, Chow, Skierczynski, & Lu, 2008; Lamb, Schmitt, Sainfort, Edwards, & Duva, 2007). The role of the staff nurses, although minimally studied, is emerging consistently as one of "initiating actions" to bring about needed care coordination for patients. The care coordination role is likely even more essential when caring for patients with multiple co-morbidities (Improving Chronic Illness Care, 2007; Institute of Medicine, 2004).

Little is known about what enables staff nurses to perform care coordination well during a patient's hospital stay. Previous research suggests a work environment that supports the professional practice of nursing in hospitals is better for nurses and the patients (Kramer & Schmalenberg, 2008b). Hospitals with professional nurse practice environments have been found to have better staff and patient outcomes. For nurses, professional practice environments are associated with higher nurse recruitment, retention and satisfaction (Aiken, Clarke, & Sloane, 2008). For patients, professional practice environments are linked to lower Medicare mortality (Aiken, Smith, & Lake, 1994), lower mortality and higher satisfaction of AIDS patients (Aiken, Sloan, Lake, Sochalski, & Weber, 1999), and lower morbidity and mortality for hospitalized

cancer patients undergoing surgery (Friese, 2008). Researchers studying the relationship between nurse practice environments and outcomes have hypothesized that professional practice environments enable nurses to better carry out core nursing processes, which in turn, improves overall patient care quality and safety outcomes (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Aiken, et al., 1999; Kramer & Schmalenberg, 2005; Laschinger, Almost, & Tuer-Hodes, 2003). Care coordination, as noted previously, is arguably one of the core nursing processes, and is critical to quality patient care quality and safety outcomes.

Specific Aims

There has been minimal study of care coordination within the hospital, so the relationship between this critical nursing process and the nurses' practice environment including the type of patients hospitalized for an acute care episode (such as those with chronic illness) is undetermined. To date, the relationship between professional nurse practice environments and the specific nursing care coordination process has not been examined. The care coordination studies found in current literature are focused more on the outcomes of care coordination roles and practices than on understanding the process itself (Beringer, Fletcher, & Taket, 2006) . Furthermore, current study of nurse care coordination typically emphasizes the risk of chronically ill patients only at the transition points, e.g. at point of transfer from hospital to home, rather than the complete process of care coordination during the hospital stay (Naylor, 2003; Weiss, et al., 2007). This study will contribute to the gap in our knowledge through the following specific aim and research questions.

The specific aim of this study is to: Examine the relationship between characteristics comprising the nurse practice environment and the process of staff nurse care coordination on medical-surgical units in the hospital.

Q1.A: What is the relationship between the perceived professional practice environment (Lake's PES-NWI) and nurse care coordination (Lamb & Gittell Instruments) reported by staff nurses on acute care medical-surgical units?

Q1.B: What is the relationship between the percent of patients with ambulatory sensitive chronic illness on the nurses' practice environment and on the process of staff nurse care coordination on acute care medical surgical units?

Q1.C: What is the relationship between hospital characteristics identified as size, teaching status, and ownership, on the perceived professional practice environment reported by staff nurses on acute care medical-surgical units?

Purpose

This study examines the relationship between the nurse practice environment and the performance of a core nursing process. This knowledge may lead to identification of modifiable factors that can be altered to improve care and outcomes for chronically ill patients hospitalized for acute care episodes. The long term goal of this program of research is to gain a better understanding and therefore develop interventions to improve the process of staff nurse care coordination for hospitalized patients, particularly those with chronic illness. This is important work because this population of patients is at an increased risk for poor outcomes including

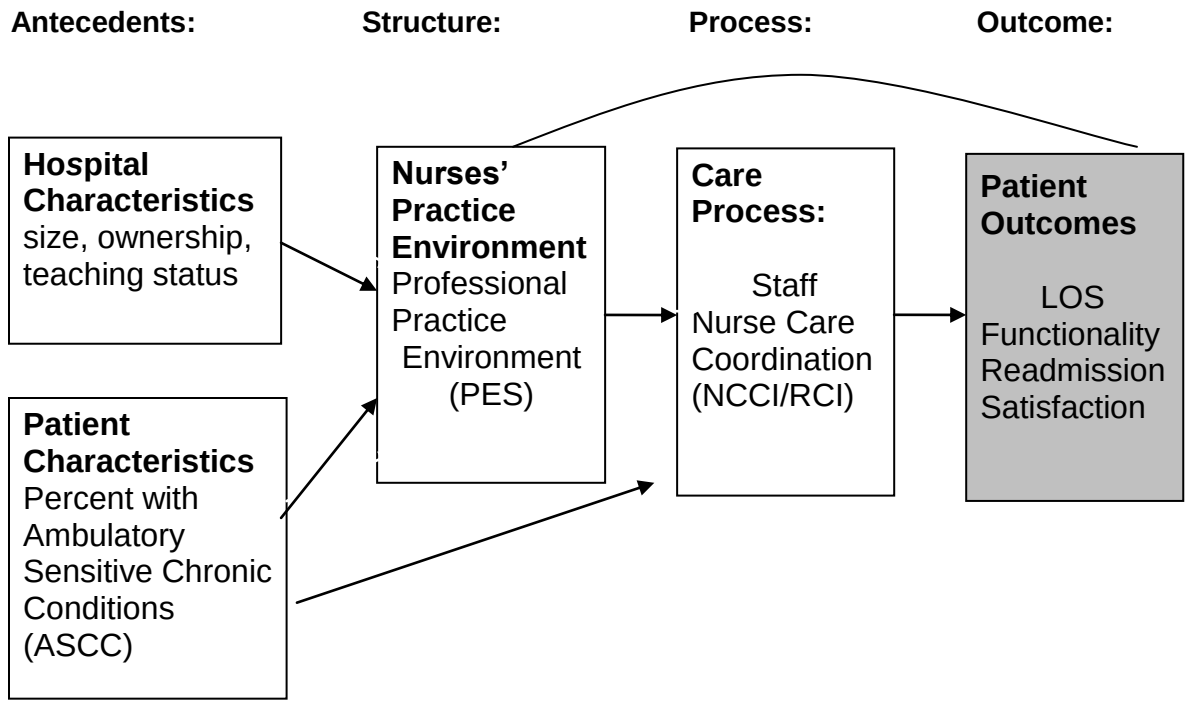
preventable readmission, medication errors, and functional decline. These poorer outcomes not only decrease patients' quality of life but result in unnecessary costs to the healthcare system.

Conceptual Framework

The conceptual model guiding this study is the Structure, Process, Outcome (SPO), or Quality of Care Model (Figure 1). SPO proposes a causal relationship between structure and process variables on subsequent outcomes. Donabedian indicates that structure and process have a linear relationship and together result in outcomes. For desired outcomes to be achieved the right structure precedes the right process (Donabedian, 1966). This model was originally proposed as a framework for evaluating the quality of medical care and suggesting needed research (Donabedian, 2005). Widely used to guide quality improvement and health outcomes research, SPO has become a common foundation for research investigating the relationship between nursing care and patient outcomes (Aiken, Clarke, Sloane, et al., 2002; Kramer & Schmalenberg, 2005; Oropesa R.S., Landale N.S., & TS, 2002; Weech-Maldonado, Maret-Hanke, Neff, & Mor, 2004). Patient outcomes will not be measured in this research. The focus of this study is on the relationship between the nurses' work environment; the patient, hospital and unit characteristics comprising that work environment and the process of staff nurse care coordination.

Figure 1:

Factors Impacting Staff Nurse Care Coordination for Hospitalized Patients



Antecedents. In this model, hospital and patient characteristics are included as antecedents preceding the structure, process and outcome stages. Hospital characteristics are organizational level variables predicted to directly influence the structural variable at the unit level, the professional practice environment. The second antecedent in the model, patient characteristics, is hypothesized to have a direct relationship with the professional practice environment and staff nurse care coordination.

***Hospital characteristics*.** Three organizational characteristics, hospital ownership, size, and teaching status are hypothesized to have a direct relationship with the professional practice environment. In a review of studies 95 studies, Hearld et al. (2008) concluded that hospital level variables influence patient care unit characteristics as well as the organization of work (Hearld,

Alexander, Fraser, & Jiang, 2008). They found that at the hospital level, 53% of the studies examining structural characteristics, including size, ownership and teaching status, found a positive effect of structure on processes of care associated with quality at the hospital or unit level. Most of the studies reviewed found a positive relationship between size and quality care and teaching status and quality care as either a process or outcome variable. However, of the studies that included hospital ownership all but one found either no association or a negative relationship to quality care. At the team level the results were more robust, as 9 of 9 studies found a positive relationship between structural variables and process. At the patient care unit level, magnet status is associated with quality care and this was also noted in the review (Hearld, et al., 2008). For this study, the hospital size, not for profit ownership and teaching status were examined because Magnet hospitals, which demonstrate a high level professional nurse practice environment and better patient outcomes, are noted to be disproportionately not-for-profit, large, teaching institutions (Lake & Friese, 2006a).

At a for-profit hospital there is a public accountability to stockholders, and so it is perceived that there may be a greater emphasis on financial results. Hospital ownership may, therefore, impact the availability of unit resources and the care provided on patient care units. A 1994 study specifically examining hospital ownership and mortality outcomes found a positive relationship with for-profit status (Kuhn, Hartz, Krakauer, Bailey, & Rimm, 1994). More recently, a study of nursing homes that underwent an ownership conversion found a positive relationship between conversion to non-profit status and better performance related to quality of care indicators although it was not statistically significant (Grabowski & Stevenson, 2008). Lake and Friese (2006), however, studied variations in hospital practice environments using a 1999

sample of Pennsylvania hospitals and found no relationship between ownership and a professional practice environment (Lake & Friese, 2006a).

In this same study, Lake and Friese (2006) did find a significant relationship between "moderate" teaching hospitals, defined as a teaching hospital with less than one resident for every five to nine staffed beds, and an unfavorable professional practice environment for nurses. However, no relationship was found between the size of the hospital or the other levels of teaching status (minor and major) of the hospital to the professional practice environment (Lake & Friese, 2006a). In contrast, other study findings support a positive relationship between the size and teaching status of hospitals and the professional practice characteristics at the unit level. Hospital size and teaching status are two hospital level characteristics frequently included in studies of the nurse practice environment. In 2002, Shamian and colleagues noted there were stronger characteristics of a professional practice environment in teaching hospitals than in non-teaching hospitals (Shamian, Kerr, Laschinger, & Thomson, 2002). Cummings et. al. (2007), found that hospital size indirectly influenced nursing research utilization at the unit level through professional practice environment characteristics such as staff development, staffing and support for nursing (Cummings, Estabrooks, Midodzki, Wallin, & Hayduk, 2007). In a recent study by Blegen et.al (2008), examining 279 patient care units nationwide, high RN staffing, which is a characteristic of a professional practice environment, was positively related to several hospital characteristics including hospital size and teaching status (Blegen, Vaughn, & Vojir, 2008). Bacon and Mark (2009) looked at the influence of hospital characteristics on the unit structure and on patient satisfaction. Both the hospital and the unit level characteristics were determined to influence patient satisfaction with care, further supporting the relationship between organizational and unit level work environment characteristics (Bacon & Mark, 2009). Seago

(2008) also determined a positive relationship between unit level professional practice predictor variables and patient satisfaction. Teaching status and size were both controlled for in this study as they were considered to be potential confounders on the relationship.

In summary, research findings on the relationship between organization level characteristics and the professional practice work environment at the unit level are mixed. Ownership, often hypothesized to have a relationship with a professional practice environment, has not been consistently found to demonstrate this relationship. Size has consistently demonstrated a positive relationship and teaching status has demonstrated both a positive and negative relationship with the professional practice environment.

Patient Characteristics. The second antecedent concept in this model is the percent of patients discharged from medical-surgical units with at least one ambulatory sensitive chronic illness condition. This antecedent is hypothesized to have a direct relationship with the professional practice environment and with staff nurse care coordination. An ambulatory sensitive chronic condition (ASCC) is a chronic condition that if managed well in the community should not require a hospital admission. These conditions, when resulting in a hospital admission indicate poor access to primary care or low quality of care in the ambulatory setting, and suggest a greater need for care coordination for these patients while in the hospital (Howard, Hakeem, Njue, Carey, & Jallah, 2007; Laditka, Laditka, & Mastanduno, 2003).

The ASCCs included in this study are five of the most common chronic conditions and include chronic obstructive pulmonary disease, hypertension, congestive heart failure, diabetes and asthma. These five ASCCs are intended to capture the percent of patients with common chronic conditions on each unit in contrast to the units' primary patient type reflected in a primary service label, such as telemetry or cardiology. Patient care units are designed to take

care of their primary service type patient, identified typically by the patient's primary diagnosis, which is a stable characteristic that is not expected to change. The percent of patients with ambulatory sensitive chronic conditions comprising the patient mix vary and are hypothesized as antecedent to structure. These patient characteristics are not necessarily accounted for as part of the patient population, yet necessarily influence the nurses' practice environment, organization of work and care processes due to care needs related to the chronic illness (Wolf & Starfield, 2002).

The percentage of patients on a nursing unit with chronic illness has long been used as a risk adjustor for its' influence on the nurses' care processes. Early studies of hospital practice environments found that hospital based HIV/AIDS units, notably having a specific concentration of a chronically ill population, demonstrated better patient outcomes than patients with HIV/AIDs cared for on general care medical-surgical units (Aiken, et al., 1999). These units were also found to have higher levels of professional practice, such as more reported autonomy and control over practice. Friese (2008), a colleague of Aiken, recognized the influence of chronic illness on the nurse practice environment and used measures of co-morbid illnesses to risk adjust analysis of the relationship between the level of the professional practice environment and patient outcomes for a surgical oncology population (Friese, 2008). Friese's study found that patients cared for in hospitals with professional practice environments had lower and mortality rates. Another recent study of nursing in rural and community hospitals uncovered that younger nurses choose to work in urban settings in part due to a perceived higher level of professional practice in the work environment. In the urban settings nurses have the opportunity to work with a concentrated population of patients and therefore can become specialized (Montour, Baumann, Blythe, & M., 2009). Becoming specialized in caring for a high number of

patient with similar needs, such as those with a chronic illness, encourages the nurses' sense of professionalism. Again, this specialized practice has been linked to higher levels of professional practice in the nurses' work environment.

The mix of Ambulatory sensitive chronic condition patients (ASCC) on the unit is also hypothesized to have a direct relationship with care coordination. Chronically ill patients are associated with more complexity in their plan of care due to their co-morbidities, typically requiring greater involvement from the interdisciplinary team, additional care dynamics, and a less predictable plan of care. Organizational theorists support that a high level of uncertainty in work adds to the complexity of the work (Gittell, 2000a, 2000b, 2002; Mintzberg, 1979; Mitchell & Shortell, 1997). Patients with co-existing chronic illness are therefore believed to require greater care coordination causing an increase in the staff nurse care coordination activities. The conceptual model guiding this study thus reflects that patients with co-existing chronic illness considered ambulatory sensitive directly influences the activities of staff nurse care coordination. On the whole, patients with chronic illness typically have care regimens that are more extensive and complicated (Wolf & Starfield, 2002). The hypothesized relationships between ASCC, professional practice environments and staff nurse care coordination are based on research results indicating there is a greater need for care coordination for these patients while in the hospital (Anderson, 2007; Hossain & Laditka, 2009; Saha, Solotaroff, Oster, & Bindman, 2007; Wolf & Starfield, 2002).

Structure. According to Donabedian (1980, p.81), structure refers to the "physical and organizational properties that are stable characteristics of institutional settings and the characteristics of personnel that influence the way healthcare is delivered". For this proposed study, structure is defined in the context of the patient care unit in which nursing care

coordination occurs. Patient population characteristics such as those that define the service provided or type of unit (i.e. medical surgical versus intensive care or rehabilitation) have relevance to the context in which work, or care coordination, is occurring. Structure of the unit also encompasses material and other resources, e.g. technology and organization of the work environment including staff meetings, and interdisciplinary team meetings present on the unit.

The structural concept in the model is the nurse practice environment on the unit, specifically the level of professional practice on the unit. The professional practice environment is characterized by qualities such as high levels of registered nurses in the staffing mix, nursing autonomy, control over practice and collaborative nurse-physician relationships (all of which support the professional practice of nursing). Consistent with the Donabedian conceptualization of structure, the level of the professional nurse practice environment is a fairly stable characteristic of a patient care unit, where the work of nursing occurs (Donabedian, 1980). It is not expected to change rapidly or on an ongoing basis.

The professional practice environment. Salient characteristics of a professional practice environment were established through the study of "Magnet Hospitals" (Kramer & Schmalenberg, 2008a). These original Magnet Hospitals were identified as such because they were able to recruit and retain nurses during a time of severe nursing shortage (McClure, Poulin, Sovie, & Wandelt, 1983). Subsequently, these hospitals were also found to have higher nurse job satisfaction and better patient outcomes in key quality and safety areas such as morbidity, mortality and patient satisfaction (Aiken, et al., 1999; Aiken, et al., 1994; Friese, 2005). These outcomes are attributed to the common practice environment characteristics that were found at these hospitals: nursing leadership at the highest level of the organization, nursing self–governance structures, decentralized, participatory management, and support for professional

autonomy (Lake, 2002; Upenieks, 2003). Conceptually, these characteristics are linked to professional practice behaviors reflecting higher quality nursing care and therefore contribute to the better patient outcomes (Aiken & Patrician, 2000; Laschinger, et al., 2003; Laschinger, Sabiston, & Kutszcher, 1997).

A professional nurse practice environment is comprised of the characteristics identified in the Magnet Model for Nursing Excellence. This model can apply to nursing in any setting; however the characteristics were originally identified in the acute care setting, and continue to be recognized primarily in the acute care setting. A professional practice work environment must be present in order for a hospital to be recognized for nursing service excellence and receive a "Magnet" designation by the American Nurses Credentialing Center.

Professional nursing practice embodies the values of nursing and is perceived by nurses to support higher quality nursing care. Professional practice is in accordance with regulatory standards and reflects principles identified by relevant professional nursing organizations (Lake, 2002; Pearson, et al., 2006). Nurses practicing in professional practice environments have access to and can mobilize resources quickly to respond to patient needs. "Magnet" designated hospitals have a higher registered staffing levels, strong nursing leadership and a governance structure supporting nurses to function at the highest scope of their clinical practice. Additionally, nurses report that professional practice environments have better communications with physicians, reflective of greater respect within the organization, which promotes more effective relations amongst the entire interdisciplinary team (Friese, 2008; Kramer & Schmalenberg, 2005).

Process. Process refers to the content of care as well as the methods and practices involved in the delivery of that care. Process includes both interpersonal and technical care mediating the impact of structure on outcome. Thus, the right process, when combined with the

right structure, leads to desired outcomes in the hospital setting (Donabedian, 1980, 1988). Process encompasses the activities of giving and receiving care. As noted, this study is concerned with one specific nursing process, staff nurse care coordination, particularly for hospitalized patients that have coexisting chronic conditions.

Staff nurse care coordination. A recent mixed methods study by Beringer et al. concluded that staff nurse care coordination activities are diverse and encompass the nurse drawing upon a wide range of material and non-material resources (Beringer, et al., 2006). It is generally understood that in bringing about care coordination staff nurses engage in concerted activities to link up and integrate different aspects of care to achieve safe care and improved health outcomes for the patient (Bender & Schmitt, 2005; Beringer, et al., 2006; Institute of Medicine, 2004; Lamb, et al., 2008) . Staff nurse care coordination is defined in this study as "the actions initiated by nurses with patients, families, and/or members of their health care team to manage and correct the sequence, timing, and/or effectiveness of patient care from hospital admission to hospital discharge" (Lamb, et al., 2007).

Staff nurse care coordination is also characterized by its broad applicability to patient care outcomes; through these activities the staff nurse facilitates safe, quality patient care. Staff nurse care coordination can facilitate other critical nursing processes, such as surveillance or patient education. Staff nurses engage in care coordination activities that have been noted to be the key to successful system implementations, such as the use of hospitalists, which is ultimately a system initiative aimed at protecting patients and improving care quality and cost (Hoangmai, Grossman, Cohen, & Bodenheimer, 2008; Palmer, et al., 2001).

Lamb et al, (2007) identified six specific categories of staff nurse care coordination activities: assisting, checking, mobilizing, managing information, organizing, and backfilling.

These categories are comprised of 15 additional subcategories of specific nursing work, all part of the process of staff nurse care coordination for the hospitalized patient (Lamb, et al., 2007). Together, these categories and subcategories illustrate the process of staff nurse care coordination. See table 1.

Table 1
Nurse Care Coordination Activities

Domains:	Activity Definition	SubCategory:
Assisting	Getting or giving help to carry out one or more steps in care coordination process that a nurse would ordinarily do themselves	1. Asking for help 2. Offering help 3. Responding to requests for help
Checking	Evaluating accuracy, timeliness and completion of steps required in the sequence to carry out care coordination processes	4. Assessing/Monitoring/Surveillance 5. Following up on orders
Mobilizing	Directly and indirectly getting others to take actions for which they are accountable and are required to carry out care coordination processes	6. Advocating 7. Directing 8. Negotiating 9. Prompting 10. Requesting consult for the patient or family
Exchanging / Managing information	Giving and receiving information needed to carry out care coordination processes	11. Documenting (chart, forms, computer) 12. Communicating (patient, clinical team)
Organizing	Creating a structure that allows care coordination to be carried out in a safe and timely way	13. Self Organizing and prioritizing 14. Managing the environment 15. Anticipating/Predicting/ Projecting
Backfilling	Doing the work of other members of the care team for which they were responsible but did not do to carry out care coordination processes	

Gittell's (2002) relational coordination is a construct similar to staff nurse care coordination. In contrast to identifying role specific coordination activities, relational coordination is a construct that identifies the staff nurse as part of a functional team of care providers. Relational coordination represents the quality of interactions between coordinating participants within a particular work function, such as providing patient care. As it is conceptualized, relational coordination can apply in any work setting, including the hospital. The Relational Coordination Inventory (RCI) provides an indicator of the strength, or quality, of relationships between team members, and the role this plays in the coordination of highly interdependent work such as nurse care coordination (Gittell, 2000a, 2007). The relational coordination inventory provides a rare measure of coordination applicable to staff nurses in the hospital. Gittell et al.'s (2002) Relational Coordination Instrument will be used in this study as a measure of concurrent validity for the nurse care coordination instrument.

Outcome. The outcome in this model is a measurable result or consequence of staff nurse care coordination (process) and any influence from the context in which nursing care occurs (structure). Outcomes linked to staff nurse care coordination can be at an organization, group or individual level. The literature links nurse care coordination to outcomes such as patient satisfaction, readiness for discharge, reduced length of stay, medication errors, falls, pressure ulcers, and unnecessary re-hospitalizations (Clark, 2006; Gittell, 2000a; Institute for Healthcare Improvement, 2004; Weinberg, Gittell, Lusenhop, Kautz, & Wright, 2007; Weiss, et al., 2007). Although patient outcomes are an essential element of the SPO model and the framework for the proposed study, this study focuses on understanding the antecedents to outcomes, not the outcomes themselves.

Summary

The influence of the nurses' practice environment on the critical nursing process of staff nurse care coordination is an important area of study. The hospital nurses' involvement in care coordination for patients is important to assuring safe, quality patient care. More and more, patients hospitalized for acute care episodes have at least one co-existing chronic illness. Patients with chronic illness are known to have greater coordination of care needs and be at greater risk for adverse outcomes. Nurse practice environments exhibiting a high level of professional practice are believed to support nurses in providing care and have been linked to better nurse and patient outcomes, such as lower mortality rates and higher patient satisfaction. However, it is not known how the nurses' practice environment and antecedents to that environment influence staff nurse care coordination for patients, particularly those with chronic illness, in the hospital. This study examines the influence of important hospital and patient characteristics on the nurse practice environment and the nurse practice environment relationship to the process of staff nurse care coordination.

CHAPTER II

Background and Significance

The Impact of Chronic Illness

The number of chronically ill patients in this country is over 133 million, almost half of our total population, and is expected to continue growing (Anderson, 2007; Improving Chronic Illness Care, 2007). Chronically ill persons are up to ten times more likely to be hospitalized than people with no chronic conditions (Anderson, 2007). Individuals with chronic illness are complex to care for, they are often elderly, have more than one chronic illness, limited support systems, and poor general health behaviors (Naylor, 2003; Naylor, et al., 2004). Adverse events common to individuals with chronic illness while in the hospital and after discharge include greater loss of function, increased falls, less medication adherence, more adverse medication reactions, poorer symptom management and reporting, and finally, less satisfaction with healthcare providers and the healthcare system (Bynum, et al., 2004; Gaugler, Kane, Kane, & Newcomer, 2005; Moser, Doering, & Misook, 2005; Naylor, et al., 2005).

Hospitalized chronically ill patients tend to have longer lengths of stay, receive more duplicate testing, and have higher rates of preventable readmissions (Anderson, 2007; MedPac, 2007). Adding to the concerns associated with caring for individuals with chronic illness is the disproportionate contribution to the spiraling costs of healthcare. According to the Centers for Disease Control (2008), chronic illness consumes approximately 71% of the more than two trillion dollars spent annually on healthcare in the United States (Bodenheimer & Berry-Millett, 2009; Mensah, 2008). Research has also shown that up to one-half of patients with chronic health conditions require readmission to the hospital, due mostly to preventable complications

(Hong, et al., 2004; Oddone, et al., 1996; Vinsen, Rich, Sperry, Shah, & McNamara, 1990). Preventable readmissions are a significant concern because they reflect deterioration of health status for the patient following discharge and large costs to the health care system (MedPac, 2007). The cost of readmissions, on the quality of life of these individuals as well as on the healthcare system, is substantial.

Poorer outcomes and higher costs have led to a heightened search for interventions to prevent or decrease adverse events and hospital readmissions (Institute of Medicine, 2001; MedPac, 2007; Mollica & Gillespie, 2003). To date, much of the emphasis has been on interventions to decrease adverse events occurring at transfer points between settings. For example, Naylor (2003), Coleman (2004), and others have examined specialized caregiver roles designed to follow patients from discharge to home that lead to improved compliance with medication regimens, decreased occurrence of functional decline and ultimately a decrease in unnecessary readmissions (Coleman, Smith, Frank, & Min, 2004; Naylor, 2003; Naylor, et al., 2004; Rastkar, Zweig, Delzell, & Davis, 2002; Skillings & MacLeod, 2009). Naylor (2004) found that extending nurse care coordination services for chronically ill heart failure patients through the hospital to home transition period resulted in less adverse outcomes and longer periods between hospitalizations (Naylor, 2004; Naylor, et al., 2005).

There also has been greater recognition recently of the role that each healthcare setting plays in the overall continuum of the patient experience. A few studies have examined the implementation of specialized nursing roles to facilitate the work of the interdisciplinary team and ultimately improve effectiveness and efficiency of care within settings (Fisher & Raphael, 2003; Isler, 1998; Rastkar, et al., 2002). Friedman and Basu (2004) and Moser and colleagues (2005) are among a growing group of researchers suggesting that more could be done to identify

and intervene with at risk patients prior to their discharge from the hospital setting (Friedman & Basu, 2004; Moser, et al., 2005). To address this need, Naylor (2004, 2005), recommends that individualized care focused on acute events as well coexisting conditions is necessary to improve outcomes for these patients (Naylor, et al., 2004; Naylor, et al., 2005). These suggestions indicate that expanded care coordination for chronically ill patients hospitalized for acute care episodes will improve these patients' outcomes, both before and after discharge.

The critical process of care coordination in the hospital. Until recently, the study of care coordination has focused primarily on transitions between settings, a time when chronically ill patients are likely to "fall through the cracks". Notably, care coordination, both within acute care and across settings, was identified by the Institute of Medicine as a cross-cutting strategy necessary to close what has been termed the "quality gap" (Institute of Medicine, 2001). Done well, it assures the needs of patients are addressed across providers and settings (Allred, Arford, & Michel, 1995; American Academy of Pediatrics, 1999; Hammer, 1996; Institute for Healthcare Improvement, 2004; Marek, Popejoy, Petroski, & Rantz, 2006; Mollica & Gillespie, 2003; National Quality Forum, 2006; Weinberg, et al., 2007).

Specific outcomes have also been linked to care coordination mechanisms within the hospital setting and on individual patient care units. These outcomes include provider-perceived unit effectiveness, quality of care, ability to meet family needs, and family satisfaction with care (Bender & Schmitt, 2005; Gurses & Xiao, 2006; Shortell, et al., 1994; Stricker, et al., 2009) in addition to a reduced length of stay (Felton, Cady, Metzler, & Burton, 1997; Lilly, Sonna, Haley, & Massaro, 2003; Skillings & MacLeod, 2009). Specific to medical-surgical units, related aspects of care coordination including collegiality, collaboration, and relational coordination have all been linked to better patient outcomes. Sovie and Jawad (2001), found fewer urinary

tract infections and falls and Gittell (2000) found less post-operative pain, higher functioning and decreased length of stay for joint replacement patients (Gittell, et al., 2000; Sovie & Jawad, 2001).

The study of care coordination within hospitals emerged from the social and organizational sciences as the study of coordination of work between team members. Coordination, in general, is accepted as critical to meeting operational goals, and organizations (such as hospitals) are believed to exist in order to facilitate effective coordination (Van de Ven, 1976). Therefore, the study of coordination within the hospital organization has been traditionally focused at either the team or subunit level. Researchers such as Gittell (2002) and Dutton (2003) found that the quality of team coordination plays a vital role in the care and timely discharge of hospitalized patients (Dutton, et al., 2003; Gittell, 2002; Isler, 1998). Gittell's findings of shorter length of stay and improved post discharge outcomes associated with stronger team member relationships supports the importance of increasing knowledge of coordination within the hospital and the role of individual team members (Gittell, et al., 2000). Insights into both individual contributions and team elements of care coordination provide the potential for a broader range of interventions, such as adding clarity and role expectations to improve the care coordination process and associated patient outcomes.

The Role of Staff Nurses in Care Coordination. As the patient's "ever-present" healthcare team member, a staff nurse assures that patients under their watch receive safe, efficient care (Clarke & Aiken, 2003a; Schmid, Hoffman, Happ, Wold, & DeVita, 2007) The consistent presence of nurses with the hospitalized patient allows for assessment, communication, and relationship opportunities generally unavailable to other roles or disciplines (Clarke & Aiken, 2003a; Lamb, et al., 2007). In "Keeping Patients Safe", the Institute of

Medicine noted that care coordination is critical work for staff nurses and recommended that structural supports for nurse care coordination be identified and implemented (Institute of Medicine, 2004). A recent study of staff nurses in the pediatric acute care setting concluded that the structural supports present in the work environment (such as policies and rules) guided the coordination process for patient care (Beringer, et al., 2006)

Until recently, there was little known of the role of staff nurses in care coordination. Most of our insights about nurse care coordination came from research on advanced practice nurses, case managers, designated care coordinator individuals, or community nurses providing transitional care between hospitals and post-acute settings (Allred, Arford, & Michel, 1995; Allred, Arford, Michel, et al., 1995; Isler, 1998; Lamb, 1995, 1997; Rastkar, et al., 2002; Skillings & MacLeod, 2009). Studies conducted by Naylor et al, 2004, and others found consistently positive relationships between nurse care coordination in transitional care and patient outcomes, including lower hospital readmission rates, higher functional performance after discharge and greater patient satisfaction (Marek, et al., 2006; Naylor, et al., 2004; Waszynski, Murakami, & Lewis, 2000). However, studying nurses in specialized roles that support or perform care coordination overlooks the multitude of recognized and unrecognized care coordination activities undertaken by staff nurses as part of their everyday work.

The 2006 study by Beringer et al. found that while pediatric staff nurses performed care coordination activities in a diverse and inconsistent manner, the nurses were able to individualize care and their approach to best meet the needs of each patient. A recent observational study of staff nurses conducted by this applicant's mentor, Dr. Gerri Lamb, along with collaborators Schmitt, Sainfort, Edwards, and Duva supports the importance of staff nurses in coordinating care due to their consistent presence at the bedside. This foundational work by Lamb et al.

revealed that staff nurse care coordination occurs in the hospital as a mechanism to keep patients on a smooth trajectory throughout their hospital stay and following discharge (Lamb, et al., 2007). These findings are consistent with literature stating that coordination occurs by crossing function or discipline lines to assure that patients have their needs met throughout the course of hospitalization (Gittell, 2002; Skillings & MacLeod, 2009). In Lamb's research (2007), the staff nurse role in care coordination emerges as instrumental to important patient outcomes; the study examines links to important patient outcomes such as medication errors, falls, pressure ulcers and patient satisfaction. In this critical role, the staff nurse practices at the crux of information exchange, focusing on maintaining an actionable flow of work between members of the interdisciplinary team for the purpose of moving the patient toward successful discharge (Lamb, et al., 2007).

Until recently, study of staff nurse care coordination in the hospital was hampered by the lack of an operational definition of staff nurse care coordination and the absence of tools to measure the process. Following systematic analysis of extensive observations and interviews of staff nurses and members of their nursing and interdisciplinary teams, Lamb and her team provided a definition specific to staff nurse care coordination. The process is defined as "the actions initiated by nurses with patients, families, and/or members of their health care team to manage and correct the sequence, timing, and/or effectiveness of patient care from hospital admission to hospital discharge" (Lamb, et al., 2007). Six major and 15 subcategories of nurse care coordination activities were identified. This research provides groundwork for advancing the understanding and improvement of nurse care coordination in the hospital. Empirically grounded definitions and tools now exist to measure nurse care coordination which makes it possible to examine the process, its antecedents, and its outcomes. As is described in the

methods section, this study used the results of Lamb et al.'s work (the definition and measurement instruments) to focus on antecedents to nurse care coordination activities in the hospital and characteristics of the practice environment that may support them (Lamb, et al., 2007; Lamb, et al., 2008). Additionally, Gittell's Relational Coordination Instrument (RCI) offers an alternative team focused measure to staff nurse care coordination, and has been more widely used, so will be administered concurrently. The RCI measures the construct of relational coordination, which is not specific to nurses, and is linked to similar outcomes at the patient care unit level.

The practice environment link to outcomes. The Institute of Medicine, along with other national organizations, has called for a focus on the nurse practice environment to improve quality of care for patients (Institute of Medicine, 2004; Robert Wood Johnson Foundation, 2006). Evidence compiled for the 2004 report by the Institute of Medicine revealed that many nurse practice environments were characterized by serious threats to patient safety, such as the management practices, staffing patterns, design of work and culture of the organization (Institute of Medicine, 2004). On the contrary, professional nurse practice environments provide a context to facilitate professional nursing practice and therefore promote patient safety and quality outcomes (Kramer & Schmalenberg, 2008b; National Quality Forum, 2004).

The nurse's practice environment is defined as "the organizational characteristics of a work setting that facilitate or constrain professional nursing practice" (Lake, 2002). It reflects a model for control and coordination of work in a particular work area, such as the patient care unit. The professional practice of nursing is in accordance with all regulatory standards, reflects the values and principles identified as relevant by professional nursing organizations and is perceived by nurses to support a higher quality of care (Lake, 2002; Pearson, et al., 2006). It is

in direct opposition to a task-oriented or bureaucratic work environment emphasizing rules over flexibility and innovation. A professional practice environment supports the professional practice of nursing, preferred by nurses as their work is considered highly unpredictable and complex (Gittell, 2002; Lake, 2002).

Characteristics of a professional practice work environment are high levels of nurse autonomy in patient care, nurse control over practice (such as with shared governance structures), and positive nurse and physician relations promoting better communication between interdisciplinary team members (Hoffart & Woods, 1996; Kramer & Schmalenberg, 2003a, 2003b; Laschinger, et al., 2003). Nurses with more autonomy and control over practice are empowered to implement the most appropriate nursing care (Kramer & Schmalenberg, 2003a, 2003b; Laschinger, et al., 1997). Nurses with good physician relations state a higher level of respect within the organization as contributing members of the patients care team. These nurses have been shown to be more satisfied in communications with physicians, which is also highly important to patient care and reflected in better patient outcomes (Apker, Propp, Zabava, & Hofmeister, 2006).

The link between professional practice work environments and better patient outcomes is well established (Aiken, Clarke, & Sloane, 2002a; Aiken, Clarke, Sloane, et al., 2002; Aiken, Havens, & Sloane, 2000; Friese, 2005). Magnet hospitals, originally studied for their success in recruiting and retaining nurses during a severe nursing shortage, exemplified nursing excellence resulting from the presence of organizational supports for professional nursing practice (Aiken, et al., 2000). Current literature clearly demonstrates that professional practice environments are associated with both nurse outcomes (satisfaction, burn out, and retention) and patient outcomes

(satisfaction, morbidity, and mortality rates) (Adams & Bond, 2000; Aiken, et al., 1999; Friese, 2008).

To date, few studies have explicitly tested the link between structural features of the nurse's work environment and a nursing care process, or the subsequent link between a nursing care process and patient safety and quality outcomes (Clarke & Aiken, 2003b; Kutney-Lee, Lake, & Aiken, 2009; Lamb, et al., 2008; Naylor, et al., 2004). There is a growing movement to identify outcomes that are responsive to nursing actions and interventions, commonly called "nurse sensitive outcomes". Yet, there are few process indicators that have met the rigorous criteria for demonstrating a strong and consistent link to outcomes. One promising and important area of study focuses on the relationship between the nursing process of surveillance and failure to rescue (an inability to prevent death due to complications during a hospital stay). Clark & Aiken (2003) and Needleman (2002) hypothesized that the significant relationship they have found between nurse staffing and failure to rescue is mediated by nurse surveillance. However, this relationship has not been empirically tested. This study will specifically test a hypothesized link between the structure of the nurse work environment and a core nursing process, nurse care coordination.

Summary and Significance

The proposed research aims to build new knowledge about staff nurse care coordination in the hospital setting. This research capitalizes on newly developed measure of nurse care coordination in the hospital setting and seeks to systematically extend this work to three new areas of study: (1) the characteristics of the nurse practice environment that support professional practice and how they relate to the activities of staff nurse care coordination (2) antecedents to

the nurse practice environment that support or create barriers to staff nurse care coordination, including hospital-level characteristics and unit-level patient characteristics, through their impact on the professional practice environment and (3) the influence of the patient characteristic, at the unit level, directly on the process of staff nurse care coordination.

Preliminary research findings by Lamb et. al.(2008) in addition to findings by Gittell (2000), Naylor (2004), Coleman (2004, 2005) and Stricker (2009) suggest that staff nurse care coordination functions significantly contribute to important patient outcomes, including medication errors, falls, pressure ulcers and patient satisfaction (Coleman, Smith, Devbani, & Min, 2005; Coleman, et al., 2004; Gittell, et al., 2000; Lamb, et al., 2008; Naylor, et al., 2004; Stricker, et al., 2009). The Institute of Medicine (2004) recommends that improvements to the nurse's work environment are needed to support the nurse's role in promoting patient safety and quality care (Institute of Medicine, 2004) Currently, we have no studies to identify the factors that enable nurses to carry out care coordination activities. The intent of this study is to examine those factors to build a more comprehensive and explanatory model of staff nurse care coordination and its outcomes.

This research also contributes to existing knowledge of the context of staff nurse work, in this case care coordination, which is of significance to the quality and safety of care provided and ultimately patient outcomes. Studies are needed that identify structural factors comprising the nurse's work environment that explain and predict activities of critical staff nurse processes such as care coordination. This will be the first study to empirically study the relationship between the nurse practice environment and this specific core nursing process. Therefore, this study proposes to establish an important, and as of yet not described, link in the structure-process chain that contributes to outcomes for hospitalized patients.

Finally, this research contributes to the existing literature on the quality of care for hospitalized patients with chronic illness. In the midst of a chronic illness epidemic little evidence exists to guide best practices in caring for chronically ill patients hospitalized for acute episodes. Systematic study is needed to identify the structures and antecedents associated with best practice staff nurse care coordination (Beringer, et al., 2006; Bowles, Foust, & Naylor, 2003). Study results will guide process and design interventions to improve the care of chronically ill patients at an important intersection on their overall continuum of care.

CHAPTER III

Research Design and Methods

A descriptive, cross-sectional design was used to examine the association between the nurses' perceived professional practice environment and care coordination on acute care medical-surgical units (Q1A). Selected covariates were examined for a relationship to the work environment and with the nurse's perceptions of nurse care coordination. Patient characteristics, specifically the percent of patients with a diagnosis of chronic illness on the patient care unit, were explored for a relationship to nurses' perceptions of the work environment and the perceived level of nurse care coordination (RQ 1B). Hospital-level characteristics (size, ownership and teaching status) were evaluated for their relationship to the unit-level practice environment and to perceived nurse care coordination on medical-surgical patient care units (RQ 1C).

Setting and Sample

Setting. The setting for this study consisted of 4 hospitals in the metro Atlanta area, three of which participated in the preliminary study to develop and test the Nurse Care Coordination Instrument. The hospitals include Emory University Hospital, Emory Midtown, St. Joseph's Hospital and South Fulton Hospital. These hospitals are representative of hospitals with a range of structural features related to size, ownership, and teaching status (Table 2).

Table 2

Description of Hospital Settings

Hospital	Number of licensed beds and (staffed)	Number of Medical-Surgical Units	Ownership	Teaching Status
Emory Midtown	511 (525 staffed)	9	Not for Profit	Moderate
Emory University	579 (550 staffed)	16	Not for Profit	Major
St. Joseph's	410 (335 staffed)	10	Not for Profit	Non
South Fulton Regional	338	2	For Profit	Non

Teaching status was categorized as Non (no residents), Moderate (< 1 resident/ 5 -9 staffed beds) or Major (1 residents/ ≤ 4 staffed beds)
(Lake & Friese, 2006a).

Sample size. This sample is composed of all medical-surgical patient care units at these four participating hospitals. In total, 37 patient care units were classified as medical surgical.

A power analysis using PASS statistical software was conducted to determine the sample size necessary to conduct multiple regression analysis to achieve the primary aim of this study and to answer the associated research questions. There is one independent variable (the professional practice work environment), one dependent variable (staff nurse care coordination) and 4 covariates (patient mix, hospital size, teaching status, and ownership). For 80% power, a sample size of 24 units was required to detect the unique contribution to variation by the independent variable as low as 0.265 (the R-squared) using an F-test with significance level

(alpha) of 0.05. The variables tested are adjusted for the additional covariates with an R-squared of 0.001. Influence from these covariates on the dependent variable at 0.001 or more will be removed from experimental error. This influence would otherwise be attributed to the overall proportion of explained variance in the model.

In addition to having a sufficient number of patient care units for meaningful data analysis, a sufficient number of nurses on each unit must participate in order for individual nurse data to be aggregated to the unit level. Verran, Gerber, and Milton (1995) suggest that fifty percent of the staff nurses employed on the unit should be included for data to be representative of a unit level construct (Verran, Gerber, & Milton, 1995). Current staffing numbers were obtained from unit managers prior to data collection to determine desired response rates. Anticipating difficulty in achieving such high response rates, over sampling was done to minimize the effect of units dropping out of the analysis due to low participation. In a previous study of care coordination on nursing units in four metro Atlanta hospitals (the initial testing of the NCCI), 50% participation was achieved with three-quarters of the participating units. This precedent indicated that achieving a sample size of 24 patient care units (71 %) would be feasible with the initial sample size of 32 units.

Inclusion/ Exclusion criteria

For patient care units inclusion criteria required the units be defined as general medical-surgical units (including telemetry) consistent with description for state regulatory agencies or Joint Commission Accreditation surveys. Rationale for this inclusion criterion is to control for wide variations in patient acuity due to the intensity of patient care required. Units were excluded from this study if there was turnover of unit management within the month preceding data

collection. Rationale for the unit exclusion criterion is that the study investigates stable characteristics of the work environment; therefore recent change in unit management may lead to invalid responses by the staff to the survey questions.

For staff subjects inclusion criteria include 1) must be a registered nurse, 2) must have at least 6 months of experience on the participating patient care unit at the time of the survey distribution, 3) must work at least 8 hours per pay period, 4) at least 50% of worked time must be in direct patient care, and 5) must speak and read English. For staff subjects, exclusion criteria include: 1) currently working as traveling or agency nurses and 2) currently on a leave of absence.

Rationale for inclusion and exclusion criteria for staff subjects. The target population for this study is acute care registered staff nurses having direct contact with patients in the hospital setting. This sample is limited to registered nurses (RNs) because this is consistent with previous studies examining professional practice environments (Aiken & Patrician, 2000; Friese, 2008; Lake, 2002). The performance expectations of registered nurses are distinct from other licensed personnel including licensed practical nurses or assistants to nurses. To date, there is no research that supports the generalizability of professional practice measures to non-RN groups. In addition, nurses who participate in this study must have a minimum of six months experience and be current members of the regular staff on their nursing unit to assure familiarity with the unit environment and integration into work processes. This will increase the likelihood that responses reflect a group or shared norm. The shared or group norm is necessary so that individual responses aggregated to the unit level to provide an appropriate measure of a unit level construct. Intimate knowledge of the unit they are working assures that individual nurses can provide information reflecting the characteristics of their unit and the work that they

do(Klein & Kozlowski, 2000). Fluency in English is necessary to comprehend and complete the study forms. Fluency should not be an issue for inclusion as nurses hired to work in these hospitals are required to be proficient in the English language.

Recruitment

Recruitment of hospitals was achieved via investigator contact and prior participation in nurse care coordination studies. The primary investigator sent one introductory email and one U.S. postal service mailed letter to the hospital nurse executive inviting participation. If willing, the hospital nurse executive was asked to provide a hospital contact name for moving forward with the study for on-sight facilitation of the study protocol. A letter of authorization was obtained from each facility agreeing to participate.

Hospital participation was voluntary, and withdrawal from the study at any time was permitted. Five hospitals expressed willingness to participate in this study and completed letters of authorization for the Institutional Review Board (IRB) application. However after IRB approval two of the hospitals withdrew interest prior to data collection. One hospital cited an unfilled chief nursing officer position as a barrier to participation and the second hospital was concerned that providing even small incentives to participate would be considered coercive and therefore noncompliant with hospital policies. Additional hospitals were approached to participate. One of these additional hospitals agreed to be the fourth hospital to participate in this study.

Prior to the data collection, the study proposal was approved by Emory University's Institutional Review Board (Appendix A) and the Institutional Review Board's of the three participating hospitals not affiliated with the Emory Healthcare System. Also, each of the

hospitals asked that the study be presented to and approved by the hospital's nursing research council. In the one hospital without a nursing research council, the study was presented to the nursing leadership team for approval.

Participating study units were identified in consultation with the nurse executives or designated hospital contact. All hospital units classified as medical-surgical inpatient units were included in the study.

Staff RN recruitment was coordinated with the unit manager of each participating unit. Staff members were recruited at staff meetings, with flyers and with email announcements according to the preference of the unit manager.

Instruments

Several instruments were used for data collection. Copies of all tools are provided in Appendix B. The following table describes each study variable, the measurement and analysis level, and the instrument that was used to measure the variable. Appendix C presents the unit profile form completed by each nurse manager. The cover letter contained in each packet contained a statement assuring confidentiality of information, the voluntary nature of participation, and clarifying that completion and return of the instrument indicates consent to participate. A copy of the cover letter is included as Appendix D. Personal identifying information was not collected. The section following table 3 describes the study variables and the instruments used to measure these variables.

Table 3

Overview of Data Collection Variables, Type of Measure, Instrument

Variable	Type of Measure	Instrument
Nurse Demographic Variables	Individual – aggregate to unit or total	Demographic Form
Practice environment score	Individual – aggregate to unit	Lake's (2002) Practice Environment Scale of the Nursing Work Inventory (PES - NWI)
Staff Nurse Care Coordination	Individual – aggregate to unit	Lamb et. al's (2007) Nurse Care Coordination Inventory (NCCI)
Care Coordination – alternate measure	Individual – aggregate to unit	Gittell's (2000) Relational Coordination Inventory
Patient Mix of Chronically Ill	Unit level - covariate	Administrative data
Hospital Size	Hospital level - covariate	Administrative data
Hospital ownership	Hospital level - covariate	Administrative data
Hospital teaching status	Hospital level - covariate	Administrative data

Unit profile. A unit profile form was completed for each unit by the unit manager or designee. The information collected included service type, budgeted number of beds, average daily census, the number of registered nurses on the unit and filled versus open full time

equivalent employees. This information was collected from unit level managers to increase accuracy and decrease response burden on the individual nurses.

Demographics. An RN demographic form was included in the survey packet. Demographic data collected on each participating nurse included: total staff nurse experience, and experience in years on current unit, education, race, employment status and shift worked.

Hospital Characteristics. Three hospital characteristics were collected from the hospital public records and hospital administrative contacts. Hospital size was defined as small (<200), midsize (200-500) and large (greater than 500). This categorization of hospital size by number of beds is based on current literature analyzing various structural characteristics of hospitals pertinent to patient care (American Hospital Association, 2008; Lake & Friese, 2006b; Mark, Salyer, Geddes, & Smith, 1998). Ownership was defined as either for profit or not for profit status. Teaching status was defined as non-teaching, moderate teaching or major teaching hospitals calculated by the number of full-time equivalent residents (and fellows) per staffed bed. Non-teaching was defined as no residents on site. Moderate teaching was defined as less than one resident per 5 to 9 staffed beds, and a major teaching hospital was defined as one resident per 4 or less staffed beds. This operational definition for teaching status is consistent with previous research by Shamian et. al., (2002), Lake & Friese (2006), Friese (2008) studying professional practice environments in hospitals.

Patient Characteristics. Chronic illness case mix is defined as the percent of patients discharged from each nursing unit with specified ambulatory sensitive chronic condition diagnoses in any of their discharge ICD-9 codes. Eligible conditions were compiled from the literature and represent the five most common ambulatory sensitive chronic conditions, and thus are frequently associated with potentially avoidable hospital admissions. The chronic conditions

for inclusion in the patient mix calculation are: heart failure, hypertension, asthma, chronic obstructive pulmonary disease and diabetes (Clancy, 2005; Laditka, Laditka, & Probst, 2005; Roos, Walld, Uhanova, & Bond, 2005; Saha, et al., 2007). The corresponding ICD-codes are: 493, 389.91, 402.01, 402.11, 402.91, 428, 401.0, 402.00, 403.0, 404.0, 405.0, 437.2, 491, 492, 494, 496, 250.1, 250.2, and 250. Hospitals were asked to provide the number of patients with any of the ICD-9s of interest in their diagnoses for each participating unit. This information was collected on all patients discharged from study units over the three month period preceding the survey packet distribution. A percentage was calculated by dividing the number of patients with one of the target ICD-9 codes (listed above) divided by the total number of patients discharged from the unit. For each of these three months, patients were included in the percentage of discharges with ambulatory sensitive conditions if they had at least one of any of the above ICD-9 codes listed in any position captured in their discharge records. This all inclusive criterion was based on the fact that regardless of the centrality of a diagnosis to a specific admission (as reflected in the position of the code in a sequence of diagnostic codes), the condition may still influence the care provided by the nurse during the hospital stay and the overall status of the patient.

The Practice Environment Scale (PES - NWI). This instrument provides a global measure of the patient care unit's professional practice work environment. The PES -NWI, derived from the original revised Nursing Work Index (NWI-R) measuring the nursing practice environment at "Magnet" designated facilities, is comprised of 5 subscales and may be aggregated into one composite measure for all items on the instrument. The composite (total instrument) is the measure of interest in this study. Responses for this instrument are collected at the individual level and may be analyzed at the individual, unit, or organizational level (Aiken &

Patrician, 2000). Lake (2002), suggests that nurses should be informed at what level (unit or organizational) the questions are referring to, which was consistently done during this study (Lake, 2002).

The internal consistency reliability reported for the composite measure and the five subscales are consistently high at the individual registered nurse level. The Cronbach's alpha for the composite was originally reported to be 0.82 (Lake, 2002). The subscale reliabilities were also sufficiently high in the original testing: nurse participation in hospital affairs = 0.83, nursing foundations for quality care = 0.80, nurse manager ability, leadership and support = 0.84, staffing and resource adequacy = 0.80 and collegial nurse-physician relations = 0.71. A more recent analysis of data collected in 1999 from 156 Pennsylvania hospitals produced subscale and composite measure alphas ranging from .88 - .98 (Lake, 2006) This 31-item PES-NWI by Lake is intended to be more parsimonious than Aiken's original NWI. The PES-NWI provides reference values for the original magnet hospitals from which these tools were developed (Lake, 2002). Construct validity for the PES-NWI has been supported through a "known groups" approach; the PES-NWI significantly differentiates Magnet Hospitals from control hospitals. Lake's PES-NWI (2002) is also endorsed by the National Quality Forum (NQF) as a system-centered consensus standard for nursing sensitive care (National Quality Forum, 2006).

The composite PES-NWI was used as the operational measure for practice environment in this study. This is consistent with the conceptualization of practice environment as a global construct in the theoretical framework for this study. Use of this total score has been found to be more stable than the use of subscales (Estabrookes, et al., 2002; Li, et al., 2007). Construct validity of the PES-NWI as single factor solution also has been supported (Lake, 2002).

Nurse Care Coordination Instrument (NCCI). This 45 item instrument measures the perceived quality and quantity of care coordination performed by acute care staff nurses on medical-surgical patient care units. The NCCI has eight subscales consisting of general and activity specific care coordination items (see table 10). It is a five point likert-type scale with positive scoring and therefore higher scores for the instrument represent a greater amount of nurse care coordination activity. Cronbach's alpha for the eight subscales comprising this instrument ranged from 0.71 to 0.91. Explained variance from these eight subscales was moderate to high, ranging from 37% to 71%. For aggregated data at the unit level measures of within group agreement (r_{wg}) values are acceptable ranging from 0.63 to 0.92. Intra-class correlation scores range from 0.30 to 0.52 indicating low to moderate discrimination across nursing units. Unit level NCCI scales were found to significantly correlate to measures of the patient experience of coordination, patient falls, medication errors, and incidence of pressure ulcers, supporting its' construct validity (Lamb, et al., 2008).

Gittell's Relational Coordination Instrument (RCI). The focus of the RCI measure is on the role of the team as care coordinators, distinct from other team responsibilities and roles, of which the nurse is a significant team member. This instrument was used to evaluate concurrent validity of the newer NCCI and if needed, as an alternate measure of nurse care coordination. The RCI measures seven dimensions of coordination: timeliness of communication, frequency of communication, accuracy of communication, problem solving communication, shared goals, shared knowledge, and mutual respect. The RCI tool includes 55 items in a likert-type format. Team members rate their experience of other members of the care team on each of the seven dimensions. Cronbach's alpha for the total scale is reported as 0.80 and higher, with significant differences across groups (Gittell, et al., 2000). Initially tested in the airline industry, Gittell

(2000, 2007) reports support for high construct validity of these seven dimensions with hypothesized organizational control mechanisms such as cross functional accountability and supervisory span of control. Correlations between the RCI and organizational control mechanisms ranged from 0.63 and 0.96 (Gittell, 2000b, 2007). Previous correlations between the RCI and the NCCI were significant and ranged from 0.32 to 0.47 supporting the RCI use in this study [98].

Data Collection

Survey packets for each eligible staff nurse were distributed to the participating units by the primary investigator. Unit managers determined the method of distribution to staff. Packets were placed directly in staff mailboxes, in centralized locations on the nursing unit, or given to a designated individual for distribution. Each survey packet contained a cover letter explaining the study purpose and providing directions to the nurse participants, four survey instruments (demographic, NWI-PES, NCCI, RCI) and a return addressed, stamped envelope

Participating nurses also were offered the option of completing the survey packet on-line via a commercial website. This electronic option was offered at the request of the nurse leaders at the hospitals to increase access to the survey, make it more convenient for the nurses, and to accommodate what was believed to be the preference of the nurses. Participation was anonymous. The cover letter in each survey packet included a unique unit and participation identification number, to prevent the same nurse duplicating a paper response electronically and to assure responses were attributed to the correct patient care unit. Nurses were instructed to return the surveys in the stamped envelope provided or, alternatively, to complete the survey on-

line (website provided) providing unit identification number only, within a four week time frame.

To minimize response burden, staff nurses were asked to provide information only they could provide; managers for each unit were asked to provide or facilitate access to required unit-level data. The staff RN survey items total 140 items for the four separate surveys. The 4 survey packet took approximately 20 to 30 minutes to complete. Each eligible RN received a meal voucher valued at five dollars or less as a thank you and incentive for survey packet completion. To promote participation, reminder emails were distributed to unit managers and flyers were posted on the units (see Appendix E). Unit participation was tallied after two to three weeks and provided to the unit managers for posting in email and in unit break rooms. Data collection was extended to up to four weeks to maximize response rates when requested by the unit manager or the staff nurses, or if participation did not meet 50 percent. Completed survey packets were screened by the primary investigator to assure inclusion criteria were met. Units achieving the targeted 50 percent response rate of eligible participants received recognition via an email to the leadership and a thank you note from the investigator.

Data Analysis

Data were entered into an excel spreadsheet and exported for analysis using SPSS statistical software version 16 (SPSS Inc., 2008). Double data entry was completed by the primary investigator for 10% (35) of the survey instruments to ensure accuracy. All hospital data (size, ownership and teaching status) and unit level data (mix of chronically ill patients) were double checked with hospital administrative contacts for completeness and accuracy.

Initial data analysis included descriptive statistics on individual level data for the purpose of data cleaning. Histograms and frequency tables were examined to look for outliers, skews, and any patterns in the missing data. If greater than 10% (14 responses) of the data from an individual subject was missing, the subject's data were completely removed from the analysis. If >10% of an individual's responses were missing from a single instrument only (up to 6 responses depending on the instrument), that instrument was removed from the unit level analysis but the respondents' responses on the completed instruments remained for use during analysis. If less than or equal to 10% of total responses were missing, just those missing variables were removed from analysis. Data were next examined for normality to determine if assumptions for statistical tests were met.

Assessment of the psychometric properties of all study instruments was performed prior to model testing and any aggregation of data. These instruments have all been used previously with nurses. At the individual level the internal consistency of the data were assessed for a Cronbach's alpha > 0.8. Construct validity was assessed through exploratory factor analysis. If the exploratory factor analysis was not consistent with published subscales a confirmatory factor analysis was conducted, forcing items to load on the expected factors.

Scoring for the professional practice measure and nurse care coordination inventories was calculated according to the instruments' scoring directions. The PES-NWI was reverse scored so that it and the care coordination instruments (NCCI and RCI) would both be positively scored. Higher scores indicate a better professional practice environment and better (or more activities of) coordination occurs.

Next, data from these individual level instruments were assessed for reliability and validity at the unit level. To validly aggregate data from the individual level to the group level,

the instruments must be constructed with items that when aggregated will represent the appropriate group construct. Each of these instruments has previously been tested and used to represent a group level measure. Furthermore, 50% or more of the individuals comprising the unit should participate in the survey to assure a valid group sample (Verran, et al., 1995). Within Group Agreement (r_{wg}) and Intra-class Correlations (ICC) were assessed. The r_{wg} should be 0.7 or higher to indicate within unit agreement on the scale items. The ICC should be 0.6 or higher, indicating greater agreement within the units than across the units, further justifying use of the mean as an aggregate score to represent each unit (Klein & Kozlowski, 2000).

After aggregating the data to unit level, analyses were conducted to assess the data at the unit level for the assumptions of normal distribution, homogeneity of variance, and independence and the need for any transformation. Data were also examined for outliers that may need to be removed.

Finally, analysis was conducted to address the **Study Aim**: To examine the relationship between the nurse practice environment and staff nurse care coordination on acute care medical-surgical units and the research questions as follows:

Q1.A: Is there a relationship between the perceived professional practice environment (Lake's PES-NWI) and nurse care coordination (Lamb & Gittell Instrument) reported by staff nurses on acute care medical-surgical units?

The NCCI and RCI unit means were individually regressed upon the PES-NWI. Correlations between the PES- NWI and the NCCI were run using Pearson's r. The outcome variable (NCCI) was regressed upon the PES-NWI to determine the extent of variance explained by the PES-NWI. This same process was followed for the RCI as alternate measure of care coordination.

Q1.B: Is there an impact of the percent of patients with ambulatory sensitive chronic illness on the nurse practice environment and on staff nurse care coordination on acute care medical surgical units? The percent of ambulatory sensitive chronic conditions (ASCC) for each unit was entered into both care coordination outcome models as a covariate. Linear regression was performed to determine any significant impact of the ASCC patient mix on the practice environment and the nurse care coordination measures, noted by a change in the strength of any relationship determined between the independent (PES-NWI) and dependent (NCCI or RCI) variable in the each model.

Q1.C: Is there an impact of the hospital characteristics of size, teaching status, and ownership on the perceived professional practice environment on acute care medical-surgical units?

The three hospital level antecedents were entered as covariates for each care coordination outcome measured. The hospital size, ownership, and teaching status was added to each model to determine the level of impact of these hospital characteristics on any relationship, or explained variance determined between the PES-NWI and the NCCI or RCI. Intra-class correlations were assessed at this higher level for significance to signal that a multi-level model is necessary. Significance indicates there may be nesting effects occurring as a result of hospital membership, which as an initial test is sufficient to address question three. As called for, data were entered into hierarchical linear models to assess the contribution at the unit level versus individual level to overall variance. Additionally, data were analyzed to assess unique contribution from the higher level of the hospital to the models' variance, with the limitation of the hospital sample size noted.

Summary

A non-experimental, correlation design using a convenience sample was used to examine the influence of the nurse practice environment on the activities of staff nurse care coordination. Data were collected from nurses at four hospitals and 32 medical-surgical nursing units. Psychometric testing was performed on the individual level data, and as appropriate the data were aggregated to the unit level. Psychometric testing was conducted again with the aggregated data at the unit level. Regression and correlations were run to test for any relationship between the practice environment and staff nurse care coordination. Additionally, hospital and patient characteristics were added to the model as covariates. The hospital size, ownership and teaching status was examined for any influence on the nurse practice environments' relationship to staff nurse care coordination. The percent of ASCC patients was added to examine any influence on the practice environments' relationship to staff nurse care coordination as well as for a direct relationship to the activities of staff nurse care coordination as reported by RNs on the participating units.

Chapter 4

Findings

The aim of this study was to explore the relationship between characteristics of the nurse practice environment and staff nurse care coordination on acute care medical-surgical units. This study examined the perceived level of professional practice on the patient care unit in relation to the activities of nurse care coordination as reported by the staff nurses. Antecedent variables included organizational level attributes: hospital size, ownership and teaching status, and the percent of patients on the unit with ambulatory sensitive chronic illness conditions. This chapter describes the sample characteristics and an analysis of the research questions. Results of descriptive and inferential statistical analyses of the collected data are presented. Statistical analyses were conducted using Microsoft Office Excel and the Statistical Program for Social Sciences release version 18.0.

Descriptive Statistics

Thirty-two medical surgical patient care units from 4 acute care hospitals in metro Atlanta participated in the study. Survey packets were distributed via nurse managers to 779 Registered Nurses on the participating patient care units. Of the 27 nurse managers participating, 22 were responsible for one unit while five had responsibility for two units in the study.

A total of 339 (44%) of the registered nurses either returned completed survey packets to the primary investigator or completed the online version of the survey. Two participants who had worked less than six months were excluded from analysis. The final sample for individual data analysis consisted of data collected from 337 staff nurses (44%).

Organizations. All four of the hospitals participating in this study were community hospitals located in metro-Atlanta. Two of the facilities were academic, non-profit, and part of the same healthcare system. A third hospital was also non-profit but sponsored by a faith based organization. The fourth hospital included in the study was for-profit and owned by a national healthcare corporation. Each hospital varied in number of medical surgical units and the percent of these medical surgical units ultimately participating in the study (see table 4).

Patient Care Units. All patient care units classified as medical-surgical were invited to participate in this study. Medical-Surgical units were considered for exclusion only if there had been a change in unit management or in the primary patient population in the previous 3 months. Two medical-surgical units were excluded; due to recent management turnover and absence of a manager. A lack of response by the unit manager and director to initial and follow-up email and voice mails was taken as a refusal to participate. Three units did not participate in the study for this reason. Of the 37 patient care units eligible to participate in this study, all but 5 were included for a total unit sample size of 32 medical-surgical units.

Unit response rates were calculated by dividing the number of surveys returned from each unit by the number of eligible RNs on that unit. Individual data were aggregated for analysis at the unit level, so a 50% response rate from each participating patient care unit was targeted. This target was chosen based on a recommendation by Verran, Gerber and Milton (1995) that the majority of the individuals comprising the group level (in this case the patient care unit) would ensure group level representativeness (Verran et al. 1995). However, only 10 of the 32 units in the sample met the 50% target so the necessary response rate was reevaluated. A review of similar studies aggregating individual level responses to the level of the patient care unit showed analysis of aggregate data with response rates ranging from 35% to 44%

(Estabrooks, Midodzki, Cummings, Ricker, & Giovenetti, 2005; Gittell, et al., 2000; Manojlovich, Antonakos, & Ronis, 2009; Upenieks, 2003; Weston, 2006). When examining the impact of nursing characteristics on 30 day mortality, Estabrooks et al. (2005), relied on a 35% response rate of eligible nurses. Gittell et al.(2000), had individual provider response rates between 38% and 75% in a study looking at factors impacting unit level patient satisfaction. Upnieks (2003) had 44% individual return rate when studying the impact of magnet hospital characteristics on RN job satisfaction aggregated to the hospital level. Similar to this study, the surveys were dispersed by the patient care unit directors to nurses for return to a central location, not the nurse manager (Upenieks, 2003). In order to conserve data, Weston (2006) and Manojlovich (2008) aggregated to the unit level with less than 50% response rates. In both of these studies, RN perceptions of professional practice characteristics were collected (control over practice and nurse – physician relations respectively). Weston included units with a participation rate as low as 40% and Manojlovich all participating units, therefore including units with return rates as low as of 6% (Manojlovich, et al., 2009; Weston, 2006).

Raudenbush & Bryk (2009), established researchers in the field of education, recommend that the sample size for the individual or lower level (the level of data being aggregated) consider the sample's homogeneity in responses (Raudenbush & Bryk, 2009). In this study, the units included that were lower than 50%, had 5 respondents or more, demonstrated high intra-class correlations (ICC1) as well as within group reliability (r_{wg}) greater than 0.98. Therefore, in order to preserve data and achieve an adequate sample for this study, all units meeting 35% or greater eligible RN participation were maintained in the final unit level analysis. The final sample consisted of 24 patient care units, meeting the projected sample size needed to address the research questions in this study.

Table 4 presents a profile of the unit response rate by patient care unit and hospital. The hospital with the greatest number of eligible units had the lowest participation rate. No other distinguishing characteristics between hospital units that achieved high enough response rates for inclusion and those that did not were noted. A Mann-Whitney test failed to reveal statistically significant differences between mean responses to the study instruments (PES, NCCI and RCI) on units eligible for unit level analysis and those not (Mann-Whitney $p \geq 0.05$).

Table 4

Hospitals, Participating Units and Actual Percentage Participation Rate

Hospital Number	Number of Participating / Eligible Units	Number and Percent of participating Units with Participation ≥ 35%	Patient Care Unit	Percent of eligible RNs participating
# 1	8 / 9	7 units (88%)	1	53%
			2	47%
			3	15%
			4	50%
			5	36%
			6	50%
			7	40%
			8	50%
#2	14/16	8 units (57%)	9	37%
			10	40%
			11	36%
			12	20%
			13	19%
			14	36%
			15	50%
			16	40%
			17	24%
			18	22%
			19	40%
			20	46%
			21	11%
			22	25%
#3	8/10	7 units (88%)	23	35%
			24	50%
			25	22%
			26	50%
			27	71%
			28	54%
			29	50%
			30	75%
#4	2/2	2 units (100%)	31	36%
			32	47%

Individuals (Registered Staff Nurses). The individual RN demographic survey collected information about the nurses: highest nursing degree, highest non-nursing degree (if any), years of experience in nursing, years experience on current unit, shift and length of shift worked, employment status and race. The nurses comprising this sample were predominately BSN prepared (almost 50%), with just over 33% of the sample reporting a bachelors degree outside of nursing. Just over 50% of respondents had more than 10 years of experience in nursing, although only 20% had worked on their current unit more than 10 years. The largest group of respondents (30%) reported working on their current unit from one to five years. A majority (86%) of the participating nurses worked full time, 12 hour shifts. Over 60% were day shift employees and 35% worked night shift. The largest percentages of reported race were: white (34%), African-American (31%) and Asian (19%). National statistics reflect a much higher percent of white nurses in the work force. A survey conducted in 2004 found that more than 81% of registered nurses employed in nursing self-select white (non-Hispanic) as their racial/ethnic background (U.S. Department of Health and Human Services, 2004). The higher percentage of minorities in this sample may be reflective of the primarily urban southeastern location of the participating hospitals. Known to have a greatly increased in minority population over the decade, the most recent U.S. Census Bureau data are 33%, white, 61% black and almost 5% Asians residents in this area (AJC, 2010; Bureau, 2000). See table 5 for the specific demographic composition of this sample of RNs.

TABLE 5

RN Demographic Data

Variable:	Selection:	Total sample (n = 32 units) Staff nurses (n = 335)**	≥ 35% Response rate* (n = 24 units) Staff nurses (n = 296)
Highest Nursing Degree	Diploma	57 (16.9%)	50 (17.1%)
	Associate degree	96 (29%)	84 (28.8%)
	Baccalaureate degree	161 (48.6%)	144 (49.3%)
	Masters Degree	16 (4.8%)	13 (4.5%)
	Doctorate	1 (0.3%)	1 (0.3%)
Highest Non-Nursing Degree	Associate degree	42 (12.5%)	38 (12.8%)
	Baccalaureate degree	84 (25.1%)	75 (25.3%)
	Masters degree	16 (4.8%)	15 (5.1%)
	Doctorate	1 (0.3%)	1 (0.3%)
	No response***	192 (57.3%)	167 (56.4%)
Years as a nurse	Less than 1 year	12 (3.6%)	11 (3.8%)
	Between 1 and 5 years	76 (22.9%)	71 (24.2%)
	Between 6 and 10 years	65 (19.6%)	57 (19.5%)
	Greater than 10 years	179 (53.9%)	154 (52.6%)
Years on unit	Less than 1 year	38 (11.4%)	34 (11.6%)
	Between 1 and 5 years	150 (45.0%)	134 (45.6%)
	Between 6 and 10 years	75 (22.5%)	64 (21.8%)
	Greater than 10 years	70 (21.0%)	62 (21.1%)
Work status	Full time	289 (86.3%)	254 (85.8%)
	Part time	35 (10.4%)	31 (10.5%)
	Per diem	11 (3.3%)	11 (3.7%)
Shift Worked	Days	197 (61.8%)	178 (62.9%)
	Evenings	12 (3.8%)	7 (2.5%)
	Nights	110 (34.8%)	98 (34.6%)

Length of Shift	8 hours	40 (12.7%)	35 (12.5%)
	10 hours	4 (1.3%)	4 (1.4%)
	12 hours	271 (85.8%)	239 (85.7%)
	Other	1 (0.3%)	1 (0.4%)
Race	White	135 (34%)	116 (40%)
	Non-Hispanic	3 (0.9%)	3 (1%)
	Hispanic	4 (1.2%)	4 (1.4%)
	Native American	1 (0.3%)	1 (0.3%)
	African American	101 (30.7%)	89 (30.7%)
	Asian	63 (18.8%)	56 (19.3%)
	Other	23 (0.7%)	21 (7.2%)

** ≥ 35% response rate*
*** Two RN respondents removed prior to descriptive analysis due > 10% missing data*
** **This category (highest non-nursing degree) had a high non-response rate so this was included in category to maintain integrity of percentages totaling 100 consistent with other categories.*

Analyses were conducted to compare the demographic characteristics of the individual RNs who participated from patient care units with very low response rates (less than 35%) to the total sample. Demographic data collected were all categorical, so comparisons were conducted with the individual level data using a Chi-Square test for each characteristic. Each demographic was grouped into two groups to meet chi square assumptions for cell size and also for more meaningful comparison. See table 6 for demographic variables and how they were grouped. No significant differences were found using χ^2 (2, $p < 0.05$) between demographics of the individual RNs from units included in the unit level analysis the total sample of participating RNs.

Table 6: Groupings of Demographic Variables

Demographic Variable	*Group 1:*	*Group 2:*
Nursing degree	Less than Bachelors	Bachelors or above
Highest non-nursing degree	Less than Bachelors	Bachelors or above
Years as a nurse	Less than 6 years	Greater than 6 years
Years on the unit	Less than 6 years	6 or more years
Shift worked	Days	Evenings or Nights
Hours worked	8 or 10 hours	12 or other hours
Race	Caucasian	All others

Demographic Summary. This sample consisted of 27 nurse managers and 337 staff nurse respondents from 4 acute care hospitals and 32 patient care units. Units with less than 35% of staff nurses responding were excluded from further analysis. Respondents missing greater than 10% of data were removed from analysis. Therefore, the final sample for data analysis at the unit level consisted of 20 nurse managers and 296 staff nurses on 24 units. No significant demographic differences were found between the demographic characteristics of nurses from units included in the unit analysis (units with greater than 35% participation) and characteristics of RNs from the units that were not included for the unit level analyses.

Missing Data Management

Before further analysis of the research questions, missing data were explored. There was less than 10% missing data on all demographic variables. For the three survey instruments, if more than 10% of the items were missing within any total scale or subscale, the entire scale or subscale score was deleted from analysis. For survey instruments missing less than 10% of data, pairwise deletion was used so that the missing variables were removed from analysis but the rest of the data remained in the sample for analysis. When instrument or subscale scores were calculated for individuals, scale means were used. When these individual scores were aggregated to represent unit level scores, mean item means were used. These overall scale and subscale scores were calculated using only the items with responses

Two respondents were missing greater than 10% of all their data (across instruments). These two respondents were removed from both individual and group level analysis. All missing data were also analyzed for any patterns by comparing the unit and demographic variables of those participants with complete response to those with missing data using Chi-square statistics. No significant differences were found. More missing data occurred on the RCI, the final of the three instruments, indicating there may have been survey fatigue or insufficient allocation of time to complete the surveys.

Psychometric Testing

Reliability and validity of each of the three instruments were evaluated at the individual and unit level prior to model testing. An overview of the procedures and criteria used for psychometric testing at both levels is provided followed by a detailed description of the results for each instrument.

Individual Level. The reliability and validity of the three instruments used in this study were first tested at the individual level, using the final sample comprised of 335 eligible RN respondents. Inter-item correlations, Cronbach's alpha, and scale if item deleted were examined to assess the reliability of each instrument and instrument subscale (see table 7). For the NCCI, an acceptable reliability co-efficient is 0.7 or greater because it is a new instrument. The PES and RCI have both been used before with a nursing sample, so a Cronbach's alpha of 0.8 or greater was desired (Strickland, 2006). A principal components analysis with varimax rotation was performed to evaluate construct validity. The three survey instruments were examined for the number of underlying constructs and compared to results from prior use of these measures. The PES-NWI was supported for use as a comprehensive score, as it is used in this study. A confirmatory analysis was also performed. The number of factors was selected a-priori to corroborate previously published subscales and compare to the exploratory findings. Factor loadings greater than 0.30, Eigen values greater than one, and the scree plots were assessed for agreement with subscales and scoring guidelines for each instrument (see table 8).

Table 7
Instrument Reliability Measures at the Individual Level

Instrument / Subscale	Number of items	Mean Score	Standard Deviation	Range for Corrected Item-Total Correlation	Cronbach's Alpha
Practice Environment Scale (PES)	31	2.9	.42	0.41 – 0.76	0.95
Nurse Care Coordination Inventory (NCCI)	45	3.2	.40	0.10 -0.54	0.86
NCCI – General A	10	2.2	.81		0.87
NCCI – B1	4	4.3	.83		0.81
NCCI – B2	6	2.8	.82		0.83
NCCI – C1	4	3.5	.85		0.89
NCCI – C2	6	3.2	.81		0.85
NCCI-Sp1	6	3.3	.58		0.67
NCCI-Sp2	7	3.5	.55		0.70
NCCI-Sp3	2	3.1	.68		0.59
Relational Coordination Inventory (RCI)	56	4.0	.42	0.22 - 0.58	0.94

Table 8:
Individual Level – Confirmatory Principal Components Analysis

Instrument	Previous Subscale Structure	# of Factors	# of Items	% of Explained Variance	Factor Loading Range
Practice Environment Scale (PES)	5	1	31	42.18%	0.43 – 0.79
Nurse Care Coordination Inventory (NCCI)	8	8	45	60.27%	0.00 – 0.59
Relational Coordination Inventory (RCI)	7	7	54	61.78%	0.03 – 0.60

Unit Level. After reliability and validity of the survey instruments were determined at the individual level, psychometric evaluation of each of the instruments was performed at the unit level. The measure of the practice environment, staff nurse care coordination and relational coordination are a reflection of the mean of the individual responses comprising the patient care unit. These are composition variables assumed to be essentially identical in higher level and lower level constructs. When aggregated, these variables represent a convergence at the unit level of the individual level characteristics.

Content validity of the three instruments at the unit level was established first. Each of these instruments was designed for use at a group level (e.g. a group of nurses comprising a unit) and utilizes a group level referent. It has also been suggested that the "representativeness" of the lower, individual level of the sample is critical to validity of a measure at the group or higher

level (i.e. the patient care unit). Representativeness refers to having a reasonable number of group members participate to assure that any aggregated responses reflect the entire group. As noted earlier, a 50% participation rate is considered assurance of an adequate group representation (Verran, et al., 1995). If the group demonstrates homogeneity in their responses, a smaller sample size can be used (Raudenbush & Bryk, 2009). For this study, a 35% participation rate was used as the cut-off for unit level analysis. Homogeneity of the sample (intra-class correlations and within-group agreement (r_{wg}) were both high) supports the representativeness of this smaller sample despite being less than 50%.

For all units with a 35% or greater response rate, within group agreement (r_{wg}) was assessed. Within group agreement compares the variability of measurement within a specific unit to the expected unit. If this measure is greater than 0.6 (or close to 1) there is evidence there is a high level of agreement in responses within the patient care unit. Obtaining an (r_{wg}) greater than 0.6 supports aggregating the individual RN data to the patient care unit level for analysis as these aggregated individual measures are an appropriate representation of the higher level group (Verran, 2007).

To further establish construct validity and support for the aggregate level measure, the intra-class correlation coefficient (ICC) was assessed. The ICC indicates whether the between group variability is greater than the within group variability, and although it is essentially a measure of reliability, supports validity as a unit level measure and is necessary to test substantive theoretical models (Klein & Kozlowski, 2000). Different measures of the ICC exist. For this study the ICC (2) was assessed because it has an identified criterion level (Bliese, 2000). It is calculated by running an ANOVA and using the mean squares differences (within group mean square – between group mean square / within group mean square). Generally, the ICC2

should be greater than 0.6 to indicate that between group variability is sufficiently greater than within group variability. A large ICC also indicates sufficient variance exists across the sample (Verran, 2006). See table 9.

Table 9

Unit Level Instrument Reliability and Construct Validity Testing Results

Instrument / Subscale	**Average Within-group agreement (r_{wg})**	**Range of within-group agreement (r_{wg})**	**Anova F/ Significance**	**Intra-class correlation coefficient ICC (2)**
Practice Environment Scale (PES)	0.98	0.96-0.99	2.7 / .00	0.68
Nurse Care Coordination Inventory (NCCI)	0.97	0.96-0.99	1.54 / .06	0.30
NCCI – General A	0.97	0.96 – 0.99	2.38 / .00	0.58
NCCI – B1	0.98	0.96 – 0.99	1.47 / .08	0.27
NCCI – B2	0.98	0.94 – 0.99	1.19 / .26	0.24
NCCI – C1	0.95	0.92 – 0.99	1.04 / .11	0.32
NCCI – C2	0.95	0.92 – 0.99	1.05 / .03	0.54
NCCI-Specific 1	0.95	0.94 – 0.99	1.80 / .01	0.32
NCCI-Specific 2	0.95	0.94 – 0.99	1.30 / .19	0.05
NCCI-Specific 3	0.94	0.92 – 0.98	2.15 / .00	0.54
Relational Coordination Inventory (RCI)	0.99	0.97-0.99	1.13 / .31	0.05

Study Variable Psychometrics

PES-NWI. Lake's (2000) Practice Environment Scale asked individual RNs to provide their perceptions about the nurse practice environment. The nurse-specific (individual level) scores were calculated as a mean of the items in each of the five subscales: nurse participation in hospital affairs, nursing foundation for quality care, nurse manager ability, leadership and support, staffing and resource adequacy and collegial nurse physician relations. For unit subscale scores these means were aggregated and the item-level means were used to calculate the group (or unit level) subscale scores. The overall PES-NWI "composite" score represents the mean of these five subscale scores.

Reliability of the PES-NWI as a total instrument was supported in this study by a Cronbach's alpha of 0.95 at the individual level of analysis (table 7). Deleting any single item would not result in an increase in the alpha coefficient. When five factors were forced (see confirmatory analysis table 8) the factors loaded cleanly to the five components that Lake has named as subscales (Lake, 2002). However, exploratory analysis supported use of the one comprehensive score because the first factor contributed to 42% of the variability with all factor loadings greater than 0.4. This is consistent with previously published research, where a principal components analysis supported valid use of the instrument as a single scale representing a comprehensive measure of the practice environment (Estabrookes, et al., 2002). The PES-NWI also performed well as a unit level measure. The within-group agreement (r_{wg}) was almost one (0.98), supporting construct validity, and the ICC2 was greater than 0.6 (0.68) demonstrating greater variability in the individual responses between units than the individual responses within units.

NCCI. The NCCI was developed to measure the quality and quantity of activities of staff nurse care coordination as perceived by the staff nurses. It was designed for use on medical surgical hospital units. There are four distinct sections of the instrument: general A, B, C, and specific. Each of the general sections uses a different question stem and specific asks a list of 15 distinct questions regarding occurrences of coordination on the nurses' usual shift. There is only an initial psychometric testing of the NCCI offering an 8 factor solution. See table 10 for subscales based on initial factor solutions (Lamb, et al., 2007).

Table 10

NCCI subscales

Subscale Names	*Question Stem*	*Domains:*	*Item Numbers:*
General A	How much time do you spend on this activity in a usual shift?	All	Section A: 1-10
B1	How high is this activity on your priorities for a usual shift?	Checking, Organizing	Section B: 3, 4, 9, 10
B2		Mobilizing, Exchanging, Assisting, Backfilling	Section B: 1, 2, 5, 6, 7, 8
C1	How much time did you spend on this activity in the <u>last shift</u> you worked?	Checking, Organizing	Section C: 3, 4, 9, 10
C2		Mobilizing, Exchanging, Assisting, Backfilling	Section C: 1, 2, 5, 6, 7, 8
Specific 1	Please think about your usual shift and respond to each of the following questions:	Mobilizing	Section D: 1,2,3,5,7,10
Specific 2		Assisting, Organizing, Checking	Section D: 4,8,9,11,12,13, 15,
Specific 3		Backfilling	Section D: 6, 14

Each of the first three sections (General A, B, C) of the instrument consists of ten questions each measured on a 5 point likert-type scale. In the first of these sections (General A) higher number numbers indicate greater amounts of time spent during the usual shift on activities of care coordination. The second section (General B) again uses the usual shift as a referent with the higher numbers indicating a higher perceived priority for these same activities. The third section (General C) mirrors the first two sections regarding the activities, asking about the amount of time spent on the activity but uses the last shift as the referent and again, higher scores indicate a greater amount of allocated time as perceived by the nurse. However, this third section asks the nurse to not just to rate an amount, but adds a value to the response with the options ranging from 1 rated as "less than I should" to 5 indicating "more than I should". This rating guide indicates that the best answer would be three (or just right), which is inconsistent with the scoring on the rest of the instrument. Finally, the last section of the instrument includes 15 questions, asking about the frequency of a set of specific care coordination activities. This section references a usual shift again and measures on a five point likert-type scale with the addition of a not applicable response. With the exception of the third section, the scoring is also positive, so higher numbers indicate greater frequency of activity (never to always).

Cronbach's alpha for the NCCI total scale at the individual level of analysis was 0.86 (table 7). The alpha did not increase with the removal of any single items. The subscales ranged from 0.59 to 0.87. The lowest alpha (0.59) was for the "backfilling" subscale, comprised of only two items. Inter-item correlations were less than 0.3 for close to half of the items.

The factor structure for the NCCI did not completely support the current eight subscale structure. However, this was only the second time this instrument has been used, so the original subscale structure reflects preliminary results. An exploratory factor analysis with the data from

this study provided anywhere from an eight to eleven factor solution explaining between 61% and 68% percent of the variance. Forcing an eight factor solution took just five iterations and explained 51.7% of the variance. However, several items double loaded and some items did not reflect the original subscales. General A subscale items reflect time allocated on a usual shift for activities across all the domains of the inventory (see table 1). All the items in this subscale loaded on the first factor, with only two items double loading. Subscale B1, reflecting priority of these same activities on the usual shift, but only in the checking and organizing domains, had all items load on factor 2 (.37 or higher). However, two items loaded higher on the fifth factor. Subscale B2, the priority given the assisting, exchanging, mobilizing, and backfilling domains of the inventory, also loaded cleanly on factor 2. This suggests a possibility to have just one general B subscale. Subscale C1 (checking and organizing) and C2 (mobilizing, exchanging, assisting and backfilling) loaded cleanly on factors 3 and 4 respectively. Subscale Specific 1, measuring time allocated for the specific mobilizing care coordination activities on the usual shift, loaded on evenly on both factor 6 and 7. Subscale Specific 2, asking about assisting, organizing and checking activities, loaded evenly on factor 7 and 8. Finally, both items of Specific 3 loaded on factor 6 suggesting a commonality between these two backfilling items and the three mobilizing items from Specific scale 1 that loaded on factor 6 as well. Conceptually there is a link between the items as Specific 3 is backfilling (defined as activities associated with doing the work of other members of the clinical team for which they were responsible but did not do) and three items from Specific 1 are the prompting and directing activities of mobilizing (telling or encouraging an individual from another discipline to carry out an action necessary to carry out the patient's plan of care but not within the authority of the nurse). These results suggest a potential to redefine Subscales Specific 1 and 3 as one subscale reflecting care

coordination activities that are necessarily carried out but are not considered by the RN as a positive use of nursing time. If these activities are perceived as inefficient by the RNs, they also may interfere with the RNs being able to carry out independent care coordination activities such as checking, assisting, exchanging and organizing.

At the unit level, the total scale NCCI demonstrated very high within-group agreement. The r_{wg} ranged between 0.96-0.99. Between groups variability, however, was not high. At 0.30, the total scale NCCI had an ICC2 lower than the desired 0.6. This raises a concern that the unit level means may not measure anything distinct from the individual level means, or that the unit level sample lacks necessary variability. Therefore, following Verran et al. recommendations (1995), each subscale's ANOVA significance and ICC 2 was assessed. For the subscales, the ICC2 ranged between 0.24 – 0.58. Notably, three subscales had an ICC2 very close to the desired 0.6, and also had significant ANOVAs ($p \leq .05$). These three subscales were General A (which also had demonstrated a stable factor structure), C2, and Specific 3, with an ICC2 of 0.58, 0.54 and 0.54 respectively. Based on the psychometric results at the unit level precluding use of the total instrument score to represent a unit level construct, the General A and Specific 3 subscales were brought forward to replace the total NCCI score. Only the General A subscale and Specific 3 subscale were used to analyze the study aims. Subscale C2 was dropped for research question analysis due to concerns regarding the rating of the scale. It is inconsistent with the rest of the instrument because the scoring directions for C2 do not take into account the value level of the rating matched to the response. Consistent with the rest of the scale, a 1 to 5 score is assigned to the response. However, a score of 5 does not necessarily reflect the most positive response. The third or middle option is the most desirable response since it represents that the right amount of time is spent on the care coordination activity.

RCI. Gittell's Relational Coordination Instrument (RCI) measures the construct of relational coordination between roles on a team. For this study the RCI was implemented as a secondary measure of staff nurse care coordination. It is conceptualized as a comprehensive score to describe the quality of the relationships required for care coordination as perceived by RNs. Caring for patients, in the context of the hospital patient care unit, requires working as part of an interdisciplinary team. The RNs' perceived relational coordination, between themselves and other members of this team, is inferred from the total scores obtained on the Relational Coordination Instrument.

At the individual level of measurement, the RCI demonstrated high reliability. Cronbach's alpha for the 54 question RCI was 0.94 (table 7). An exploratory factor analysis resulted in a 7 factor solution explaining 62% of the variance. A confirmatory factor analysis to align with the seven domains described for this scale produced a solution after 17 rotations (table 8). However this method only explained 55% of the variance and several items double loaded. A closer examination of the 7 subscale structure indicated that there may be a common response set from the nurses regarding the disciplines with less interaction with their work team (the dietician, physical therapists and social workers). These results suggest there may be opportunity to reduce questions relating to disciplines having less involvement with the nurse for a more parsimonious measure.

At the unit level of analysis, within-group agreement (r_{wg}) for the RCI was high ranging from 0.97 – 0.99. However, the ICC2 for the RCI was almost zero (0.05), below the desired 0.6. This finding presents a concern for the instruments' use as a backup measure of staff nurse care coordination at the patient care unit level. Its analysis as part of the study aims is included but any conclusions must take this validity issue into consideration.

ASCC. The percent of patients with ambulatory sensitive chronic conditions (ASCC) is conceptualized as a compilation variable and measured at the unit level. Compilation variables vary and are distinct across the individuals (in this case the patients) comprising the unit. When compilation variables are aggregated to the unit level they take on a new meaning, different from how they necessarily exist at the individual level, and become their own, new variable characteristic of the unit not of an individual patient. For this reason, there was no theoretical need to assess the percent of patients with ambulatory sensitive chronic conditions for reliability or validity at the individual level. For the purposes of analysis this variable exists only as a unit level variable.

The ASCC exists as continuous data points representing the percent of patients discharged from a participating patient care unit with one of five chronic conditions recognized as "ambulatory sensitive". Hospitals were asked to calculate the percent of patients with at least one of 19 ICD-9 codes at discharge, in any location in their recorded diagnostic codes, out of the units' total discharged patients over a three month period. These 19 ICD-9 codes were selected because they have been identified as some of the most common adult ambulatory sensitive chronic conditions. The chronic illness codes include diagnoses of asthma, congestive heart failure, hypertension, chronic obstructive pulmonary disease and diabetes (table 11).

Table 11:

ASCC percentages for unit level analysis

		ASCC %
Hospital 1	1	4.4
Unit:	2	12.1
	4	10.9
	5	5.9
	6	6.6
	7	8.6
	8	5.2
Hospital 2	9	2.4
Unit:	10	6.8
	11	4.2
	14	2.5
	15	4.0
	16	4.2
	19	1.3
	20	8.6
Hospital 3	23	49.8
Unit:	24	45.2
	26	63.5
	27	N/A*
	28	60.7
	29	67.5
	30	67.3
Hospital 4	31	43.9
Unit:	32	38.8

(units $\geq$ 35% participation)

*ASCC not available for this unit (all are renal dialysis patients).

ASCC data were collected from a designated hospital administrator who was provided with calculation guidelines and with the assistance from the primary investigator (see appendix B). There was substantial variability in data reported across the 4 hospitals. The range for hospital one and two for ASCC percentages was between 2.5 to 12.1. The range for hospital three and four for ASCC percentages was between 45.2 and 67.5. The data were reviewed and verified with each hospital administrator. During this process, it was noted that the hospitals also varied in the number of ICD-9s documented per patient (between 15 and 30 depending on hospital) and the type of ICD-9s reported (ex: hypertension diagnoses comprised the majority of one hospital's reported ASCCs and only 5% of another, at another hospital one code included in this study relating to heart failure was not a coding option for their patients). For this reason, after multiple reviews of these data, it was determined that the variability in coding decisions related to ICD-9s made the reliability questionable across hospitals. These procedural differences may explain variation in the percentages between the hospitals, as opposed to the actual patient populations being different. Within the hospitals, the data collection methods and coding procedures were consistent. These data are believed to accurately reflect the variation in percent of patients with ASCC between units in the same hospital. Therefore, the percent of patients for units within the same hospital were analyzed for any relationships to the practice environment and to staff nurse care coordination. In light of the small sample size and questions about the differences across hospitals, these data were used only to explore possible trends to pursue in future studies, not in full model testing.

Summary of Psychometric Testing. The reliability and validity for all three study instruments (PES-NWI, NCCI, and RCI) was supported at the individual level of analysis. Each

of these instruments demonstrated high Cronbach's alphas, acceptable inter-item correlations and scale if item deleted did not result in any improvements. Exploratory analysis supported construct validity and the current subscale structures were supported with confirmatory factor analyses.

At the unit level of testing, however, psychometric results were mixed. The instruments all had very high within-group agreement, indicating that nurses within the same unit responded consistently alike to survey items. Only the PES-NWI met the recommended 0.6 for the ICC2, indicating that there was sufficiently more variability in responses to items from nurses between units than within patient care units. Three of the identified eight subscales of the NCCI (General A, C2 and Specific 2) were very close to the desired 0.6 (all above 0.5) as well as having significant ANOVAs ($p \leq .05$). As a comprehensive inventory, however, the ICC2 for the NCCI was low at 0.3 and the ANOVA was not significant. The RCI, routinely used as a team measure by aggregating individual level responses, also had a very low ICC2 (close to zero). The ASCC percentages, a unit level measure, are so disparate between hospital organizations that this variable is statistically difficult to analyze and restricted in interpretation due to the small sample size.

Based on the results of psychometric testing, necessary adjustments were made to the study instruments prior to research question analysis. The PES-NWI total score remains the measure of the nurse practice environment. However, the NCCI General A and Specific 3 subscales replaced the NCCI total scale score as the measure of staff nurse care coordination. The RCI total scale score remains an alternate measure to staff nurse care coordination, but with recognized concerns as a unit level measure. And finally, the percent of patients with ASCC on

each patient care unit is an antecedent measure to the practice environment and staff nurse care coordination, yet is limited to the units within a single hospital.

Addressing the Research Questions

To address the study research questions, analysis was conducted using only the 24 units meeting the quota of 35% eligible RN participation. Analysis was conducted at the unit level using the PES as a comprehensive measure and two NCCI subscales (General A and Specific 3 subscales) rather than a total scale NCCI score. The RCI was analyzed as a secondary measure of nurse care coordination, with the caveat that it may not be valid as a unit level construct. Correlations were examined between these model variables prior to model testing. At this level of analysis, instrument scores reflect unit means of the individual level means; therefore the central limit theorem supported using Pearson's Correlation Coefficient to look for correlations between the model variables. Analysis was additionally conducted using multi-level methods to distinguish the contribution to variance of the PES-NWI measure at both the individual and the unit level of analysis to each of the care coordination measures. Last, linear regression was used to test the research questions and determine any contribution to variance from each of the model variables.

Q1.A: What is the relationship between the perceived professional practice environment (Lake's PES-NWI) and nurse care coordination (Lamb & Gittell Instruments) reported by staff nurses on acute care medical-surgical units?

Operational measurement for this first research question was modified after psychometric testing. The total NCCI score had a low ICC2 and the ANOVA was not significant, indicating it may not be a valid measure at the level of the patient care unit. The General A and Specific 3

subscales had an ICC2 very close to the desired level of 0.6 and a significant ANOVA, so replaced the total NCCI in correlations and regression analysis.

Both subscales had a significant, negative relationship with the PES-NWI. At $p \leq .05$ the following negative correlations were found: PES-NWI and the NCCI General A subscale ($r = -.41$), PES-NWI and the Specific 3 subscale (frequency of backfilling) ($r = -.51$). The PES-NWI was also positively and significantly correlated with the RCI total score ($r = 0.48$, $p \leq .05$).

Regression analysis determined that the proportion of variance explained by the PES-NWI for the General A subscale was 0.17 ($p=.05$) and for the Specific 3 subscale was 0.26 ($p=.01$). This considered a moderate effect size but is slightly underpowered with a sample size of 24 units (56%). As the alternate coordination measure, the RCI had a low ICC2, bringing in to question its' appropriateness as a unit level measure. However, the RCI did have a significant, positive relationship with the PES-NWI and the proportion of variance explained was 0.23 ($p=.02$). The effect size of the PES-NWI as a predictor of the RCI is slightly larger and higher powered (72%). These results suggest that the perceived nurse practice environment on the patient care unit has an inverse relationship to the amount of time spent on activities of care coordination by the RNs but a positive effect on relational coordination between patient care team members as perceived by the RNs.

Q1.B: What is the relationship between the percent of patients with ambulatory sensitive chronic illness on the nurses' practice environment and on the process of staff nurse care coordination on acute care medical surgical units?

Research question number 2 was analyzed with unit data from within each of the four participating hospitals instead of with the unit data from across the entire sample of hospitals. This decision was made due to potential differences in the way that ICD-9 data were coded

across the participating hospitals. Although it was determined that these data may have been reliable and valid across units within each hospital, there was questionable comparability between hospitals. For example, one hospital's highest reported ICD-9, 43% of all medical-surgical unit discharges, was code 401 (hypertension). However, another hospital reported negligible percentage of this code, while the third and fourth reported none, and it was unclear whether this last hospital even included 401 as a diagnoses coded.

Analysis was subsequently conducted within in each hospital and it was found that within Hospital 3, the ASCC percentages were significantly related to the NCCI General A subscale score ($r= .89$, $p=.01$). Despite having a sample size of only 7, the effect of the ASCC was well powered (98%, $p\leq.05$). Additionally, when the one outlier patient care unit was removed from the hospital three unit level analysis there was a significant negative relationship between the ASCC percentages and the RCI frequency of communication subscale ($r=.88$, $p=0.2$). This effect was also well powered (92%, $p\leq.05$). The medical-surgical patient population on this unit was hematology-oncology. The ASCCs related to hematology-oncology were not included as codes of interest for this study because they were not considered the most common. This may explain why this unit reported the lowest ASCC percentages as well as the lowest RCI frequency subscale means and therefore showed up as an outlier. These two significant relationships found at Hospital 3 are both negative. This finding suggests that on units with a higher percentage of ASCC patients, RNs perceive less time spent on activities of care coordination and that there is a lower frequency of communication with the interdisciplinary team regarding the patients' care. No relationship was found between ASCC and the PES-NWI scores, NCCI Specific 3 subscale, the total RCI score or any other of the RCI subscales.

Q1.C: What is the relationship between hospital characteristics identified as size, teaching status, and ownership, on the perceived professional practice environment on acute care medical-surgical units?

No significant interactions were found between any of the identified hospital characteristics. Hospital size, teaching status and ownership were also run as covariates in the overall model, with no significant relationships. Hospital membership, as a single covariate, was also insignificant. No obvious trend was noted with any of the hospital level antecedents (size, teaching status, ownership) to the PES-NWI or the NCCI. Hospital level variables and hospital membership were dropped as covariates and not included in the final model (table 12).

Table 12

Results of Linear Regression for Study Research Questions

Research Question	Independent variable	Dependent variable	R	R^2	ß	*p*
RQ 1 A	PES-NWI	NCCI Gen A	-.41	.17	-.41	.05
		NCCISS3	-.51	.26	-.51	.01
		RCI	-.23	.23	.48	.02
RQ 2 *	ASCC	PES-NWI	.37	.14	.37	.37
		NCCI Gen A	.88	.79	- .68	.01
		NCCISS3	.01	.01	.08	.88
		RCI	.01	.02	.13	.81
RQ 3**	Hospital size	PES-NWI	N/A	N/A	N/A	N/A
		NCCI	N/A	N/A	N/A	N/A
		RCI	N/A	N/A	N/A	N/A

* RQ 2 uses hospital 3 unit data only.
** Analysis limited due to small sample size (4)

Prior to regression analysis, hierarchical linear modeling (HLM) was used to partition the contribution of variance between the predictor at level one (individual RNs within the patient care unit) and level two (between patient care units) to provide further support for the model variables at the patient care unit level. The percent of variance seen in the care coordination measures (RCI and NCCI subscales) that could be attributed to the work environment measure (PES-NWI) at each level is presented in table 13. The PES-NWI is significant as either a level-1 or level-2 predictor of the RCI. For the NCCI subscales, for general A, specific 1, specific 2 and specific 3, the PES-NWI (comprehensive score) is a significant level-2 predictor. These multi-level methods supported examination of the research questions for all of the variables at the level of the patient care unit, consistent with the study model presented.

Table 13:
Partitioned Variance -Individual Level (level 1) and Unit Level (level two)*:

Outcome (Y_{ij})	**Predictor** $\frac{(X_{ij} - \bar{X}_{.j})}{\bar{X}_{.j}}$ or	*** = Significant @ ≤ 0.05** **Level-1/Level 2**	**% variance at level-1**	**% variance at level-2**
RCI	PES-NWI	* / *	11.7%	11.7%
NCCIA	PES-NWI	* / *	6.31%	28.4%
NCCISp3	PES-NWI	* / *	10.43%	47.6%

* Included variables

HLM results do not support use of table 14 scores at the unit level (not significant at .05 or less) for model testing. This is consistent with prior psychometric testing at the unit level. The HLM analysis further supports use of the PES-NWI, NCCI General A and Specific 3 subscales as well as the RCI total score which were chosen for study research question analysis (table 13).

Table 14: Partitioned Variance -Individual Level (level 1) and Unit Level (level two)**

Outcome (Y_{ij})	**Predictor** $\frac{(X_{ij} - \bar{X}_{.j})}{\bar{X}_{.j}}$ or	*** = Significant @ ≤ 0.05 Level-1/Level 2**	**% variance at level-1**	**% variance at level-2**
NCCIB1	PES-NWI	ns / ns	0.53%	-8.6%
NCCIB2	PES-NWI	ns / ns	0.57%	-22.4%
NCCIC1	PES-NWI	ns / ns	10.35%	-3.23%
NCCIC2	PES-NWI	ns / ns	4.39%	19.83%
NCCISp1	PES-NWI	ns / *	-0.32%	29.09%
NCCISp2	PES-NWI	* / ns (* ≤ .1)	1.20%	3.51%

**Excluded Variables

Summary

The primary aim of this study was to determine whether a relationship existed between characteristics comprising the nurse practice environment and the process of staff nurse care coordination on acute care medical-surgical units in the hospital. Four hospitals with 32 medical-surgical units and 750 eligible RNs participated in this study. Individual RN

participation was greater than 40%. Psychometric evaluation of the instruments was conducted on all RN responses at the individual and unit level. At the individual level all instruments were supported as reliable and valid. After aggregation of data reliability and validity of the instruments for use at the unit level was established prior to use in the final unit level model. This resulted in the use of the PES-NWI total scale score as planned, a substitution of the NCCI General A and Specific 3 subscale for the NCCI total scale score, and the RCI total scale score and ASCC percentages with noted limitations. A criterion of 35% eligible RN participation was required for inclusion of a unit in final model testing. Model testing revealed significant relationships between the measure of the practice environment (PES-NWI) and measures of staff nurse care coordination (NCCI Subscales A and Specific 3, RCI total score). A negative relationship was found to be significant between the PES-NWI and the frequency of nurse care coordination activities measured by the two NCCI subscales. In contrast, a positive relationship was found between the measure of the practice environment (PES-NWI) and the RCI, the alternative measure of care coordination.

Due to the small sample size at the hospital level, antecedents in the model were all analyzed but unable to be statistically interpreted. Disparity of the reported ASCC percentages and differences in data reporting between the four hospitals prevented analysis of this variable across all four hospitals. Instead, the ASCC percentages were analyzed within each hospital, and were found to be significantly related to the amount of time spent on general activities of staff nurse care coordination (NCCI General A) within hospital three. This was a strong, negative relationship. When an outlier unit was removed from analysis, a significant and strong relationship was found between the ASCC percentages and the RCI frequency subscale. No relationship was found between hospital characteristics and the ASCC percentages or between

any of the antecedent variables and the PES-NWI scores. Additionally, hospital characteristics did not demonstrate any interaction effect as an antecedent or any significance when entered as covariates.

Chapter 5

Conclusions

This was the first study to explore the relationship between characteristics of the staff nurses' practice environment and the process of staff nurse care coordination on medical-surgical hospital units. Main findings from this study were significant relationships between the professional practice environment, as perceived by the nurses, and measures of staff nurse care coordination. Understanding this link is an important first step to promoting best practices in nursing care and improving patient outcomes, as suggested by the IOM's 2004 Report "Keeping patients safe, transforming the work environment of Nurses" (Institute of Medicine, 2004). This chapter discusses the results of this study from the perspective of Donabedian's Quality of Care Model, a commonly used framework for healthcare improvement studies, as well as current state of the science in nursing systems research. Implications for future research and discussion of study limitations are also included.

Discussion

The Professional Practice Environment and Staff Nurse Care coordination

This study found that nurses who perceive a higher level of professional practice in the work environment report less time spent on the general activities of staff nurse care coordination (NCCI General A subscale), a lower frequency of specific backfilling activities (NCCI Specific 3 subscale), and higher levels of relational coordination (RCI total scale). Statistically significant, negative relationships were demonstrated between the PES-NWI and the NCCI General A and

Specific Subscale 3. A statistically significant, positive relationship was found between PES-NWI and the RCI total scale score. The effect of the practice environment was moderate for time spent on general activities of care coordination (General A) and larger for the frequency of backfilling (Specific 3) activities and relational coordination (RCI).

According to the SPO model, a good fit between structure and process is the key to better outcomes. The link explored in this study is between the ratings of professional practice in the staff nurses' immediate work environment, which is the medical-surgical patient care unit, and ratings of the quality and quantity of staff nurse care coordination, as measured by the NCCI. Conceptually, the professional practice environment is defined as one that facilitates the professional practice of nursing, empowering nurses to provide quality patient care. Staff nurse care coordination is conceptually defined as those activities engaged in to assure a smooth hospital stay and transition post discharge (Lamb, et al., 2008). Staff nurse care coordination is considered a critical nursing process and viewed as a priority of care for the profession (IOM, 2000). Literature supports that both a professional practice environment and good staff nurse care coordination leads to better patient outcomes (Aiken 1994, Friese, 2008). Consequently, on units rated highly by nurses on the characteristics of the professional practice environment, a good fit with process indicates these units would also have higher ratings of staff nurse care coordination. Ultimately this match between the nurses' practice environment and nursing process contributes to better patient outcomes.

Findings from this study demonstrated that higher rated professional practice environments were associated with less frequency and time spent on staff nurse care coordination activities. The eight subscales of the total NCCI ask nurses in different ways about the amount of time spent on activities of care coordination as well as the priority and frequency of these activities.

All together, the subscales cover six different care coordination domains (table 1). After consideration of the subscale psychometric testing results, two subscales were selected for research question analysis: General A (crossing all domains) and Specific 3 (backfilling domain). There was a significant relationship for both of these two NCCI subscales; the first measuring perceived amount of time spent on general care coordination activities and the second measuring frequency of backfilling activities. Interpreting this negative relationship between care coordination activity and the practice environment in the context of the PPE-NWI and the concepts that comprise this measure offers insight into nurses' perception of their practice and explains how it fits within this study's guiding framework.

The first subscale, General A, asks the nurses to rate the amount of time spent on activities across all of the NCCI domains. The staff nurse engaged in these care coordination activities, across the six care coordination domains, is working to assure a smooth hospital stay for the patient and an effective transition post-discharge, in addition to performing all other required activities for their patients' care. Practice environments facilitating professional nursing practice may facilitate staff nurse care coordination by streamlining the process. RNs in a professional practice environment rate that they have access to and can mobilize resources quickly to respond to patient needs as well as report stronger leadership and better communication with physicians (Friese, 2008; Kramer & Schmalenberg, 2005). These characteristics can decrease the amount of time spent on care coordination activities without compromising the quality of the nurses' work. Additionally, hospitals with a commitment to professional nursing practice and exhibiting this type of environment likely have more organizational processes in place to facilitate the work of nurses. Characteristics of a PPE such as high autonomy, control over practice and staffing numbers can emanate from organizational policies defining nursing practice, scope, and self

governance structures. These organizations are also known for supportive management and better staffing, all potentially contributing to more efficient work (i.e. less time needed) processes for nurses.

Backfilling, the practice of completing tasks owned by another staff member or discipline, but within the scope of the nurses' practice, is a commonly relied on practice in nursing. It is often necessary to backfill for others to maintain the patient on their trajectory of care, assure quality of care and patient safety. However, backfilling can be a symbol of a deficient process. The responsible staff member does not complete their own work as expected so the nurse fills in to prevent omission or delay in subsequent care. While important to patient care, when nurses backfill the work of others, it interferes with them carrying out other activities they have planned. They also may not have enough time to carry out work that requires their own professional skills and experience. Previous studies have identified that nurse job satisfaction is higher when the work environment is one that enables quality care and supports a manageable workload (Adams & Bond, 2000; Ma, Samuels, & Alexander, 2003; Snarr & Krochalk, 1996). The characteristics of a PPE, which include better staffing, more available resources and strong nurse leadership, have been linked to lower nurse dissatisfaction and lower nurse turnover (Aiken, et al., 2008; Aiken, Clarke, Sloane, et al., 2002). Consequently, a negative relationship between a PPE and backfilling frequency is congruent with previous study of nurses as well as with Donabedian's SPO model guiding this study.

In contrast to the NCCI General A and Specific 3 subscales, a positive relationship was demonstrated between professional practice and the back-up measure to nurse care coordination, the RCI. This positive relationship supports the projected relationship between the structural component of the study model and the process component of the study model. This finding is

also consistent with the literature that acknowledges the importance of a professional practice environment to facilitate quality care by nursing and the contributions and coordination necessary between the entire patient care team for the achievement of patient goals (Kramer & Schmalenberg, 2005; Laschinger, et al., 2003; Manojlovich, et al., 2009). Likewise, when relational coordination is high among care team members, patient outcomes are better (Gittell, 2007), indicating also that relational coordination facilitates the work of nurses and their contribution to patient outcomes.

The strength and direction of the relationship obtained between the PES-NWI and the RCI indicates that the RCI may be capturing a different dimension or quality of staff nurse care coordination than the NCCI. The strong, positive relationship between the PES-NWI and the RCI may suggest that the RCI is measuring a construct more similar to the PES-NWI than the NCCI. When relational coordination is high it supports communication, respect, knowledge and relationships necessary for task integration, or in the case of this study, care coordination (Gittell, 2007). The PES-NWI also evaluates communication, specifically between nurses and physicians, autonomy and self-governance as well as availability of resources which both exemplify a level of respect for RNs within the organization. The professional practice environment, measured with the PES-NWI and relational coordination, measured by the RCI, have also both been linked in the literature to job satisfaction and to patient outcomes such as patient morbidity and patient satisfaction with care (Aiken, et al., 1999; Gittell, et al., 2000; Seago, 2008).

Notably, the RCI did not perform as well as the NCCI General A and Specific 3 subscales for use as a unit level measure. The ICC2 for the RCI was close to zero, much lower than the recommended 0.6, and indicates little variability in responses between the patient care

units. When this measure is low, there is a concern that the aggregated data at the unit level is not measuring anything different than the individual level. One explanation for the low ICC2 may be related to the team orientation of the RCI. It was designed to measure at the level of the interdisciplinary team, not the patient care unit. So whether the team is bounded at the level of the patient care unit or is one whose functions cross over multiple patient care units may need more consideration in interpretation of these results. Based on this study's findings consideration of relational coordination as a structural variable influencing nursing process is warranted, instead of as a back-up measure to staff nurse care coordination. No significant relationships were found between the NCCI or its' subscales (with the exception of the NCCI General A subscale and the RCI frequency subscale) and the RCI. This was not anticipated and may suggest that RCI is measuring a comparable construct to the PES-NWI rather than the NCCI. Within the structure-process-outcome (SPO) framework, relational coordination may be a referent, like professional practice environment, of structure, i.e., support or capacity for staff nurse care coordination activities rather than the actual activities of this specific work process of nurses. Structure within the SPO model includes various features of the work environment that do not change on a daily basis. An example is the staffing, or an aptitude for performing work, can indicate a capacity for a given process, such as staff nurse coordination.

This "capacity" or aptitude to perform work featured by the professional practice environment is often cited in the literature as high levels of professional autonomy, control over practice, nurse, collegial physician relations and adequate resources. The professional practice environment has been hypothesized as facilitating nursing care and as a result is associated with better patient outcomes (Aiken, et al., 1994; Friese, 2005). When instruments are not available to measure a specific nursing process, practice has been to measure the capacity for the process,

or the supportive structural features, and deduce the conclusions regarding the process from the capacity findings. An example of this is the recent study by Aiken and colleagues (2008) using the PES-NWI score as indication of the process of surveillance by nurses (Aiken, et al., 2008). Understanding the capacity to perform a process is important, but the implications to practice are different. Relational coordination is a "mutually reinforcing process of interaction between communication and relationships carried out for the purpose of task integration" (Gittell, 2002, p.301). Thus defined, it provides the capacity for task integration, which in this study would be care coordination. Placement of relational coordination within the study model may be different if the relationship between the RCI and PES-NWI indicates a construct similarity with the practice environment (as a facilitator or barrier to practice) rather than the actual process of care.

Antecedents:

The percent of patients with ambulatory sensitive chronic conditions (ASCC) comprising the patient population of a patient care unit was identified as a potential antecedent both to the practice environment as well as to the process of nurse care coordination. Consistent with the study model, results of previous research indicated that this unit characteristic may influence the perception of specialization of care by the nurses (associated with a professional practice environment) as well as provision or quantity of care coordination by unit staff nurses.

As a unit level variable, the ASCC percentages were a sufficient number to analyze (24). No relationships were found between the ASCC percentages and the PES-NWI or the care coordination measures. However, as discussed in chapter 3, this may be explained by the disparity in the data across hospitals, raising the concern that there are different coding practices between the hospitals (not necessarily signifying a different patient population). For this reason,

the data obtained were examined for trends only within each hospital (as opposed to across all hospitals in the sample). One of the four hospitals demonstrated significant findings.

Within hospital 3, ASCC percentages were negatively related to the General A subscale of the NCCI within hospital 3 (r=.-89, p=.01). The patient care units with higher percentages of patients with the identified ASCC conditions reported less time was spent on the activities of staff nurse care coordination for their patients. In addition to this finding, when the outlier patient care unit from this hospital, unit 24, a hematology-oncology unit that justifiably did not have as many of the selected ASCC codes, was not included in the analysis, another significant relationship was found. The frequency of communication subscale for relational coordination, the secondary staff nurse care coordination measure was significant (r = .88, p=0.02). This was also a highly powered relationship, strengthening the indication of a promising trend.

One interpretation of these results may be that a higher percent of ASCC patients on a patient care unit may be comparable to patient care unit specialization in service lines or in patients with similar diagnoses and care needs. A higher percent of patients with ASCCs may allow greater efficiency in nursing care, as evidenced by less time spent on activities of care coordination and less frequent communication with the interdisciplinary team by RNs caring for these ASCC patients, presumably with additional care coordination needs. It may be that because these ASCC care needs begin to represent the normal care provided on the unit it is more certain and predictable for the RN. Higher percentages of patients with ASCC may also reflect a level of specialization, or greater depth of knowledge and experience of the RNs with this specific population, because they are providing the care more frequently (Aiken, et al., 1999; Gittell, 2000b).

There was not a relationship between any of the four hospitals and the PES-NWI scores to signify differences in the practice environment related to these specific patient conditions. Higher percentages of ASCC patients did not relate to more structural support for nurse care coordination and thus less time needed to carry out nurse care coordination activities. The negative relationship between the PES and the NCCI Subscale A and Specific 3 may lend credence to the importance of looking at efficiency as a concept in interpreting these findings. It may be indicating a preference by the RN or a greater propensity in the practice environment for nursing care efficiency and so less time spent on the general care coordination activities and less frequent backfilling. The RCI frequency subscale is the only RCI subscale that measures the RN's perceived quantity of care coordination as opposed to the quality or capacity of care coordination. Even though this finding can only represent a trend, this finding may be further relevant if what the RNs perceive as inefficient activity is actually preventing the delivery of necessary care coordination relevant to achieving desired patient outcomes.

The disparity of the ASCC data noted between the four hospitals in the sample supports the need for larger sample sizes at the level of the organization. The results of this study could suggest an influence of hospital membership, or an artifact of coding, which would be easier to discern with a larger sample. There was no evidence that the individual hospital characteristics selected for analysis in this study co-varied with the independent variable in the model (the professional practice environment). The small hospital level sample size was a concern identified a priori. Still, these higher level antecedents were included to recognize the multi-level nature of this study and the role of organizational constructs in interpreting unit level constructs. The nature of the work of nurses in the hospitals called for this multi-level design. Nurses are nested within their patient care unit and these patient care units are nested within the

hospital. Therefore, the model guiding this study included antecedents identified in the literature that may influence the unit practice environment (hospital size, ownership and teaching status and percent ASCC) and staff nurse care coordination (percent ASCC). While no influence was determined, it remains that sample size limitations preclude statistical analysis of the identified antecedents from the study model. Although many studies support measurement of the main study variables at the unit level, the potential influence of the organization level should be considered in the interpretation of this study's findings (Manojlovich & DeCiccio, 2007; Seago, 2008; Weston, 2006). A research question for a future study, if a large enough sample can be obtained, is whether this study's same variables at the level of the hospital organization, yields significant results. This would be useful to determine at what level staff nurse care coordination is most impacted.

Implications for nursing practice:

Findings from this study indicate that a professional practice environment may enable nurses to perform core nursing activities, such as care coordination activities, in less time and reduce less valuable activities, such as backfilling. The potential to conserve nursing time and focus nursing activity on core professional functions is important. Reducing backfilling, or nurses carrying out the work of other team members, has great potential to increase the amount of time nurses have for professional activities. Enabling nurses to be more efficient in their activities allows nurses to spend more time with their patients which in turn promotes the delivery of safe, quality patient care (Aiken, Clarke, & Sloane, 2002b; Kramer & Schmalenberg, 2005). Further exploration of the relationship between professional nurse environment and the other care coordination activities, such as mobilizing and exchanging, should be undertaken to explain the process by which the practice environment supports professional nursing activities.

Recent research and quality improvement efforts have focused on increasing value-added activities of nurses and reducing non-value added activity (Hendrich, et al., 2008). In this study, a professional practice environment was associated with less backfilling, work that nurses should not be doing. Backfilling typically is undertaken by nurses to safeguard patients or prevent a care lapse. However, frequent backfilling also may reflect systemic problems and possibly an unsafe practice environment (IOM, 2004). When nurses spend considerable time of backfilling, they are less able to safeguard patient care. Understanding how the practice environment reduces backfilling merits additional study.

Implications for Future Research:

The results of this study indicate the need for refinement and revision of the Nurse Care Coordination Inventory (NCCI). It was not possible to use the total scale score for the NCCI since validity of the measure was not supported at the unit level, which is the level of analysis in this study. Additionally, some items on the instrument factored slightly differently than in the initial testing in a previous study. Possible explanations for these findings are discussed as well as suggestions for additional refinements in the NCCI.

There are a number of possible explanations as to why the NCCI, as a total scale score, did not perform well in this study including (1) differences in stems across the instrument in scoring across subscales which may have compromised instrument validity in capturing a global construct and (2) possible blurring of two distinct domains of coordination, coordination of work and coordination of care. This study provides needed information to refine and further develop the NCCI to increase its usefulness as a nursing process measurement.

Each section of the NCCI used a different question stem in an effort to develop the best measure of staff nurse care coordination. The first section stem directs the rater to provide the

amount of time, in minutes, spent on a usual shift for ten different activities. The second scale asks to rank the priority of these ten given activities on a usual shift. The third section measures how the amount of time spent on the last shift was perceived – a spectrum from too little to too much. The final section again asks about the frequency of a more specific set of 15 activities, but they are not the same 10 activities listed in rating sections one, two and three. The developers of the NCCI purposely incorporated different stems to evaluate how they would perform in a first measurement of a complex process construct. However, differences in the focus of each scale (frequency of care coordination, comparison of actual frequency to expected frequency) may make it difficult to combine the items into a scale with uniform meaning as well as to interpret findings. In this study, analyzing the instrument as a set of subscales, since the subscales did not cross over answer sections, effectively resolved the scoring concerns. In the future, creating specific scoring guidelines to account for the differences between the different sections question stems is recommended. This may make the use of the total scale score more effective in discerning comprehensive differences in the activities of staff nurse care coordination between patient care units.

Differences in the nature of the care coordination dimensions in the NCCI may offer another explanation of the performance of the total scale score in this study. The NCCI was designed to index six dimensions of care coordination. Lamb et al (2007) suggested that some of these dimensions, most notably organizing and checking, may be antecedent to nurses care coordination activities. Organizing and checking, in contrast to the other dimensions, are most commonly carried out by individual nurses and establish the context or groundwork for the interactive coordination activities reflected in the other dimensions. It is possible that some of the dimensions of the NCCI reflect coordination of work while others are more valid representations

of care coordination. Blurring the distinctions between these two aspects of care coordination also may have contributed to inadequate validity and reliability metrics found for the total scale score.

An alternative to using the total scale score could be the General A subscale combined with the mobilizing questions from the Specific 1 subscale and the two questions comprising the Specific 3 subscale. Analysis of the NCCI in this study revealed a slightly different subscale structure than the initial use of the instrument. The General A, B, C and Specific 3 subscales factored like the original structure, however Specific 1 and 2 did not. Specific 3, the backfilling subscale, consisted of only two items but aligned with two Specific Subscale 1 items. Specific 1 covered the mobilizing domain, but these two questions about "prompting" did not factor as it they did originally with the mobilizing questions covering delegation. Data analysis in this study suggested that the General A subscale combined with the questions from the specific 1 and 3 subscales that factored together would have psychometric support at the unit level and may feasibly replace the use of the entire instrument as it is structured currently. Paring down the number of questions from 45 to 15, for the purpose of measuring staff nurse care coordination quantity, results in a more parsimonious instrument. Important research questions promoting the refinement of the NCCI would be to identify whether this parsimonious instrument had any relationship to relevant patient outcomes and which, if any, of the six identified care coordination domains have a stronger relationship to relevant patient outcomes.

Currently, the NCCI scales used in this study focus only on the frequency of nurse care coordination and do not address nurses' perceptions of the quality of their care coordination activities or the unit level strategies used to support their care coordination. Instrument subscales intended to index quality, e.g. items asking about actual frequency of care coordination

compared to expected frequency, items asking how often care coordination resulted in the intended outcome, could not be used in model testing. To more effectively capture the quality aspect of staff nurse care coordination, future research using the NCCI might include more questions about specific activities unique to coordinating a patients' care in the hospital. These questions could address communication with the family members regarding the plan of care, discussing daily goals, medication reconciliation and establishing the care needs after discharge (Rogers, 2008). In consideration of the relationship to the practice environment as a structural facilitator, the RNs could be asked about participation in interdisciplinary rounds, bedside reporting and patient care conferences (Apker, et al., 2006; Beringer, et al., 2006; Bowles, et al., 2003; Clark, 2006; Felton, et al., 1997). Finally, because documentation and electronic communication are integral to communication and smooth care transitions, questions could be added regarding the staff nurses' documentation practices (Bjorvell, Wredling, & Thorell-Ekstrand, 2003; Hoangmai, et al., 2008).

Finally, a focus on measures that allow for the steps of critical nursing processes to be broken down and the value of each specific activity comprising the processes to be better understood is still needed. The NCCI is one of the few nursing care process measures available and the only one known that measures staff nurse care coordination in the hospital. Its' development was critical to the inception of this study, the results of which can be used to further knowledge in this area and refine the measure for future use.

A likely explanation for the dearth of instruments to measure important nursing processes (such as assessment, surveillance, patient education etc.) is due to the nature of work in the hospital. As pointed out in a study on nursing surveillance, it is difficult to attribute the effectiveness of an individual nurse to the outcome of an individual patient because nursing

processes in the hospital are cumulative and occur over time (Kutney-Lee, et al., 2009). Staff nurse care coordination for an individual patient is certainly an example of a process that occurs due to interventions by an individual nurse working within a team, as well as a collective effort of interventions delivered by multiple nurses throughout the patients' hospital stay. For this reason staff nurse care coordination, even though measured by individual RN perceptions, is treated as a unit level variable and analyzed in that way in this study.

Overall study results supported analysis of staff nurse care coordination at the patient care unit level. Individual level data aggregated to the unit level for analysis is typically aggregated to the mean. As a new, higher level variable, this mean value is assumed to be applicable to the entire group (in this case the higher level group variable is the patient care unit). However, attributing a mean of individual RN responses to serve as a patient care unit variable in this way represents a composition or partial composition model of emergence for the variable. Performing psychometric testing to look at the within group agreement, the between group variance and establishing the difference between these two is also an effort to support the a priori selected composition model of emergence (Verran, 2006). Future research could include the potential for nursing process to be a result of compilation instead of composition at the unit level. This would account for different contributions by different RN roles in the unit, such as between the charge nurse or team lead nurse and the other staff nurses on the unit, that are not captured now since all responses are treated the same.

Examination of the ANOVAs, ICCs and the, r_{wg} 's in this study provided strong support for the PES-NWI and the identified NCCI subscales and mixed results for the RCI as a partial or complete composition model of emergence. Multi-level methods, such as hierarchical linear modeling, were also applied to determine whether the PES-NWI was a good predictor of staff

nurse care coordination at the unit level (see table 12). Results of the HLM were positive for this study model, showing more variance explained at the unit level than at the individual level for the NCCI General A subscale, Specific 1 subscale and Specific 3 subscale. For the RCI, the back-up staff nurse care coordination measure, there was a fairly even contribution of variance at the individual or the unit level indicating the RCI measures as effectively at the level of the individual RN as at the level of the patient care unit. Continued use of HLM methods and examination of the work of nurses at the unit level is suggested to further illuminate nursing care processes and the impact on patient outcomes. Teasing out individual contributions to individual patient outcomes does not seem feasible, and to date has not been achieved.

Implications for Theory Development

In addition to building support for nursing processes in general and the mediating role they play in achieving safe, quality care for patients**,** the purpose of this study was to learn more about the staff nurse care coordination process itself and what impacts it. This study provided new knowledge related to structural features of the patient care unit that serve to facilitate the process, how the specific activities are perceived by the RNs that carry out the activities, and insight into the activities in terms of impact on the overall staff nurse care coordination process.

Findings from this study support the relevance of examining the relationship between the context or environment for nursing practice and core nursing processes. They indicated that structural features of the unit-level professional practice environment, such as RN-physician collaboration, access to resources, autonomy and control over practice, may serve to facilitate staff nurse care coordination by decreasing the amount of time nurses spend performing the care activities. Although there is research supporting the impact of higher level organizational factors

on practice environment in the model, this relationship was not supported. In future studies, these organizational variables need to be examined again with larger samples. Alternatively, other organizational variables, such as culture or policies, may be found to be more explanatory than typical organizational descriptors.

Future theory development requires additional concept analysis of care coordination. It is not clear which care coordination activities are more important to nurses and to patient outcomes. To some extent, the domains of care coordination identified in previous research (Lamb et al., 2007) combine coordination of the care environment as well as coordination of the patient's care. Each of these may have a different relationship with patient outcomes.

The generalizability of the theoretical model to other professional nursing activities should be examined. At present, the relationship between professional practice environment and nursing activities, including medication administration, patient assessment, patient education, discharge teaching, and patient surveillance are not known.

Study Limitations

There were a number of limitations in this study. As previously discussed, this study relied heavily on the use of a new process measure (the NCCI), which did not perform well as the comprehensive measure presented in the study model. Refinements are needed either to the scoring, so that one score from this instrument can represent a comprehensive construct or to the question stems and actual questions to better capture the quality aspect of care coordination. Other challenges in the use of the NCCI as a process measure result from the inherent complexity of the work nurses within organizations. There is an inadequacy of linear modeling and analysis to capture variance contributed by work performed over time, by many individuals,

or due to contributions at the higher level of the hospital or organization. The limited use of the NCCI and the multi-level implications of this study served to magnify the limitations presented by the relatively small sample size and geographic clustering of the hospitals that were included.

The single use of the NCCI prior to this study was a known limitation. Further refinement of this tool is likely, and is expected after one initial phase of psychometric testing. This limitation is reflective of the difficulty in measuring the work of nurses, particularly to clarify the contribution of the nurse to patient outcomes. Nevertheless, the data obtained in this study provides more information about a specific nursing process in a specific context. Next steps for use of this instrument include defining scoring guidelines by subscale, redesigning questions stems and questions to target quality activities and finally, addressing the potential to measure staff nurse care coordination differently, perhaps not as an aggregate of individual RN perceptions but as a reflection of activities actually completed (such as through observation or simulation) . Discriminating the difference between care coordination as a result of compilation instead of composition has implications on the validity of the instrument in its current and in any future format. This consideration subsequently implicates refinements for future use of the NCCI as well as the reconsideration of the sample size necessary at all levels of the model.

Further use of the NCCI can continue to enhance understanding and application of multi-level measurement as well as understanding of staff nurse care coordination. A question that remains for the NCCI, the critical measure of staff nurse care coordination in this study, is the implication of a composition emergence versus compilation emergence model. According to Klein and Kozlowski (2000), compilation processes are based on the premise that phenomenon constitute a different domain across levels (i.e. individual versus group or unit level) so there is no theoretical need to establish agreement at the lower, individual level prior to aggregating to

the higher, unit or group, level (Klein & Kozlowski, 2000). An argument could be made that staff nurse care coordination exists differently at the individual RN level than at the higher patient care unit level. Arguably, experience and role assignments of the RNs caring for a patient throughout the hospital stay could contribute to varying degrees to the patients care coordination. Benner's "Novice to Expert" (1984) reports in depth about her research on the differences in the effectiveness and efficiency of care provided by nurse with varying degrees of experience as well as the different contributions experience levels of nurses bring to a team of nurses (Benner, 1984). There are often different roles assigned to a team of nurses caring for a patient. For instance the shift charge nurse may fulfill different care coordination duties than the patient's staff nurse for the shift. Some patient care units even assign different duties to the various roles on the unit which may vary for the different shifts during the day (i.e. day versus night duties related to care coordination). Lamb's (2007) qualitative research leading to the development of the NCCI illustrated this in comments by nurses similar to "during the night shift our coordination is necessarily different - urgent because it would be related to the patient's condition deteriorating". This research also identified staff nurses with varying roles related to coordination of care such as the shift charge nurse being called the shift "care coordinator" (Lamb, et al., 2007) due to added responsibility for care coordination of patients on the unit. These diverse contributions of experience and roles may be important at the unit level and mean that staff nurse care coordination at the unit level is a uniquely different construct from staff nurse care coordination carried out by individual nurses. This consideration impacts the measurement, meaning the NCCI itself should be evaluated in its ability to measure staff nurse care coordination as it has been defined, versus as a compilation variable, and the consequential interpretation of analysis and results.

The small number of hospitals included in this study restricts the generalization of study results and full evaluation of the study model. To understand how to improve nursing process at the unit level, it is vital to understand whether specific hospital characteristics (such as ownership, teaching status and size) versus hospital membership interacts or co-varies with unit level characteristics to influence nursing process. These variables could not be analyzed for any statistical significance in this study. The effect of adding hospitals to this study of unit level variables would incorporate many more RN subjects. Collecting these data presents a feasibility issue, mostly due to the difficulty and practicality involved in recruiting hospitals. This feasibility challenge underscores the need for larger data sets such as the collection of quality measures and patient data from hospitals on a routine basis. It also reinforces the need to use sophisticated multi-level methods, which may not require such a large number of nurses within each unit or group to participate, particularly when studying nurses working in multi-level organizations such as hospitals. An interesting research question for future study would be to identify whether relationship findings differ, and if applicable at what point they differ, depending on the percent participation of eligible RNs from a unit to determine whether the current 50% participation recommendation is supported.

The sample size for this study became smaller at the unit level of analysis once the percent participation of eligible RNs was considered. The remaining 24 units provided just enough power (80%) to detect a relationship of .20 between the predictor and staff nurse care coordination. As a result, findings were slightly underpowered when only a relationship of .17 with 56% power was detected. Recruitment of RNs on each unit to meet sufficient participation rates was a critical issue for this study. Management style, a nursing research structure, and competing organization priorities proved to have influence on the varying participation rates

across units. For example, units in which the manager controlled distribution had the slowest response rates. Time was added to the distribution process when the manager personally met with and checked off each RN receiving a survey. Often these were the units with the lowest participation. This could have been too great of a burden, in addition to other nurse manager job responsibilities. Alternately, this may have been perceived as a subtle form of coercion by the staff nurse or an additional job responsibility that was not well received by the RNs and therefore ignored. Units using a central location, such as the nurse's station, for storage of surveys and supportive communication from unit management regarding participation seemed to have the best participation. On these units the RNs were free to take a survey if they wished to participate and were eligible; yet no duplicate responses were noted when checked with random audits by the primary investigator. This variance in survey distribution was discouraged by the primary investigator but could not be controlled.

Having a foundation for nursing research, such as being a magnet hospital ultimately facilitated data collection from individual RNs. The one designated magnet hospital had higher participation rates, overall, compared to the two hospitals on the magnet journey and the one non-magnet hospital. The magnet hospital nurses were accustomed to nursing research and the nurse managers needed less encouragement to participate than in the other hospitals. There were also simpler avenues in place to communicate with hospital contacts and to address any issues that needed to be resolved (i.e. determining the eligible RN numbers). However, the one magnet hospital also required an extended time frame for both initiating the study and the data collection period. There were several concurrent research studies requiring nursing personnel to complete surveys. There was a complaint of "survey fatigue" by the nurses at this hospital. This problem suggests that increasing the number of Magnet hospitals overall will facilitate nursing research

not only because of the increased focus on research but also because it may decrease the amount of research participation requested from the same group of nurses (which is typically completed in addition to regular work responsibilities).

The many competing hospital priorities creating demands on personnel time may explain some of the lower unit participation rates. Competing priorities included a visit by The Joint Commission and a concurrent staff satisfaction survey requests. Two of the four hospitals were reviewed by The Joint Commission during the study period and a third hospital had staff satisfaction surveys being conducted during the data collection period. These are uncontrollable and necessary events that interfere with the time needed to participate in the research process. Hospital organizations consistently have many demands for data and special project participation which contributes to human resource or time restraints. It is well known that staff nurses already have constraints on their time when just completing their daily work assignments.

The inclusion of patient care units with less than a 50% eligible RN participation is also a limitation of this study. The current recommendation in the field of nursing research is that 50% participation is necessary to assure an adequate group sample (Verran, et al., 1995). For this study, RN participation as low as 35% was considered sufficient amount to have the individual data aggregated for inclusion in the unit level analyses. The decision to preserve more units in the final sample was made based on precedent set by other nursing and organizational science multi-level studies, in which less than 50% was used. Additional strategies to assure representativeness of the sample included assuring a wide variety of nurses on the units were included (i.e. varying shifts, experience and work schedules) and the responses of these smaller within unit samples were analyzed for consistency.

Finally, the geographic cluster of the participating patient care units can also be considered as a limitation. The data were collected only at metro area hospitals in the same large, southeastern city. These hospital units may not represent the total population of acute care hospital units. Additionally, the staff nurse mix at these hospitals, due to more urban location, does not necessarily represent the total population of nurses in this nation. To address this limitation, the demographic data regarding the patient care units and the staff nurse were collected and presented in this report. This information can be used to abstract the usefulness of the findings and application to other, varying, hospital locales and staff nurses comprising similar medical-surgical patient care units.

Significance of Findings

Overall, these findings increase our understanding of a structural factor that impacts staff nurse care coordination, a process essential to patient safety and quality care. It corroborates the imperative by the IOM (2002) to invest in improvements in the nurses' practice environment. The long term goal of this program of this research is to inform interventions to improve the process of staff nurse care coordination for hospitalized patients, particularly those with chronic illness. This is important work because this population of patients is at an increased risk for poor outcomes including preventable readmission, medication errors, and functional decline. These poorer outcomes not only decrease patients' quality of life but result in unnecessary costs to the healthcare system.

This study was the first to examine the relationship between the nurse practice environment and staff nurse care coordination, a core nursing process. This structure to process relationship is an understudied link in the SPO model. An important contribution of this study is

the support it provided for a potential mediating role of staff nurse care coordination on patient outcomes. The negative relationship between the amount of time spent on coordination activities and the frequency of backfilling can guide improvements to the nurse practice environment to support this nursing process. The positive relationship between the PES-NWI and the RCI supports the need to create specific nursing process measures to better understand the actual activities nurses engage in during patient care. Additionally, useful insights in how to improve the NCCI, the first process measure of its' kind were obtained.

Finally, study findings support the need for further nursing process research at the level of the patient care unit, with consideration to the impact hospital level characteristics may have on characteristics or processes studied at the unit level. In this study the sample size precluded any conclusions regarding antecedents to the professional practice environment and staff nurse care coordination. However, trends were noted indicating that the percent of patients with chronic illness (ASCC) may be related to the quantity of staff nurse care coordination activities. This finding supports further study of care coordination as it is carried out by nurses in a single care setting and as it is exists within the multi-level hospital organization. More specific knowledge promotes more aggressively addressing the patients' needs in the hospital, at what is often just the beginning of the care continuum. The smooth progression of patient care in the hospital is crucial to the smooth progression of care across settings and important quality outcomes.

Summary

The purpose of this study was to examine the relationship between the professional practice environment and a key nursing process, staff nurse care coordination. Study findings showed a significant negative correlation between the professional practice environment and the amount of time spent on care coordination activities as well as the frequency of backfilling activities. Study results also demonstrated significant positive correlations between the professional practice environment and relational coordination. When examined within the context of the professional practice environment and its' impact on staff nurse care coordination, the correlations were congruent with the study's guiding framework, SPO, a commonly used quality improvement model.

Issues with the psychometric properties of the NCCI, the first measure of staff nurse care coordination, were raised. A revision of the instruments' scoring guidelines, refinements to the main question stems, and revisions to the questions to better capture the quality aspect of staff nurse care coordination were all suggestions to improve its' value as a measure and validity of the total scale score at the level of the patient care unit. In addition, the implications of the multi-level nature of the work of staff nurses were addressed. The usefulness of multi-level methods was described and encouraged for application in future studies of nursing process.

The major limitations of the study included the lack of measures of nursing process, in particular the reliance on the NCCI, a new measure of staff nurse care coordination. The small sample size and geographic area additionally limited generalization of the findings and analysis of hospital level variables as antecedents to the professional practice environment and staff nurse care coordination.

This study contributes to the knowledge of a critical nursing process as a mediator of structural characteristics on patient outcomes. Study findings illustrated the impact of a professional practice environment on the nurses' perceived frequency and amount of time spent on activities staff nurse care coordination. A negative trend was noted between the percent of patients with ambulatory sensitive chronic conditions and the quantity of staff nurse care coordination, suggesting a need for further research in this area. Findings from this study extend knowledge of staff nurse care coordination for hospitalized patients, of particular significance to patients with chronic illness. It supports interventions to the nurse practice environment to support the work of nurses and provides a foundation for continued research of specific nursing processes, such as care coordination, within a single setting such as the hospital.

Appendix A

EMORY UNIVERSITY | Institutional Review Board

FROM: Tzu-Chin (Claire) Wu, MPH, CIP
Senior Research Protocol Analyst

TO: Ingrid Duva
Principal Investigator

CC: Lamb Gerri Nursing – Main

DATE: June 2, 2009

RE: **Notification of Exempt Determination**
IRB00021927
Factors in the practice environment impacting staff nurse care coordination for hospitalized patients

Thank you for submitting an application in eIRB. We reviewed the application and determined on **6/2/2009** that it meets the criteria for exemption under 45 CFR 46.101(b)(2) and thus is exempt from further IRB review.

This determination is good indefinitely unless something changes substantively in the project that affects our analysis. The PI is responsible for contacting the IRB for clarification about any substantive changes in the project. Therefore, please do notify us if you plan to:

• Add a cohort of children to a survey or interview project, or to a study involving the observation of public behavior in which the investigators are participating.
• Change the study design so that the project no longer meets the exempt categories (e.g., adding a medical intervention or accessing identifiable and potentially damaging data)
• Make any other kind of change that does not appear in the list below.

Please do not notify us of the following kinds of changes:
• Change in personnel, except for the PI
• Change in location
• Change in number of subjects to be enrolled or age range for adults

• Changes in wording or formatting of data collection instruments that have no substantive impact on the study design

For more information about the exemption categories, please see our Policies & Procedures at www.irb.emory.edu. In future correspondence about this study, please refer to the IRB file number, the name of the Principal Investigator, and the study title. Thank you.

Sincerely,

Tzu-Chin (Claire) Wu, MPH, CIP
Senior Research Protocol Analyst
This letter has been digitally signed

Emory University
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Appendix B: Survey Instruments

Demographics

The purpose of this survey is to explore the relationship between the nurse practice environment and the activities of staff nurse care coordination. We hope that this study will help us to understand how to impact staff nurse care coordination to ultimately contribute to improved quality of care in the hospital.

Please read the directions carefully and provide answers to each question. The surveys each have packet have different sections and each section may have new instructions. Thank you for your participation.

Section A: Demographic Information

1. Your unit name/number _____
2. Number of years you have worked as a registered nurse _____
3. Number of years you have worked on your unit as an RN _____
4. Please indicate your highest NURSING Degree earned: ☐ Diploma ☐ AND ☐ BSN ☐ MSN ☐ DNP ☐ PhD
5. Please indicate your highest NON-NURSING Degree earned: ☐ AD ☐ BS/BA ☐ MS/MA ☐ PhD ☐ N/A
6. Employment Status: ☐ Full time ☐ Part time ☐ PRN
7. Do you usually work: ☐ 8 hours ☐ 10 hours ☐ 12 hours ☐ Other (please indicate) _____
8. What hours do you usually work? ☐ Days ☐ Evenings ☐ Nights
9. What percent of your usual work-time do you provide direct patient care? ☐ Less than 50% ☐ Greater than 50%
10. What is your race? ☐ White ☐ Non-Hispanic ☐ Hispanic ☐ Native American
    ☐ Black/African American ☐ Asian ☐ Other

The Practice Environment Scale of the Nursing Work Index

For each item, please indicate the extent to which you agree that the item is PRESENT IN YOUR CURRENT JOB. Indicate your degree of agreement by circling the appropriate number.

		Strongly Agree	Agree	Disagree	Strongly Disagree
1	Adequate support services allow me to spend time with my patients.	1	2	3	4
2	Physicians and nurses have good working relationships	1	2	3	4
3	A supervisory staff that is supportive of the nurses.	1	2	3	4
4	Active staff development or continuing education programs for nurses.	1	2	3	4
5	Career development/clinical ladder opportunity.	1	2	3	4
6	Opportunity for staff nurses to participate in policy decisions.	1	2	3	4
7	Supervisors use mistakes as learning opportunities, not criticism.	1	2	3	4
8	Enough time and opportunity to discuss patient care problems with other nurses	1	2	3	4
9	Enough registered nurses to provide quality patient care.	1	2	3	4
10	A nurse manager who is a good manager and leader.	1	2	3	4
11	A chief nursing officer who is highly visible and accessible to staff	1	2	3	4
12	Enough staff to get the work done	1	2	3	4
13	Praise and recognition for a job well done.	1	2	3	4
14	High standards of nursing care are expected by the administration	1	2	3	4
15	A chief nursing officer equal in power and authority to other top-level hospital executives	1	2	3	4

16	A lot of team work between nurses and physicians.	1	2	3	4
17	Opportunities for advancement.	1	2	3	4
18	A clear philosophy of nursing that pervades the patient care environment.	1	2	3	4
19	Working with nurses who are clinically competent.	1	2	3	4
20	A nurse manager who backs up the nursing staff in decision making, even if the conflict is with a physician.	1	2	3	4
21	Administration that listens and responds to employee concerns.	1	2	3	4
22	An active quality assurance program.	1	2	3	4
23	Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).	1	2	3	4
24	Collaboration (joint practice) between nurses and physicians.	1	2	3	4
25	A preceptor program for newly hired RNs	1	2	3	4
26	Nursing care is based on a nursing, rather than a medical, model.	1	2	3	4
27	Staff nurses have the opportunity to serve on hospital and nursing committees.	1	2	3	4
28	Nursing administrators consult with staff on daily problems and procedures	1	2	3	4
29	Written, up-to-date nursing care plans for all patients.	1	2	3	4
30	Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next.	1	2	3	4
31	Use of nursing diagnoses.	1	2	3	4

NURSE CARE COORDINATION INVENTORY

Instructions:

1. Please use the definitions below for completing this section of the survey.
2. Select the response for each item consistent with your experience.

Definitions

Interdisciplinary Team: Members of non-nursing professions and groups, e.g. medicine, pharmacy, therapy, who you work with in providing care to your patients.

Nursing Team: Nursing staff, e.g., RNs, LPNs, Techs, Aides, who you work with in providing care to your patients.

Team members: Members of your nursing team and interdisciplinary team who you work with in providing care to your patients.

Instructions: Please answer each of the following questions for this item.

	How much time do you spend on this activity in a usual shift?				
	< 30 Min	31-60 Min	61-90 Min	91-120 Min	> 120 Min
1. I initiate actions to get my **nursing team** members to do what is needed to keep my patients on their plan of care.	☐	☐	☐	☐	☐
2. I initiate actions to get my **interdisciplinary team members** to do what is needed to keep my patients on their plan of care.	☐	☐	☐	☐	☐
3. I perform my patient assessments so that they will be useful to everyone on the team.	☐	☐	☐	☐	☐
4. I check that orders and procedures for my patients are carried out when they are scheduled.	☐	☐	☐	☐	☐
5. I ask my **nursing team** members to assist me with my patient activities when I am tied up with one or more of my patients.	☐	☐	☐	☐	☐
6. I communicate information to my **interdisciplinary team members** that they need to know to carry out their patient care activities or to make changes in the plan of care.	☐	☐	☐	☐	☐
7. I step in and do the work other members of my **nursing team** are responsible for doing so I can get my own work done and keep patients on their plan of care.	☐	☐	☐	☐	☐
8. I prompt my **interdisciplinary team** to do the work they are responsible for doing so I can get my own work done and keep patients on their plan of care.	☐	☐	☐	☐	☐
9. I organize my own activities to be able to keep the care of my patients on track.	☐	☐	☐	☐	☐
10. I organize the supplies that I need to be able to keep the care of my patients on track.	☐	☐	☐	☐	☐

PLEASE GO TO NEXT PAGE

Instructions: Please answer each of the following questions for this item.

	How high is this activity on your priorities for a <u>usual shift?</u>				
	Low 1	2	3	4	High 5
1. I initiate actions to get my **nursing team** members to do what is needed to keep my patients on their plan of care.	☐	☐	☐	☐	☐
2. I initiate actions to get my **interdisciplinary team members** to do what is needed to keep my patients on their plan of care.	☐	☐	☐	☐	☐
3. I perform my patient assessments so that they will be useful to everyone on the team.	☐	☐	☐	☐	☐
4. I check that orders and procedures for my patients are carried out when they are scheduled.	☐	☐	☐	☐	☐
5. I ask my **nursing team** members to assist me with my patient activities when I am tied up with one or more of my patients.	☐	☐	☐	☐	☐
6. I communicate information to my **interdisciplinary team members** that they need to know to carry out their patient care activities or to make changes in the plan of care.	☐	☐	☐	☐	☐
7. I step in and do the work other members of my **nursing team** are responsible for doing so I can get my own work done and keep patients on their plan of care.	☐	☐	☐	☐	☐
8. I prompt my **interdisciplinary team** to do the work they are responsible for doing so I can get my own work done and keep patients on their plan of care.	☐	☐	☐	☐	☐
9. I organize my own activities to be able to keep the care of my patients on track.	☐	☐	☐	☐	☐
10. I organize the supplies that I need to be able to keep the care of my patients on track.	☐	☐	☐	☐	☐

Instructions: Please answer each of the following questions for this item.

	How much time did you spend on this activity in the <u>last shift</u> you worked?				
	Less time than I should 1	2	3	4	More time than I Should 5
1. I initiate actions to get my **nursing team** members to do what is needed to keep patients on their plan of care.	☐	☐	☐	☐	☐
2. I initiate actions to get my **interdisciplinary team members** to do what is needed to keep patients on their plan of care.	☐	☐	☐	☐	☐
3. I perform my patient assessments so that they will be useful to everyone on the team.	☐	☐	☐	☐	☐
4. I check that orders and procedures for my patients are carried out when they are scheduled.	☐	☐	☐	☐	☐
5. I ask my **nursing team** members to assist me with my patient activities when I am tied up with one or more of my patients.	☐	☐	☐	☐	☐
6. I communicate information to my **interdisciplinary team members** that they need to know to carry out their patient care activities or to make changes in the plan of care.	☐	☐	☐	☐	☐
7. I step in and do the work other members of my **nursing team** are responsible for doing so I can get my own work done and keep patients on their plan of care.	☐	☐	☐	☐	☐
8. I prompt my **interdisciplinary team** to do the work they are responsible for doing so I can get my own work done and keep patients on their plan of care	☐	☐	☐	☐	☐
9.I organize my own activities to be able to keep the care of my patients on track.	☐	☐	☐	☐	☐
10. I organize the supplies that I need to be able to keep the care of my patients on track.	☐	☐	☐	☐	☐

Please think about your <u>usual shift</u> and respond to each of the following questions:

NP – refers to Nurse Practitioner
PA – refers to Physicians' Assistant

	Never	Rarely	Sometimes	Most of the Time	Always	N/A
1. When the aide(s) on my team has not completed patient care tasks that I need to complete my work, I direct them to get their work done.	☐	☐	☐	☐	☐	☐
2. I have to contact the staff in the laboratory to get reports needed to carry out my patient's plan of care.	☐	☐	☐	☐	☐	☐
3. I remind physicians/NPs/PAs to document verbal changes in medication orders in the record.	☐	☐	☐	☐	☐	☐
4. When I need to spend more time with a patient than expected, I ask other staff on the unit to assist with my other patients.	☐	☐	☐	☐	☐	☐
5. When I notify a team member that a patient is not progressing as expected, I recommend actions that I think will get the patient back on track.	☐	☐	☐	☐	☐	☐
6. When I start my shift, I have to do things that should have been completed on the previous shift.	☐	☐	☐	☐	☐	☐
7. I delegate patient care activities that I need done to the aide on my team to make sure that the patient is progressing as expected.	☐	☐	☐	☐	☐	☐
8. When my patient is off the unit I follow up with other departments to check that my patient is receiving the expected procedure or treatment at the expected time.	☐	☐	☐	☐	☐	☐
9. When I am unable to get my work done on time, I ask members of my nursing team to assist me.	☐	☐	☐	☐	☐	☐
10.I have to prompt the physician, NP, or PA to write orders so that my patient can be discharged as planned.	☐	☐	☐	☐	☐	☐

	Never	Rarely	Sometimes	Most of the Time	Always	N/A
11.I assist other nurses to get the information they need to care for their patients.	☐	☐	☐	☐	☐	☐
12.When I start my shift, I make sure that the equipment I and my team need to get our work done is on the unit and accessible.	☐	☐	☐	☐	☐	☐
13.When I go to get a supply, if I notice it is running low, I either restock it or ask someone else to do it.	☐	☐	☐	☐	☐	☐
14.I wind up doing the work the patient care techs should be doing.	☐	☐	☐	☐	☐	☐
15.I check on the work of the techs (aides) on my team for accuracy (completeness, timeliness).	☐	☐	☐	☐	☐	☐

Appendix B: Gittell Relational Coordination for NCCI

Section C

This next set of questions contains statements about your care team, and how it functions as a group. Please select one response for each question.
If you do not consider any of these disciplines to be a member of your care team at any time, please mark N/A.

1. My usual care team consists of	**Never**	**Rarely**	**Occasionally**	**Often**	**Constantly**	**N/A**
A. Dietitian	☐	☐	☐	☐	☐	☐
B. Pharmacist	☐	☐	☐	☐	☐	☐
C. Physicians	☐	☐	☐	☐	☐	☐
D. Other Registered Nurses	☐	☐	☐	☐	☐	☐
E. Other Nursing Team Members	☐	☐	☐	☐	☐	☐
F. Social Workers	☐	☐	☐	☐	☐	☐
G. Therapists	☐	☐	☐	☐	☐	☐

2. How frequently do you communicate with each of these groups about caring for patients?	**Never**	**Rarely**	**Occasionally**	**Often**	**Constantly**	**N/A**
A. Dietitian	☐	☐	☐	☐	☐	☐
B. Pharmacist	☐	☐	☐	☐	☐	☐
C. Physicians	☐	☐	☐	☐	☐	☐
D. Other Registered Nurses	☐	☐	☐	☐	☐	☐
E. Other Nursing Team Members	☐	☐	☐	☐	☐	☐
F. Social Workers	☐	☐	☐	☐	☐	☐
G. Therapists	☐	☐	☐	☐	☐	☐

3. Do people in these groups communicate with you in a timely way about caring for patients?	Never	Rarely	Occasionally	Often	Constantly	N/A
A. Dietitian	☐	☐	☐	☐	☐	☐
B. Pharmacist	☐	☐	☐	☐	☐	☐
C. Physicians	☐	☐	☐	☐	☐	☐
D. Other Registered Nurses	☐	☐	☐	☐	☐	☐
E. Other Nursing Team Members	☐	☐	☐	☐	☐	☐
F. Social Workers	☐	☐	☐	☐	☐	☐
G. Therapists	☐	☐	☐	☐	☐	☐

4. Do people in these groups communicate with you accurately about caring for patients?	Never	Rarely	Occasionally	Often	Constantly	N/A
A. Dietitian	☐	☐	☐	☐	☐	☐
B. Pharmacist	☐	☐	☐	☐	☐	☐
C. Physicians	☐	☐	☐	☐	☐	☐
D. Other Registered Nurses	☐	☐	☐	☐	☐	☐
E. Other Nursing Team Members	☐	☐	☐	☐	☐	☐
F. Social Workers	☐	☐	☐	☐	☐	☐
G. Therapists	☐	☐	☐	☐	☐	☐

5. When an error has been made regarding caring for patients, do people in these groups work with you to solve the problem or do they try to avoid getting blamed?

	Try to avoid blame	Mostly try to avoid blame	Try to avoid blame and solve problem	Mostly try to solve problem	Try to solve problem	N/A
A. Dietitian	☐	☐	☐	☐	☐	☐
B. Pharmacist	☐	☐	☐	☐	☐	☐
C. Physicians	☐	☐	☐	☐	☐	☐
D. Other Registered Nurses	☐	☐	☐	☐	☐	☐
E. Other Nursing Team Members	☐	☐	☐	☐	☐	☐
F. Social Workers	☐	☐	☐	☐	☐	☐
G. Therapists	☐	☐	☐	☐	☐	☐

6. How much do people in these groups know about the work you do in caring for patients?

	Not Much	A little	Some	A lot	Everything	N/A
A. Dietitian	☐	☐	☐	☐	☐	☐
B. Pharmacist	☐	☐	☐	☐	☐	☐
C. Physicians	☐	☐	☐	☐	☐	☐
D. Other Registered Nurses	☐	☐	☐	☐	☐	☐
E. Other Nursing Team Members	☐	☐	☐	☐	☐	☐
F. Social Workers	☐	☐	☐	☐	☐	☐
G. Therapists	☐	☐	☐	☐	☐	☐

7. How much do people in these groups respect you and the work you do in caring for patients?

	Not Much	A little	Some	A lot	Completely	N/A
A. Dietitian	☐	☐	☐	☐	☐	☐
B. Pharmacist	☐	☐	☐	☐	☐	☐
C. Physicians	☐	☐	☐	☐	☐	☐
D. Other Registered Nurses	☐	☐	☐	☐	☐	☐
E. Other Nursing Team Members	☐	☐	☐	☐	☐	☐
F. Social Workers	☐	☐	☐	☐	☐	☐
G. Therapists	☐	☐	☐	☐	☐	☐

8. To what extent do people in these groups share your goals for caring for patients?

	Not at all	A little	Some	A lot	Same goals	N/A
A. Dietitian	☐	☐	☐	☐	☐	☐
B. Pharmacist	☐	☐	☐	☐	☐	☐
C. Physicians	☐	☐	☐	☐	☐	☐
D. Other Registered Nurses	☐	☐	☐	☐	☐	☐
E. Other Nursing Team Members	☐	☐	☐	☐	☐	☐
F. Social Workers	☐	☐	☐	☐	☐	☐
G. Therapists	☐	☐	☐	☐	☐	☐

Appendix C

Unit Demographics: *to be completed by unit manager/ administrator or designee.*

Hospital Name:

Unit Name/ Number:

Budgeted Number of Patient Beds:

Average Daily Census on Unit:

Primary Service:

Secondary Service:

Number of Registered Nurse Staff:

Budgeted Number of RN FTEs:

Filled RN FTEs:

Appendix D

Nell Hodgson Woodruff School of Nursing

The work environment and activities of staff nurse care coordination

You are being asked to participate in a research study to examine factors in the hospital work environment that may impact staff nurse care coordination. The purpose of this study is to improve understanding of the nurse's role in care coordination, believed to be critical work of nurses in hospitals.

You have been invited to participate because you are a registered nurse regularly working on an identified medical surgical unit at your hospital, as either a full-time, part-time or per diem working at least one shift per week. More than 50% of your time working must be with direct patient care responsibilities. Approximately 950 registered nurses from 5 different metro-Atlanta hospitals are being recruited for this study.

Please complete the four survey instruments contained within this packet- on either the paper forms provided or the survey monkey link (not both). If using the paper surveys, upon completion they must be returned in the enclosed, addressed envelope. The four surveys include:

- RN Demographic Form
- Nurse Care Coordination Inventory (NCCI)
- Relational Coordination Inventory (RCI)
- Practice Environment Scale (PES-NWI)

Completion of the instruments will take approximately 15 to 20 minutes. As a token of appreciation for participating, a chick-fil-a gift card / coupon valued at $5 or less, is enclosed. If you do not plan to participate, please instead return the enclosed survey envelope to your unit.

Survey responses will be confidential; identifying only the patient care unit you work on. Risks to you as a participant in this study are minimal. They include the inconvenience and time of completing the surveys. Taking part in this study may not benefit you personally, but will contribute to understanding important work of nurses.

Your informed consent is implied by your voluntary participation. You may choose not to participate at any time without consequences to you or your tenure at your hospital. All survey information will be kept in a locked cabinet with access only to this investigator.

If you have questions about this study, please contact me, Ingrid Hopkins Duva, Principal Investigator, at 404-727-5871 or ihopkin@emory.edu.

If you have questions about your rights as a research subject or if you have questions, concerns or complaints about the research, you may contact the Emory University Institutional Review Board at 404-712-0720, 1- 877-503-9797, or e-mail to irb@emory.edu .

Appendix E: Reminder and Thank You flyers

Attention:
MEDICAL – SURGICAL RNs

We still need participation in:

"FACTORS IMPACTING STAFF NURSE CARE COORDINATION"

Our target is at least 50% participation of all eligible RNs. Currently your unit is at 30% participation! Check mailboxes or email RNresearch@gmail.com for the electronic survey.

Survey returns are still being accepted until October 2009.

For questions, please contact PI, Ingrid Duva @ Emory School of Nursing:
770-262-4030 or
ihopkins@emory.edu

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