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The Relationship between the Nurses' Work Environment and Patient and Nurse Outcomes

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The Relationship between the Nurses' Work Environment and Patient and Nurse Outcomes

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by

Nancy Theresa Blake

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ABSTRACT OF THE DISSERTATION

The Relationship between the Nurses' Work Environment

and Patient and Nurse Outcomes

by

Nancy Theresa Blake

Doctor of Philosophy in Nursing

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Professor Linda Searle Leach, Chair

Medical errors cost the United States over $50 billion annually. Healthy work environments (HWE) can reduce medical errors and decrease Registered Nurse (RN) turnover. Three of the variables that impact the work environments are communication, collaboration and leadership. The Joint Commission stated that communication failures are the leading cause of harm to patients in hospitals today. With an estimated shortage of 260,000 nurses identified in the year 2025, nurse leaders need to be creative and do what they can to improve the work environment. The purpose of this research study was to determine the relationship between HWEs, patient outcomes and nurse turnover in the pediatric intensive care unit (PICU), specifically around communication, collaboration and leadership and risk adjusted patient mortality, risk adjusted length of stay, central line infections, ventilator associated pneumonia and nurse turnover in the PICU. This type of study has never been done in the PICU. Donabedian's model of Structure, Process and Outcomes was used as the conceptual framework. The study design was exploratory. Nurses completed the Practice Environment Scale of the Nursing Work Index Revised (PES-NWIR), which is a 31 items instrument used the measure the practice environment. Participants

also completed questions from the ICU Nurse-Physician Questionnaire regarding communication and a demographic questionnaire. In addition to the nurses completing the questionnaire, data was obtained from the hospitals regarding nurse turnover, central line infections, ventilator associated pneumonia, risk adjusted length of stay and risk adjusted mortality as well as information about the unit's nursing and medical structure. Statistical analysis was done using SPSS 17.0. Pearson correlations were conducted to examine the relationships of healthy work environments and the outcome measures. Multiple regression, t-tests (two-tailed) and one way analysis of variance (ANOVA) were completed. This significance level was set at .05 for this study. A sample of 415 RNs completed the survey from ten hospitals. RN's were mostly female (94%), Caucasian (95%), has a bachelor's degree (75 %), and 1-10 years as a PICU RN (70%). There was an inverse relationship between CLBSI and collaboration and communication ($p<.01$) but no association between communication, collaboration, or leadership and VAP. Risk adjusted mortality was inversely related to collaboration and communication ($p<.05$). Risk adjusted LOS was inversely related to collaboration and communication ($p<.05$). There was a statistically significant relationship between leadership and the outcome ITL ($p<.05$), but not any of the other predictor variables. Communication and collaboration in the PICU between RNs and between RNs and MDs are vital for patient safety, preventing complications and increased risk of death and to reduce hospital costs at the unit level. Findings from this study also indicate that effective nursing leadership is important to PICU RNs and significantly influences their decisions about staying in their current job.

The dissertation of Nancy Theresa Blake is approved.

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This dissertation is dedicated to my husband, Kevin Blake, and my children, Carlyn and Matthew who have supported me through these past four years while I completed my PhD. Words cannot express how much I appreciate all of the support you have given me.

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CHAPTER 1: INTRODUCTION

Introduction

The work environment in acute care hospitals has been identified as important to the retention of Registered Nurses (RN). Communication issues, concerns about collaboration and the type and extent of leadership contribute to nurses' dissatisfaction with their job and an increase in medical errors that are associated with patient mortality (Rathert & May, 2007; Aiken & Patrician, 2000). These are systems issues related to how the environment is structured and how the team of both physicians and nurses interact in healthcare. To address work environment issues that affect patient safety, more information about how these processes impact pediatric patient outcomes and pediatric critical care nurses' intent to leave their organization is needed.

This dissertation examines the relationship between the nurses' work environment, focusing specifically on communication, collaboration and leadership and pediatric patient outcomes that include central line infections, ventilator associated pneumonias, risk adjusted length of stay, risk adjusted mortality and nurses' intent to leave the organization. Chapter 1 presents the introduction and background of the problem, the gaps in the literature, the specific aims and hypotheses, and the significance of the study to the profession. Chapter 2 will address a thorough review of the literature related to healthy work environments (HWE), communication, collaboration, and leadership as well as a review of how these concepts impact patient and nurse outcomes. This will be followed by Chapter 3 that describes the conceptual framework for this study. An overview of Donabedian's Structure, Process, and Outcomes Model will be addressed and one example of research in hospital units that examined how the structures and processes in patient care units can impact outcomes is provided. This will be followed by an in-depth review of the methodology, including the design, setting and sample in Chapter 4. The procedures,

including recruitment, data collection and analysis will be discussed. A more detailed review of the specific aims and how data was obtained to address the hypotheses is included. The results from this study will be reported in three papers to include two that are data-based papers and one that will be a summary of the review of the literature. These three papers will be included in Chapter 5 and will include the results of the study.

Background of the problem

Medical errors seriously impact hospital resources; costing over $50 billion annually. Using the Agency for Healthcare Research and Quality (AHRQ) safety indicators, Zhan & Miller (2003) estimated that increased length of stay for postoperative sepsis could be as long as 11 days and could cost hospitals up to $60,000 per patient. More data regarding issues now being referred to as "never events" are being published in both the healthcare literature and in the media which has driven the public and payers to demand these issues be addressed. In its report, *To Err is Human,* the Institute of Medicine (IOM) (IOM, 2000), stated that as many as 98,000 patients die in the hospital each year as a result of errors. In fact, medical errors are the eighth leading cause of death in hospitals (IOM, 2000). The IOM (2000) also reported numerous issues related to the nurses' work environment that posed a threat to patient safety. Several other studies have since reported issues with the nurses' work environment (Aiken, Clarke, Sloan, Lake & Cheney, 2008; Ulrich et al., 2009; Friese, 2005; Kramer & Schmalenberg, 2007). Safe patient care is directly and positively linked to the quality of the nurse's work environment (Kramer & Schmalenberg, 2008). The IOM Committee on the Work Environment for Nurses and Patient Safety made several recommendations to improve the work environment of nurses. These were published in their book *Keeping the Patients Safe: Transforming the Work Environment of Nurses* (IOM, 2004). The recommendations were:

1. Governing boards focus on safety
2. Leadership and evidence-based management structures and processes
3. Effective nursing leadership
4. Adequate staffing
5. Organizational support for ongoing learning and decision support
6. Mechanisms that promote interdisciplinary collaboration
7. Work design that promotes safety
8. Organizational culture that continuously strengthens patient safety (IOM, 2004, p. 314).

Three of the major areas of weakness noted by these IOM committees are directly related to communication, collaboration and leadership. Some of the individual implementation items recommended by the IOM in 2004 include promoting trust in and between the nursing staff, effective communication between nursing and other clinical leadership and providing education and training in interdisciplinary collaboration for all healthcare workers. These are important functions that need to be in place in order to keep patients safe and improve nurses' job satisfaction. Despite these recommendations, many of these problems still exist in healthcare and problems with the nurses' work environment continue. Knaus et al. (1986) found that the degree of coordination of the intensive care unit significantly impacts the environment and influences effectiveness. They recommended that further investigation on how the various elements and processes of hospital care influence outcomes from an acute illness is needed. Others have recommended that nurse's intent to leave or nursing turnover should be studied. In a recent study done by the IOM and the Robert Wood Johnson Foundation on the *Future of Nursing* (2010), similar issues and concerns were discussed. The report stated, "Producing a healthcare system that delivers the right care – quality care that is patient-centered, accessible,

evidence-based and sustainable at the right time will require transforming the nurses' work environment, scope of practice, education and numbers of America's nurses"(IOM, 2010, p. S-3). This report estimated that in addition to filling the current nursing positions, an additional 900,000 nurses who are over the age of 50 will need to be replaced in the coming years. In a poll done by the American Nurses' Association (ANA) with 16,000 nurses in 2008 through 2010, staffing shortages were an identified problem and 52% of the nurses stated that the quality of patient care had declined on their units over the last year (ANA, 2010). Projections of Registered Nurses needed in the year 2020 are 20% less than the projected workforce supply (Buerhaus, Donelan, Ulrich, Norman & Dittus, 2005).

Communication failures and lack of teamwork are one of the leading causes of adverse patient events in hospitals today. Effective communication exists when there is true transparency and the team is able to communicate about all issues clearly and efficiently. The Joint Commission stated that communication failures are the leading cause of harm to patients in hospitals (2007). They did an analysis of 2455 sentinel events reported to them in 2004 and the primary root cause for all of the errors were related to a breakdown in communication (Leonard, Graham & Bonacum, 2004). Intimidating behavior and poor interpersonal skills creates a culture of silence, which causes a breakdown in communication and an inability to achieve high quality outcomes (Maxfield, Grenny, McMillan, Patterson & Switzler, 2005). Difficulties or inattention to work relationships creates barriers that may become the root causes of medical errors, hospital acquired infections, and complications (AACN, 2005).

Collaboration is another key component of a HWE. Collaboration is essential to provide quality care for patients and families (Barnsteiner, 2001). True collaboration exists when the work group is functioning as a team and all members are valued for the contribution they bring

to the team. A HWE is one that promotes interaction and communication among professionals, a positive strong working relationship between the staff and activities that are done jointly with the team and the leadership (Barnsteiner, 2001). There are numerous studies of poor nurse-physician relationships, including reports of poor communication (Greenfield, 1999), hierarchical communication (Disch, 2001), unilateral decision making by physicians (Schmitt, 2001), and verbal abuse of nurses by doctors (Disch, 2001). Nurses and physicians, as a team, need to be cohesive and work together for the goal of safe patient care. Pronovost et al. (2006) found that one of the most important communication and teamwork skills to prevent errors was the ability for all members of the healthcare team to be able to speak up when they have concerns and to listen to others when they have concerns. In order to be able to get to that point where all members of the healthcare team feel comfortable speaking up, true collaboration must be present and encouraged.

Authentic leadership is when the leader "walks the talk" and provides the leadership needed, but also believes and contributes in promoting HWEs. Few studies have looked at the impact of manager's behavior on job satisfaction, productivity and commitment. Given the current nursing shortage, retention is very important in both maintaining nurses in the workforce and keeping nurses from moving from one hospital to another. The cost of training new nurses is going up every year as healthcare reimbursement is shrinking. Productivity of nurses, as well as job satisfaction and commitment, are of great concern to health care organizations who continue to struggle to reduce costs (McNeese-Smith, 2001). The impact of leadership on job satisfaction has been explored by numerous researchers over the past three decades. These studies both suggest a relationship between leadership, commitment and job satisfaction and leadership and employee productivity (Bass, 1990; McNeese-Smith, 2001; Leach, 2005).

Studies have been done regarding patient care unit structures related to Magnet designation and the impact on processes as well on patient and nurse outcomes. Many of these studies have been done at the organizational level and not looked at the impact on the work environment on specific patient outcomes at the unit level of analysis. There are many factors in the PICU that make it a complex and high risk work environment including the high acuity, repeated exposure to death and grieving parents, fatigue, inappropriate staffing, constantly changing body of knowledge, equipment that is not standardized, high demands and various interventions that have narrow therapeutic windows because of the care of children of all shapes and sizes (Montgomery, 2007). Because children in the PICU are so fragile, they are more vulnerable to changes in their condition that can be caused by errors. Children can decompensate very quickly and a HWE and strong team are essential to keep patients safe. Healthy work environments are a goal for all units, but they are necessary in the PICU because children can be put at risk if the care team doesn't communicate changes in the patient's condition in a timely manner as well as collaborate on all aspects of care. Providing care for critically ill children is more intense and problems can happen quickly if they don't get the care that they need. Because the Joint Commission has identified problems with communication as the largest contributor to sentinel or life-threatening events, efficient communication systems need to be in place or patients will be at risk.

Given all of the information related to HWEs and the impact of poor communication, collaboration and leadership on patient and nurse outcomes, little research has been done to examine the impact of any of these three variables on PICU patient outcomes and PICU nurse outcomes. There were no studies that investigated the impact of communication, collaboration and leadership on patient and nurse outcomes in the PICU.

Statement of Purpose

Despite the severity of these issues, little is known about the relationship between the nurses' work environment and patient outcomes. The purpose of this study is to determine the relationship between key elements of a HWE, effective communication, true collaboration, and authentic leadership and pediatric patient outcomes of mortality, hospital length of stay, ventilator associated pneumonia and central line infections with nurse turnover in the pediatric intensive care unit.

Specific Aims/Hypotheses

The specific aims of this study are to:

1. Determine the relationship between the elements of a HWE, communication, collaboration and leadership and central line infections and ventilator associated pneumonias in the PICU.

   Hypothesis 1: PICUs perceived by nurses as having effective communication, true collaboration and authentic leadership will have lower central line infections and ventilator associated pneumonias than units without HWEs.

2. Investigate the association between healthy work environments and illness adjusted mortality in the PICU.

   Hypothesis 2: Effective communication, true collaboration and authentic leadership in PICU are associated with lower illness adjusted mortality among pediatric patients.

3. Establish the relationship between HWEs and illness adjusted length of stay (LOS) among patients in the PICU.

   Hypothesis 3: There is a relationship between effective communication, true collaboration and authentic leadership and lower illness adjusted LOS in the PICU.

4. To verify the association between HWEs and PICU nurse's intent to leave their organization in six months.

Hypothesis 4: There is lower intent to leave the organization among PICU nurses in units that have effective communication, true collaboration and authentic leadership.

Professional significance of the study

A new style of leadership is needed that includes mutual respect and collaboration (IOM, 2010). Some studies have already shown a relationship between this style of leadership and a reduction in errors, better patient outcomes and a lower nurse turnover (Pearson, 2006; IOM, 2010). Because of a nursing shortage and a work force that is approaching 50 years of age and soon to be retiring, it is important to have a positive work environment to increase retention and decrease turnover. It is also important to improve patient outcomes and decrease errors to improve patient safety. Liability for hospitals is increasing and the public is more knowledgeable about patient safety. Payers, including the Center for Medicare and Medicaid, have announced that hospitals will now not be paid for extended length of stay among hospitalized patients due to medical errors which should not have occurred.

Creating a positive work environment is highly desirable. It can impact patient outcomes and nurse retention. There is strong support in the literature that healthy work environments have a positive effect on staff retention (VanOyen Force, 2005). The IOM stated that evidence has shown that unless the work environments are healthy, patient safety continues to be threatened. Latent conditions in work environments, which are factors not under the control of the front line workers and include poorly organized work structures or gaps in supervision, are the primary sources of those threats. Nurses are the largest contingent of health care workers and perform critical patient safety functions (IOM, 2004). To improve patient safety, the work environment

of nurses must be transformed. To achieve this, effective communication, true collaboration and authentic leadership must be present.

CHAPTER 2: REVIEW OF THE LITERATURE

Unhealthy and unsupportive work environments contribute to unsafe working conditions and medical errors (Aiken, Clarke, Sloane, Lake and Cheney, 2008; American Association of Colleges of Nursing, 2002; American Hospital Association, 2002; Boyle, 2004; Flynn, Liang, Dickson & Aiken, 2010; Friese, 2005; Joint Commission, 2002; Kimball & O'Neill, 2002; Knaus, Draper, Wagner & Zimmerman, 1986; Kramer, Macguire & Brewer, 2011; Kramer, Schmalenberg, & Maguire, 2010; Lake and Friese, 2006; McCusker, Dendukuri, Cardinal, Laplante & Bambonye, 2004; Mitchell & Shortell, 1997; Schmalenberg & Kramer, 2008; Schmalenberg et al., 2005; Shortell et al., 1994; Stone et al. 2007). Unhealthy and poor conditions in the nurses' work environment can negatively affect retention of experienced nurses and successful recruitment of the nurses that will be needed. It is estimated that between now and 2025, there will be a shortage of 260,000 Registered Nurses (RNs) (Buerhaus, Auerbach & Staiger, 2009). This shortage will be twice as large as any other shortage seen in nursing in the United States since the early 1960s. The work environment of nurses, the largest segment of the nation's health care work force, needs to be transformed in order to protect patients from healthcare errors (IOM, 2004). Healthy work environments (HWEs) are the result of many positive structures and outcomes put in place in nursing. Healthy Work Environment is a relatively new term in healthcare. Sometimes it is used synonymously with the term healing work environment and while similar, it is not the same (Stichler, 2009).

Healthy Work Environments – Definitions and Key Concepts

The concept of HWEs developed from the focus of numerous studies about the nurses' work environment over the past two decades. A HWE can be defined as "a work setting in which policies, procedures, and systems are designed so that employees are able to meet

organizational objectives and achieve personal satisfaction in their environment" (Disch, 2002, p.3). It is a work environment where the nurse is able to be productive and give quality patient care. It is also a satisfying place where personal needs can be met (Kramer & Schmalenberg, 2008). A HWE is "supportive of the whole human being, patient-focused, and a joyful workplace" (Shirey, 2006, p. 258).

Healthy work environments refer to organizational practices that focus on being the employer of choice such as pay, autonomy, policies and procedures, formal and informal interactions and perceived professional status (Alspach, 2009). It is not one variable that makes the work environment healthy, but a compilation of several interrelated factors and a cumulative effect of these factors (Alspach, 2009). These factors are all related to the organizational structures and processes that influence the environment and the nurse. Aiken and Patrician (2000) defined theoretical relationships that linked organizational attributes of the nurses' work environment with improved nurse and patient outcomes. They specified empirical outcomes to measure for both nurse and patient outcomes. These empirical outcomes were higher patient satisfaction and lower mortality, lower burnout and needlestick injuries (Aiken & Patrician, 2000). Others have noted how unhealthy work environments are associated with poor communication practices, lack of leadership, abusive relationships and ineffective collaboration (Heath, Johanson, & Blake, 2004). One group found that organizations that strive for multidisciplinary teamwork and better patient outcomes have to proactively reinforce communication and collaboration (Propp et al., 2010).

In 2003, the Registered Nurses Association of Ontario, Canada in partnership with the Office of Nursing Policy known as Health Canada introduced a large project aimed at developing, implementing, disseminating and evaluating a suite of Healthy Work Environment

Best Practice Guidelines. The purpose of this initiative was to create and sustain healthy work environments because healthier work environments are known to result in positive outcome for workers and improved health service quality, cost effectiveness and workforce renewal (Lowe, 2003). Pearson et al (2006) did a comprehensive systematic review of the evidence on a nursing team that fosters a HWE to identify all of the available evidence internationally. Many of the articles were from the United States and Canada, but there were other HWE studies done in Europe. The results of this review included nine experimental or quasi-experimental studies, 11 descriptive studies and four qualitative studies. While there were a variety of team compositions identified, the recommendations from this review were that team characteristics should include accountability, commitment, enthusiasm and motivation which could lead to healthier work environments (Pearson, 2006).

Healthy Work Environments have been positively associated with increased patient satisfaction, better quality patient care, increased patient safety, and a decrease in medical errors, including medication errors resulting in decreased morbidity and mortality (Aiken et al., 2008; Hart, 2006; Kramer & Schmalenberg, 2008; Manojilovich & Dicicco, 2007; Shirey & Fisher, 2008; Ulrich et al., 2009). The RN work environment has also been linked to problems with nurse retention and burnout (Cohen, Stuenkel & Ouyen, 2009; IOM, 2004; Lake & Friese, 2006; McGillis-Hall, 2005).

In 2001, the American Association of Critical Care Nurses (AACN) made a commitment to promote HWEs for critical care nurses and for patients. They began a project to better understand the factors in the work environment that impact patient outcomes and professional nursing practice (Heath, Johanson, & Blake, 2004). AACN developed the HWE standards as a foundation for dialogue about the realities and problems in the RN work environment and to

encourage more to be done to address these problems. In 2005, AACN launched the Healthy Work Environment (HWE) Standards that were developed from previous work done by the Nursing Organization Alliance (Boeck, 2005). The six standards are: skilled communication, true collaboration, effective decision making, appropriate staffing, meaningful recognition and authentic leadership. Skilled communication means that "…nurses must be as proficient in communication skills as they are in clinical skills" (AACN, 2005, p.13). It is more than a one-way delivery of information which sometimes is not effective, but a two-way dialogue in which people think and decide together. True collaboration is something that nurses should be relentless in pursuing and fostering. AACN describes collaboration as a process that eventually, over time which will result in an environment where joint communication and decision making between the team of nurses and other disciplines becomes the status quo (AACN, 2005). Effective decision making exists when nurses have the ability to participate in those areas of clinical practice for which they are held accountable. This refers to nurses having control over their nursing practice and the care environment in which they work. Appropriate staffing is not only making sure that the appropriate numbers of staff is available, but that there is a match between the patient needs and the nurse's competency. Recent evidence shows that better patient outcomes result when there is a high proportion of registered nurses and those registered nurses are bachelor's prepared at a minimum (Aiken et al., 2002; Blegen, Goode, Spetz, Vaughn & Park, 2011; Needleman et. al, 2002). Meaningful recognition is the fifth standard. It is a process of acknowledging the contribution and importance of the RN role and of the RN as an individual rather than a token event or party as some might think. Effective recognition programs occur over time when nurse leaders work with the nursing staff to determine what is relevant to them. These programs usually result in policy and procedural changes about how nurses are

involved and compensated as partners in the organization. The last AACN HWE standard is authentic leadership. Authentic leadership requires that nurse leaders in the organization "fully embrace the imperative of a healthy work environment, authentically live it and engage others in its achievement" (AACN 2005, p. 33). In order to achieve this, organizations must ensure that nurse leaders receive the support and ongoing development to be role models. Nurse leaders must also be positioned in the organization to be involved in key decisions that influence nursing practice. Communication, collaboration and leadership are essential to promoting control of nursing practice and are therefore the focus of this research study.

Many studies have been done over the years on the impact of communication, collaboration and leadership on the nurses' work environment and nurses' intent to leave the organization. Most of these studies are done on retrospective data base reviews and at the organization level of analysis. Few studies have linked the nurses' work environment to patient outcomes at the unit level since Knaus' landmark study in adult critical care units in 1986 (Knaus et al., 1986). There were a few other research studies that were able to show a positive correlation between nurse-physician collaboration and patient outcomes (Aiken et al. 2008; Aiken et al, 2002; Baggs et al., 1999; Flynn, Liang, Dickson, & Aiken, 2010; Friese, Lake, Aiken, Silber & Sochalski, 2008; O'Brien-Pallas et al., 2006). Most of these studies linked data at the organizational level and not specifically at the unit level.

Early on, Aiken (2000) found that the work environment was one of the key elements related to lower mortality and positive nurse retention. Other studies that followed linked problems with the work environment to nurse outcomes that included job dissatisfaction, burnout and nurses' intent to leave an organization (Aiken et al., 2008; Aiken et al., 2002; O'Brien-Pallas et al., 2006; Schmalenberg & Kramer, 2007; Stone et al., 2007; Ulrich, Buerhaus,

Donelan, Norman & Dittus, 2005). In a recent study, nurses reported that the hospital workplace had improved, but not in some areas such as overtime hours, sexual harassment and physical violence (Ulrich et al., 2009). With regard to communication and collaboration, the nurses reported a slight improvement.

Communication in the Health Care

Webster's definition of communication is, "The imparting or interchange of thoughts, opinions, or information by speech, writing or signs". AACN defines communication as "…two-way dialogue in which people think and decide together" (AACN, 2005, p. 13). Others have defined communication as the process by which information is exchanged between a sender and a receiver which occurs both verbally and nonverbally (McGillis Hall, 2005). Effective communication exists when there is true transparency and the team is able to communicate about all issues clearly and efficiently. Numerous issues related to communication have been identified as the major contributor to adverse events in health care and the largest contributor to nurses' dissatisfaction with their job and intent to leave an organization. These issues are generally related to the nurses' work environment including inadequate training or knowledge, distractions, fatigue, stress, overtime and poor staffing (Aiken et al., Berney & Needleman, 2006; Buerhaus & Needleman, 2000; Mark, Harless & Berman, 2007; Schmalenberg et al., 2005; Scott, Rodgers, Hwang, & Zhang, 2006).

Problems with communication in health care result in medical errors. One study reported that communication failures in health care arise from vertical hierarchical structures, concerns with upward influence, role conflict, ambiguity and struggles with interpersonal power and conflict (Sutcliffe, Lewton & Rosenthal, 2004). The Joint Commission stated that communication failures are the leading cause of harm to patients in hospitals today. In one study,

communication was a primary root cause for 70% of the errors (Leonard, Graham & Bonacum, 2004). The serious impact of medical errors is that 75% of these patients die unnecessarily. Other studies found that lack of communication and collaboration are associated with a higher rate of patient mortality and readmissions to the ICU (Baggs et al., 1999; Manojlovich & DeCicco, 2007). At least 6% of 36% of the adverse events reported were preventable and were associated with iatrogenesis, human errors, and failure of management factors or communication (Ksouri et al., 2010).

Nurse-to-Nurse Communication

Nurses spend a large portion of their day communicating information about their patients to others. Medical mishaps occur when communication breaks down (Sutcliffe, Lewton, & Rosenthal, 2004). Hand-off communication, whether it occurs at change of shift or when someone is covering a patient while another nurse goes off of the unit, is extremely important to maintain continuity of care and to make sure all are aware of the plan of care for the day. Nurses are taught communication skills as a basic competency in their prelicensure programs. Although there are studies about nurses who are perceived as bullying and intimidation that occurs in health care, these aspects of communication are not the focus of this study. Effective communication between nurses is important for HWEs.

Nurse-to-Physician Communication

Effective communication between healthcare professionals is essential for patient safety. Chassin and Becher (2002) analyzed an incident in which the wrong patient underwent the wrong procedure because of poor communication that they referred to as “frightening”. Doctors and nurses communicate differently. Physicians are seen at the top of the hospital hierarchy. Many studies addressed nurse-physician communication and the different perceptions by nurses

and physicians. Findings indicated nurses being less satisfied with the communication or interactions with physicians for several reasons including verbal abuse, lack of respect or lack of teamwork (Disch, 2001; Greenfield, 1999; Manijlovich & DeCicco, 2007; Oberle & Hughes, 2001; Schmitt, 2001; Thomas, Sexton, J. & Helmrich, 2003). Several studies have shown a relationship between lack of effective communication between nurses and physicians and an impact on patient outcomes (Baggs et al., 1999; Evans & Carlson, 1992; Manojlovich, Antonakos & Ronis, 2009; Manojlovich & Diciccio, 2007; Rosenstein, 2002; Rosenstein & O'Daniel, 2005).

Poor communication between RNs and MDs can lead to medical errors, but there is also sufficient data to show that effective communication can lead to positive outcomes, including improved information flow, more effective patient interventions, improved safety, enhanced employee morale, increased patient and family satisfaction and decreased length of hospital stay (Knaus et al., 1986; Shortell et al., 1994; Zimmerman et al., 1993). Effective RN-MD communication is essential for good patient outcomes.

Collaboration

One of the recommendations in the first IOM report was to improve collaboration (IOM, 2000). Collaboration is a joint decision-making and communication process among health professionals (Colluccio & McGuire, 1983). In the PICU, this typically means between RNs and MDs. Some of the attributes of collaboration are trust, knowledge, mutual respect, good communication, cooperation and shared responsibility (Arcangelo, Fitzgerald, Carroll, & David, 1996). The goal of RN-MD collaboration is to care for the needs of the patient and respect the unique abilities of each other as members of a multidisciplinary team.

True collaboration exists when the work group is functioning as a team and all members are valued for the work that they bring to the team. Kinnaman and Bleich (2004) define collaboration as "A communication process that fosters innovation and advanced problem solving among people who: are of different disciplines, organizational ranks, or institutional settings; band together for advanced problem solving; discern innovative solutions without regard to discipline, rank or institutional affiliation; and enact change based on a higher standard of care or organizational outcome" (Kinnaman & Bleich, 2004, p. 311). Krairiksh and Anthony (2001) defined collaboration as the "…interaction between nurses and physicians with trust, respect, and joint contributions of knowledge, skills, and value to accomplish the goal of quality patient care."(p. 17) Collaboration must occur at all times in order for a HWE. Every team member must contribute and support the concept. This is essential to provide quality care for patients and families (Barnsteiner, 2001).

A HWE is one that promotes interaction and communication among professionals, a positive and strong working relationship between the staff and activities that are done jointly with the team and the leadership (Barnsteiner, 2001). There are numerous studies of poor nurse-physician relationships, including reports of poor communication (Greenfield, 1999), hierarchical communication (Disch, 2001), unilateral decision making by physicians (Schmitt, 2001), and verbal abuse of nurses by doctors (Disch, 2001).

Collaboration requires good communication skills and a supportive leadership team, where nurses are not intimidated or afraid to voice their opinions. There are numerous studies in which nurses report poor collaboration and this has resulted in higher morbidity and mortality (Baggs et al., 1999; Despins, 2009; Knaus et al., 1986; Propp et al., 2010). In two different studies, Baggs et al. (1992 & 1999) measured the impact of perceptions of collaboration between

physicians and nurses in the intensive care unit on patient outcomes. Findings indicated that medical ICU nurses' reports of collaboration were positively associated with good patient outcomes.

Nurse-physician collaboration has also been shown to impact retention (Erickson, Hamilton, Jones, & Ditomaso, 2003; Foley, Kee, Minick, Harvey, & Jennings, 2002; Rosenstein, 2002). Shortell et al. (1994) found that collaboration among caregivers in the ICU was significantly associated with lower nurse turnover.

Authentic Leadership

The importance of authentic leadership in supporting good patient outcomes and nurse retention cannot be underestimated. Fontaine and Gerardi (2005) stated, "When leaders don't fully embrace the notion of health work environments, authentically live it, and engage others in it actions, there's no foundation for change" (p. 36). Authentic leadership is when the leader "walks the talk", provides the leadership needed by the nursing staff and believes and contributes to the promotion of a HWE. Studies supporting HWEs and authentic leadership have been published over the last fifteen years (Cummings et al., 2009; Kramer et al., 2007; Kramer & Schmalenberg, 2004; McNeese-Smith, 1997; Shirey, 2009; Tomey, 2009). Avolio et al. (2004) described authentic leadership as the effective leadership needed to promote HWEs. Findings indicate that in the units where nurses perceive strong nursing leadership, there is higher job satisfaction and lower intent to leave the organization over the next year.

Kramer and Schmalenberg (2004), in their studies on the Essentials of Magnetism found that nurse manager support affects nursing productivity recruitment, retention and job satisfaction. Their research found nine role behaviors of the nurse manager that made their leadership supportive. These were: approachable and safe, cares, walks the talk, motivates

development of self-confidence, gives genuine feedback, provided adequate and competent staffing, "watches our back", promotes group cohesion and teamwork, and resolves conflicts constructively (Kramer et al., 2007).

A work environment that is healthy fosters leadership growth in the RNs. In these units, the nurse leaders in the organization recognize the importance of growing leaders to help support the unit structure and the nursing staff. Nurse managers are critically important for modeling communication, collaboration and leadership. Stichler (2009) emphasized that a transformational leadership style and participative management are described most often the key processes that contribute to HWEs. Sticher (2009) found that:

> "Strong leadership is essential to create a safe work environment where staff members feel supported with a zero-tolerance policy and informed about ways to support each other in conflict situations with confrontational skills that mitigate the conflict rather than exacerbate the hostility" (p. 179).

Erenstein and MacCafferty (2007) recommend, based on a comprehensive review of the literature, that nurse leaders work with the nursing staff to build HWEs that include, trust, support, communication, and collaboration to achieve retention. The literature supports the idea that a transformational leader must be present in order to create and sustain HWEs (Heath, Johanson & Blake, 2004; Kramer, Schmalenberg & Maguire, 2010; Shirey, 2009; Stichler, 2009; Stuenkel, Nguyen, & Coyne, 2007).

Healthy Work Environment and Patient Outcomes

In the IOM report (2004), factors cited that increased errors in the nurses' work environment needed to be addressed immediately. Reason (2000) found a combination of poor staffing levels, high acuity, fatigue and heavy workloads caused nurses to miss changes in the

patient's condition or make mistakes when preparing medications. Problems with nurses' work environment can contribute to both nurse dissatisfaction and patient harm (Barron McBride, 2005; McCauley & Irwin, 2006; McGillis, Doran, & Pink, 2008; Wolf, 2006). Medication errors, burnout, high staff turnover, ineffective delivery of patient care, high stress levels and unsafe working conditions are negative impacts that occur and can result from unhealthy work environments (Miracle, 2008).

Aiken identified the attributes of evidence-based work environments that are associated with positive patient outcomes, as well as positive nurse outcomes. These attributes are staffing adequacy, positive physician-nurse relationships, and administration support services for the nurses (Aiken et al., 2002). One key patient outcome is a preventable adverse event. The IOM (2006) estimates that there are at least 1.5 million preventable adverse events due to systems issues, not due to incompetent professionals. A healthy nurse work environment positively impacts patient outcomes with fewer central line infections, lower incidence of ventilator assisted pneumonia and urinary tract infections (Stone et al., 2007). There are numerous studies that positively link HWEs to patient satisfaction, excellence in patient care and patient safety, reduced infections and medical errors and higher nurse retention (Friese et al., 2007; Kramer & Schmalenberg, 2008; Manijlovich, & DiCicco, 2007; Shirey, 2008; Ulrich et al., 2006). Aiken (2008) reported lower risks of death and failure to rescue in hospitals where nurses report better work environments. That study suggested that approximately 40,000 deaths per year could be avoided by improving the work environment, staffing and education.

Mitchell & Shortell (1997) found that adverse events may be a more closely related to organizational factors and structures. Flynn et al. (2010) found a relationship between the work environment and pressure ulcers and that found that a more supportive work environment was

associated with better outcomes, especially a lower percentage of pressure ulcers. Shortell et al. (1994) referred to the work environment as the organizational culture. Organizational culture involves the norms, values, beliefs and expectations shared by the people working in the unit. In research investigating collaboration and nurses' involvement in decision-making, a positive culture in the ICU was significantly associated with lower rates of risk-adjusted length of stay, nurse turnover and provider-rated quality care. Baggs et al. (1999) also reported that collaboration had a positive relationship with lower rates of hospital readmission and mortality. Organizational decisions related to staffing, communication and collaboration are important aspects that have been positively associated with patient safety outcomes.

Aiken and colleagues (2008) also looked at the impact of patient mortality and nursing care. Many of their research studies focused on front line management, staffing and nurse-doctor relationships as a predictor of patient mortality (Kramer & Schmalenberg, 2005). Baggs et al. (1999) reported that medical ICU nurses' reports of collaboration were associated positively with patient outcomes. In this study, Baggs et al. reported support for ICU staff nurse-physician collaboration as the variable that was associated with favorable patient outcomes. Medical ICU patients are very complex and the team must be able to work together collaboratively.

Intensive care unit structures and processes have been reported to have a relationship with the work environment. In a study of 5030 ICU patients in 13 tertiary hospitals using the Acute Physiology and Chronic Health Evaluation (APACHE) II methodology for risk-adjustment, findings revealed that the degree of coordination in the adult ICUs significantly influenced how effective the unit was (Knaus et al., 1986). APACHE is a physiologically based classification system used in adult ICUs for measuring severity of illness in groups of critically ill patients. These authors looked at the structures and processes in the ICU and the effect on

patient outcomes. Eight years later these authors found that caregiver interaction comprising the culture, leadership, coordination, communication and conflict management abilities were significantly associated with lower risk-adjusted length of stay and lower nurse turnover (Shortell et al., 1994). These studies found that ICUs with structures that promoted good nurse-physician collaboration and autonomous decision making had significant outcomes and a lower acuity adjusted mortality than ICUs not reporting this structure. Relationships between illness adjusted mortality and illness adjusted length of stay in the PICU have not been studied.

Work Environment and Nurse Outcomes

Numerous studies support the fact that nurses identify that communication, collaboration and leadership are key areas that need to be in place to have a HWE (Gunnarsdottir, Clarke, Rafferty, & Nutbeam, 2006; Kramer & Schmalenberg, 2007; McCusker et al., 2004; McGillis Hall, Doran, Pink, 2008; Schmalenberg et al., 2008; Stuenkel, Nguyen, & Cohen, 2007; Gardner, Thomas-Hawkins, Fogg & Latham, 2007). With a shortage of over 260,000 nurses estimated by the year of 2025, nurse leaders need to be creative and do what they can to improve the work environment. Creating a positive work environment is highly desirable. There is strong support in the literature that HWEs have a positive effect on staff retention (VanOyen Force, 2005). One study found that nurses who expressed the intent to leave rated their work environment more negatively than those that expressed intent to stay (Gardner et al., 2007). Previous researchers have reported a direct relationship between RN-MD communication and nursing job satisfaction (Manojlovich, 2005; Sengin, 2003). Baernholt and Mark (2009) found that job satisfaction and turnover rates were associated with both nursing unit characteristics and the work environment. Gardner et al. (2007) looked specifically at the work

environment in hemodialysis units and also found that the nurses that rated their work environment favorably indicated they did not intend to leave the organization.

The IOM reveals evidence that unless the work environments are healthy, patient safety continues to be threatened. Latent conditions which the front line staff has no control over, such as poor supervision and poor design of work in work environments are the primary source of errors. (IOM, 2004). The strongest predictor of nurses' intent to leave an organization is expressed problems with their work environment (Paris & Terhaar, 2010; Zangaro & Soeken, 2007).

Studies have been done with nurses in other countries and nurses in adult intensive care units. No studies have been done to compare the work environment for PICU nurses and the relationship to nurses' intent to leave their organization. This study is designed to contribute to building the research evidence that is lacking.

Organizational Structures and Magnet

The original Magnet hospital studies were done between 1983 and 1989 (Kramer & Schmalenberg, 2005) and were structure-outcome studies looking at hospitals with good outcomes and retention and their organizational structure and nursing hierarchy. In the later studies, researchers began to look at the nurse manager support as well as the RN/MD relationship to see how these two issues impacted the nurses' control over their practice as well as their job satisfaction. During the late 1980s and the 1990s, studies found the process features that were consistent in successful organizations were autonomous practice, constructive RN/MD relationships and nurse manager support (Kramer & Schmalenberg, 2005).

Many of the Magnet studies looked at the work environment and the hospital structures. Kramer, Schmalenberg and Maguire (2010) define a work environment as "…a set of

interconnecting surroundings, circumambience's, and conditions that determine, influence, and guide growth and action" (p.4). They further define a HWE as one that the leader provides the structures, practices, systems and policies that allow the nurses to engage in processes and relationships essential to safe and quality patient outcomes. Aiken et al. (2008) found that implementing a Magnet model was associated with a significantly improved nursing work environment as well as improved job-related outcomes for nurses and for patients. The empirical evidence on Magnet hospitals has consistently shown better patient and nurse outcomes and a better, more supportive work environment for nurses (Brady-Schwartz, 2005; Cimiotti et al., 2005; Kramer & Schmalenberg, 2005; Kramer et al., 2008; Lake & Friese, 2006). As we are entering into a time of great concern for our workforce with so many nurses needed and so few educational programs available, it is important for hospitals to retain nurses. However, a thorough understanding of communication, collaboration and leadership in the PICU is needed and their influence on pediatric ICU nurses' intent to leave their organization; otherwise, the profession will continue to have high turnover in these specialty ICUs that can affect the quality of patient care and contribute to poor outcomes.

Conclusion

Communication and collaboration are tightly woven and some overlap exists between them, but there is a relationship between those two variables and HWEs. In addition, authentic leadership highlights the role of nurse leaders and demands that they play a key role in sustaining and developing HWEs. Societal pressure also demands that everything possible be done to improve the work environment and standardize care. There are some studies that show a significant positive relationship between good communication, collaboration and leadership and a HWE (Aiken et al., 2008; Aiken et al., 2002; Baggs et al., 1999). Reviewing the empirical

evidence of the past two decades, there are characteristics of the work environment that have a significant impact on nurse and patient outcomes. These relationships have not been studied in the pediatric intensive care unit. The purpose of this study is to address that gap.

In this comprehensive literature review of HWEs and patient and nurse outcomes, only one study was found on the nurses' perception of their work environment in a pediatric tertiary setting. There is no research on the relationship between the nurses' perception of their work environment in the Pediatric Intensive Care Unit (PICU) and patient and nurse outcomes. Because early intervention is important when children become unstable, HWEs where there is good communication, collaboration and supportive leadership are essential. Therefore, it is important to study this population and obtain empirical data on the relationship between HWEs and patient and nurse outcomes. In summary, the literature on HWE and the key elements needed to have a HWE; communication, collaboration, and leadership have been presented. Although the influence of each these elements on HWE have been reported, what is not known are the factors that influence communication, collaboration, and leadership in the PICU and the influence these factors have on pediatric critical care patient outcomes.

CHAPTER 3: CONCEPTUAL FRAMEWORK

In order to evaluate the relationship between the key processes in the work environment of nurses, communication, collaboration and leadership on the outcomes of risk adjusted mortality, risk adjusted length of stay, ventilator associated pneumonias and central line infections among PICU patients, and nurses' intent to leave their organization, an appropriate framework is needed. The conceptual framework that was applied in this study was Donabedian's Structure, Process and Outcomes model (Donabedian, 1980). Donabedian's model is linear which presumes that structures effect processes and in turn processes effect outcomes (Mitchell, Ferketich & Jennings, 1998). Donabedian was a pioneer in the field of quality improvement structures and processes and his framework continues to be utilized today. Even though there is strong evidence in the quality improvement literature on the processes and outcomes, the structure has not received as much attention (Glickman, Baggett, Krubert, Peterson & Schulman, 2007).

Donabedian's Model

Donabedian developed his model because he believed there needed to be a model for assessing the quality of medical care (Donabedian, 2003). He believed that there was a need to evaluate three approaches for assessing the quality of care. The triad, as he referred to them, was "structure", "process" and "outcome". Health services research is an evaluation of health services based on data related to the structures, processes and outcomes. This model has been used to evaluate health care systems for over four decades (Schmalenberg & Kramer, 2008). It is useful in analyzing current conditions of the work environment and in developing strategies to improve the work environments in hospitals today (Kramer, Schmalenberg, & Maguire, 2010). Health services are usually evaluated on data that is collected about the structure, inputs,

processes, outputs and outcomes of the service (Donabedian, 1980). Donabedian has published extensively on this model and the framework and principles in his publications will be utilized as the conceptual model for this research study (Donabedian, 1966, 1972, 1980, 2003). He believed groups struggle with defining quality outcomes because "different people stand in different places and have different point of views" (Donabedian, 1987, p. 6). Donabedian believed strongly that the healthcare structure was important and it was the driving force behind care processes and health outcomes (Glickman et al., 2007). The model was originally rolled out to review quality of care in a traditional environment. It since has been utilized as a framework for nursing research and healthcare issues. This model is used often in health systems research because it is very simplistic (Donabedian, 2003). Quality is achieved through the three components of the model (structure, processes, and outcomes) that are interconnected. The model originally emphasized structure as the driving forces behind processes and outcomes, but now processes are thought to have a role in outcomes also. Donabedian's conceptual framework of quality assessment is shown in Figure 1. As illustrated, structure effects process which effects outcome.

Figure 1. Donabedian's Conceptual Framework for Quality Assessment

Structure

Donabedian (1980) originally defined structure as "the relatively stable characteristics of the providers of care, the tools and resources they have at their disposal, and the physical and organizational settings in which they work" (p.81). The structure is how the organization is set up or the framework and refers to the conditions under which care is provided (Donabedian,

2003). These conditions are set up into three categories: material resources, human resources and organizational characteristics. Material resources are facilities and equipment. An example is the physical layout of a patient care unit. Human resources have to do with the number and qualifications of the professional and support staff. Pediatric critical care RNs typically have pediatric advanced life support training and practice as an example of qualifications of professional staff. The structure of nursing care is how the staffing is supplied, the skill level and the education level or certification of those nurses. The most important of the three categories is organizational characteristics. These characteristics can have a strong influence on processes and in turn on outcomes. Organizational characteristics can include how medical care is organized when physicians are also faculty and having teaching responsibilities with medical students, interns and residents and the hospital is referred to as a teaching hospital. Another example is the nursing and physician hierarchy relative to power, status and influence. How nursing is organized such as an all-RN staff in the ICU or one manager per unit are examples of organizational characteristics. Other important components of the structure are the organization's policies and procedures, such as hiring only RNs with bachelor's degrees for leadership positions. Additionally, regulators require certain structures to be in place in the organization such as job descriptions and staffing patterns and policies.

Process

Process is what the activities actually are in a healthcare organization that involves physicians, nurses, and patients and families. A process might include the diagnosis or treatment of the PICU patient. The nursing process is also an example. It includes the assessment, planning, implementation and evaluation of the care of the patient by the nurse. Process includes the interaction between the nurse and the patient. It also includes

communication between nurses and between nurses and MDs. The professional relationships that develop between nurses and MDs are a foundational process for collaboration. Work processes that are supported by organizational structures can be identified through empirical research, such as those identified by Kramer et al. (2008) in Magnet facilities. They found that organizational processes such as patient bedside rounds, staffing, and technology can influence the patient's length of stay.

Outcomes

Outcome refers to the impact on the patient and/or staff (Kramer, Schmalenberg, & Maguire, 2010). Donabedian (2003) stated, "These are taken to mean changes (desirable or undesirable) in individual and populations that can be attributed to healthcare" (p. 46). Outcomes include a change in health status or behavior, or the knowledge acquired by the patients and their families that will influence future care, and patient satisfaction. Many of the nursing-sensitive quality indicators are also patient outcomes. The term nursing-sensitive quality indicator means that they are sensitive to nursing care and nursing care influences theses outcomes. Examples of quality indicators that are sensitive to nursing care include patient mortality, patient falls, hospital-acquired pressure ulcers and infections. Another set of outcomes influenced by the structure of the organization and the processes involved in delivering care to patients include nurse outcomes such as job satisfaction, turnover and intent to leave the organization (Schmalenberg et al., 2005).

In summary, Donabedian defined structure as the organizational and physical properties of the healthcare setting, while the processes are the treatment, therapies, and care provided and the outcomes are the result of the healthcare delivered (Donabedian, 1972). While structures and processes really determine the organization's effectiveness, "The emphasis on evaluating quality

of care has shifted from structures (having the right things happen) to processes (doing things right) to outcomes (having the right things happen)" (Mitchell, Ferketich, & Jennings, 1998, p. 43).

The Nurses' Work Environment

Donabedian's model has been used to evaluate the work environment of nurses for a number of years. Kramer, Schmalenberg and Maguire (2010) used Donabedian's model to conduct research on Magnet hospitals and described these work environments and the impact on patient outcomes by stating, "A healthy clinical practice environment is one in which leaders provide structures, practices, systems and policies that enable clinical nurses to engage in the work processes and relationships essential to safe and quality patient care outcomes" (p.4). A key example of how the interdisciplinary team of doctors and nurses can impact ICU outcomes was the study done by Knaus (1986), consisting of the physical layout, number of physicians, nursing ratio and technology that was available. They found that acuity adjusted patient mortality, which is the predicted outcome of death was not affected by the structures, but it was directly affected by two processes; the nurses' clinical autonomy and nurse-physician collaboration.

Communication, collaboration and leadership, if carried out effectively, can influence the quality of patient outcomes and nurse retention (Diers & Potter, 1997; Shortell, Zimmerman, Rousseau, Gillies, Wagner et al., 1999). The model proposed for this dissertation study is to examine the structure of the health care setting, specifically the PICU and the communication between RNs and between RNs and MDs, RN-MD collaboration and the leadership of the nurse manager in relation to the patient outcomes of central line infections, risk adjusted length of stay in the PICU, and risk adjusted mortality as well as nurses' intent to leave the organization. The

structures that will be studied will be hospital characteristics and nurse characteristics including types of hospital, nursing and physician leadership structure. The processes that were studied were communication, collaboration and leadership. The outcomes that were obtained on pediatric ICU patients will be risk adjusted length of stay, risk adjusted mortality, ventilator associated pneumonias and central line infections. The nurse outcome will be the nurses' intent to leave the organization. (See Figure 2.)

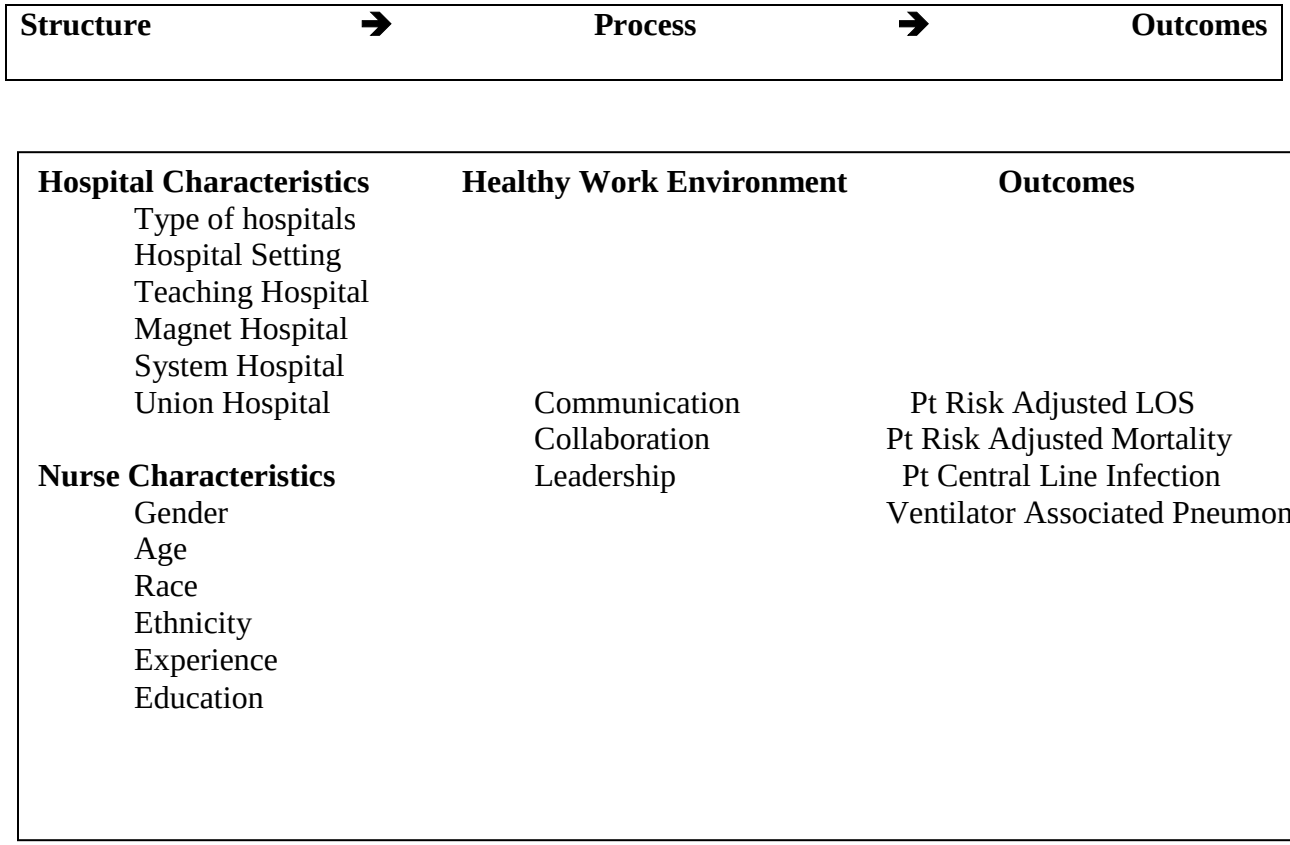

Figure 2. Conceptual model applied in this study

The conceptual framework suggests that the structure of the hospital type, setting, teaching hospital, Magnet designation, being a hospital within a health system, and a hospital where employees are unionized would be related to the effectiveness of the communication between PICU nurses and between PICU nurses and physicians, the extent of RN-MD

collaboration in the PICU, and the extent of effective leadership by the PICU nurse manager. It is expected that the characteristics of the RN that include gender, age, race, ethnicity, experience as a PICU nurse, and certification would be related to communication between PICU nurses and between PICU nurses and physicians and the extent of RN-MD collaboration in the PICU, and the perceived leadership effectiveness of the PICU nurse manager. It is also expected that both the structures and the processes in this study will have an influence on the incidence of central line infections, length of stay and mortality among pediatric ICU patients when adjusted for variation in risk associated with their illness. Additionally, the structures and processes in this study are expected to have an influence on the future retention of the PICU RN as indicated by their intention to leave the organization.

CHAPTER 4: METHODOLOGY

This chapter discusses the methodology for this study: design, setting, sample, instrumentation, data collection procedures, discussion of power, data analysis and study limitations.

Design of the Study

Overview of Study Design

The study design is exploratory, cross-sectional, correlational design for the purpose of determining the relationship between key aspects of the PICU work environment, specifically RN-MD and RN-RN communication, RN-MD collaboration, and Nurse Manager (NM) leadership, and central line infections, ventilator associated pneumonias, risk adjusted mortality, risk adjusted length of stay. Additionally, the study will examine the relationship between these aspects of the PICU work environment on the PICU RNs' intent to leave their job in the pediatric intensive care unit.

The study design has two parts. The first part involves using survey questionnaires to measure communication, collaboration and leadership in the PICU as perceived by RNs. The second part of the study involves accessing a secondary data-base that contains the PICU pediatric patient outcome data (length of stay, ventilator associated pneumonia, central line infection, and mortality) and the PICU RN outcome data (intent to leave).

Specific Aims/Hypotheses

The specific aims of this study are to:

1. Determine the relationship between the elements of a healthy work environment, communication, collaboration and leadership, and ventilator associated pneumonia, and central line infections in the PICU.

Hypothesis 1: PICUs perceived by nurses as having effective communication, true collaboration and authentic leadership will have lower ventilator associated pneumonias and central line infections than units without healthy work environments.

2. Investigate the association between healthy work environments and risk adjusted mortality in the PICU.

   Hypothesis 2: Effective communication, true collaboration and authentic leadership are associated with lower risk adjusted mortality among pediatric patients.

3. Establish the relationship between healthy work environments and risk adjusted length of stay (LOS) in the PICU.

   Hypothesis 3: There is a relationship between effective communication, true collaboration and authentic leadership and lower risk adjusted LOS in the PICU.

4. To verify the association between healthy work environments and nurse's intent to leave their organization in six months.

   Hypothesis 4: There is lower nurse intent to leave an organization among PICU nurses in units that have effective communication, true collaboration and authentic leadership.

Setting and Sample

Setting

Ten pediatric intensive care units (PICU) from different parts of the country were selected from among children's hospitals. To reduce variation across two units unrelated to study goals that might affect the outcome of interest, units asked to participate in the study were restricted to those with more than ten beds and pediatric critical care medicine fellowship programs. These programs offer a three year fellowship in pediatric critical care and require accreditation by the American College of Graduate Medical Education (ACGME). Pediatric

critical care medicine fellows are a vital component of the nurses' work environment and provide similar physician leadership and coverage structures.

Sample

The sample for this study was a convenience sample of only PICU RNs because the RN is the primary professional provider of nursing care in PICU. Non-RN staff may not influence the outcomes in this study. PICU nurses have not been studied in the past leaving a gap in the literature. The sample was drawn from the population of PICU RNs currently working in the selected units that agree to participate. The total sample of RNs that was needed was 350.

Inclusion criteria: PICU RNs who work in the unit selected for this study as bedside nurses or charge nurses.

Exclusion criteria: Administrative nurses that include assistant nurse managers and nurse managers; Non-RN staff that work in the PICU.

Sample Size

There were ten units from ten different hospitals participating in this study, with between 50-100 RNs who work in each unit. A G-power calculation of the sample size for the patient outcome variables for a two-tailed test with an effect size 0.3, alpha set at 0.05 and a power of 0.0.8 with ten groups, the calculation of the sample would be 35 from each site or a total of 350. To achieve the response rate that is necessary to obtain accurate and reliable data (Kramer, Schmalenberg & Keller-Unger, 2009) all RNs in each PICU will be included in order to obtain the planned sample of at least 35 RNs from each PICU. A convenience sample of 350 PICU RNs will provide a sufficient sample to generalize the results to the larger population of PICU nurses to observe a small effect.

Data Collection

Pediatric ICU Patient Outcomes

Data was retrieved by the hospital staff from the VPS database and based on the Pediatric Risk of Mortality (PRISM) III scores. Prism III is one of the best-known scoring systems for assessment of PICU performance (Bilan, Galehgolab, Emadaddin & Shiva, 2009). The two items obtained were the Prism III – Probability of Death (Risk of Mortality) score and the Prism III – Predicted Length of Stay score. The VPS LLC is a database that receives outcome data from almost 100 PICUs.

Hospital characteristics

Data was collected related to the unit and the hospital, such as type of hospital, special designation of hospital or unit, nursing hours per patient day, overtime usage, percentage of RNs, and physician and nurse staffing (Exhibit 1)

Nurse Outcome -Intent to Leave – Intention to leave is defined as an employee's plan to leave the present job and look for another job in the near future (Alam & Mohammad, 2010). One question asked of the nurses was regarding whether or not they plan to leave their unit in the next 6 months.

Communication in this study refers to the communication between 1.) One RN to another (nurse-nurse communication) in the context of the work environment in the PICU in the course of care delivery either in person or over the phone; 2.) One RN to one physician (RN-MD) in the context of the work environment in the PICU in the course of care delivery either in person or over the phone. It is a two-way dialogue in which people think and decide together. The ICU Nurse Physician Communication Questionnaire was utilized to measure communication. Only the 22 questions from the survey that are specific to communication were utilized. The tool measures

the perception of the RN about his/her communication with other RNs and with MDs. Permission was received to use the tool from the author (See Exhibit 2).

Collaboration is a process of joint communication and decision-making between nurses themselves and between nurses and other disciplines (AACN, 2005). It was measured by the PES-NWIR (See Exhibit 5).

Leadership is interpersonal relationship in which the leader acts in a certain manner and exhibits certain behaviors and strategies to influence individuals and groups to attain the goals. Leadership was measured via the PES-NWIR.

Demographic Characteristics

Demographic data was collected about the RNs including information about age, sex, education, and experience in nursing, experience in pediatric intensive care nursing, certification. A separate demographic questionnaire was used to measure this data. The demographic questionnaire takes approximately five minutes to complete. This tool can be found in Exhibit 3.

Organizational Characteristics

Hospital and unit specific data was collected including information about the nursing leadership, the medical leadership, the nurse staffing, the physician staffing, type of hospital (Pediatric versus non-Pediatric, magnet versus non-magnet, Beacon versus non-Beacon unit), ownership of the hospital, patient days, nursing hours per patient day for that unit. Data regarding the hospitals and the unit characteristics was requested of the individual manager. This questionnaire can be found in Exhibit 1.

Pediatric Patient Outcome Data

Patient outcome data was retrieved by the VPS data base by the hospital staff for the quarter just preceding the nurse survey. The mortality rate was collected per one thousand

patients. The data was based on the Pediatric Risk of Mortality Score (PRISM III) score. The Prism III score is an adequate indicator of mortality probability for a heterogeneous patient groups in pediatric intensive care and can measure the risk adjusted mortality and length of stay. Length of stay is per 24 hours and the number was per 1,000 patient days (Reinoud, Gemke & van Vught, 2002). This VPS database for each hospital was used to gather the information on the PICU Standardized Mortality Ratio and the PICU Severity-Adjusted length of stay, both of which are Nursing Quality Forum (NQF) endorsed indicators. The central line infection data was reported by the hospitals from the most recent prior period. This is also an NQF endorsed indicator (NQF, 2004). Ventilator Assisted Pneumonia data was gathered and submitted by the hospitals from the previous 12 months. There was only one mean score for each of these variables for each hospital. The data collection form for this information is found in Exhibit 4.

Nurse Outcome Data

Intention to leave is defined as an employee's plan to leave the present job as a PICU RN and to look for another job in the near future (Alam & Mohammed, 2010). It reflects how retention of the RN can be disrupted. It was measured by a question on the demographic survey questionnaire that asks if they intend to leave the unit in the next six months. The question asked if in the next six months they intent to stay in their current job or leave their current job.

Instruments

The Practice Environment Scale of the Nursing Work Index Revised (PES-NWIR) measured the nurse practice environment. This tool measures collaboration and leadership, two of the key variables being studied. This can be found in Exhibit 5. Because this is a widely used tool and the instrument is in the public domain due to its endorsement by the National Quality

Forum in 2004, Dr. Lake's permission was not needed for use. Even though Dr. Lake's permission was not needed, an email was received from her that serves as permission for use.

The nurse practice environment has been studied extensively over the past thirty years. In the 1980s the nurse practice environment was evaluated to understand the relationship between job satisfaction and turnover (Tomey, 2009). Much of that work was done to look at hospitals that later were determined to be Magnet hospitals. In the 1990's, the focus was more on quality of nursing care and patient outcomes (Mark, Salyer, & Wan, 2003). The Institute of Medicine (IOM) (2004) has highlighted the issues with the nursing work environment and switched the focus of concern to problems in the nurse practice environment and patient safety.

The (PES) was developed from the work done by Kramer in the Nursing Work Index (NWI) from the Magnet Hospital studies (McClure & Hinshaw, 2002). The PES-NWI was developed from the Nursing Work Index-Revised (NWI-R) which was a revision that updated the NWI. The Practice Environment Scale (PES) is a 31 items survey that measures five domains pertinent to evaluating the clinical practice environment as perceived by the RNs working in that environment. These domains are nurse participation in hospital affairs; nursing foundations for quality care; nurse manager ability, leadership and support of nurses; staffing and resource adequacy; and collegial nurse-physician relations.

Nursing Work Index

Kramer and Hafner (1989) created the NWI scale from the Magnet research done in the 1980's, which was widely used to determine nursing outcomes and job satisfaction. It was reported to be "an all inclusive list of factors having a bearing on job satisfaction and staff nurse perceptions of an environment conducive to quality nursing care" (Kramer & Hafner, 1989, p. 172). Five subscales were developed from the NWI for the purpose of measuring the hospital

nursing practice environment, using the data from the mid-eighties of 16 Magnet hospitals (Lake, 2002). These subscales were management style, quality of nursing leadership, organizational structure, professional practice, and professional development (Bonneterre, Liaudy, Chatellier, Lang, & Gaudemaris, 2008).

The NWI was designed specifically for measuring nursing work environments in hospital units. It was a 65 item scale and took a considerable amount of time to complete, which made it less practical to use in a large study because of the high potential for respondent burden. The content of the NWI was validated by three of the four original magnet researchers (Kramer & Hafner, 1989). This scale was later amended and updated to make it easier to use; the psychometric properties of the revised scale were measured, but specific information on the instrument's validity and reliability were not well published. During this time, the researchers began to look at nurse manager support as well as the RN/MD relationship to see how these two issues impacted the nurses' control over their practice as well as their job satisfaction (Lake, 2002).

Nursing Work Index Revised

The NWI was revised (NWI-R) by Aiken, who decreased it to 56 items with one item added asking about the nursing team (Aiken & Patrician, 2000). The tool was later tested and content validity was confirmed (Flynn, Carryer, & Budge, 2005). Construct validity of this tool is poor. According to Bonneterre et al. (2008), "although the subscales of the NWI-R have good internal consistency, construct validity of the NWI-R is poorly defined and the structure did not result from exploratory factor analysis" (p.216). Others that tested the tool could not observe a difference between autonomy and control at work and the intercorrelation between these two dimensions ranged from .70 (Budge, Carryer & Wood, 2003) to .98 (Li et al., 2007).

Practice Environment Scale of the Nursing Work Index Revised

In 2002, Lake developed the PES building on the work done by Kramer on the NWI. The primary objective of Lake's work was "to develop a parsimonious, psychometrically sound scale with empirically derived subscales" (Lake, 2002, p. 177). A second objective of Lake's work was to validate the work and provide reference values of the original magnet study. The PES-NWIR would allow the researcher to provide a relationship between the practice environment and nurse and patient outcomes. Whereas the NWI could validate activities that were similar to the originally designated magnet hospitals, it did not provide data on the relationship between nurse and patient outcomes.

The PES-NWIR is a 31 item instrument used to measure the practice environment. This can be found in Exhibit 5. Lake confirmed the existence of five dimensions of professional nursing practice: nurse participation in hospital affairs; nursing foundations for quality care; nurse manager ability, leadership and support of nurses; staffing and resource adequacy; and collegial nurse-physician relations (Lake, 2002). Three of the five subscales described the environment at the unit level: collegial nurse-physician relations, nurse manager's ability and support of the nursing staff, and staffing and adequate resources; and two described the environment at the organizational level: nurse participation in hospital affairs and nursing foundations for quality care (Bonneterre, Liaudy, Chatellier, Lang & Gaudemauris, 2008). The subscales had acceptable internal consistency reliability coefficients with Cronbach's $\alpha > .71$ to .84 (Lake, 2002). The Cronbach's alpha for the composite score was originally reported at 0.82 (Lake, 2002). To support reliability and consistency of nurses' assessments within hospitals, Lake did a more recent study and found intraclass reliability correlation coefficients had a

Cronbach's $\alpha > .86$ and .97 (Lake, 2007). Construct validity was measured by a confirmatory factor analysis done by Lake (2002) and Leiter and Laschinger (2006).

The PES-NWIR was also tested for validity and reliability in a study of 321 Asian nurses in Texas and California (Liou & Cheng, 2009). Cronbach's alpha was actually higher (.96) with Asian nurses then the research that was done with mostly Caucasian nurses in Pennsylvania (.82). The tool has also been validated in oncology and medical-surgical units (Friese, 2005). It has also been tested in a variety of types of units. More recent studies were done in dialysis units in hospitals (Gardner, Thomas-Hawkings, Fogg & Latham, 2007) and a psychiatric unit (Hanrahan, 2007). This instrument has not been evaluated among RNs in pediatric intensive care units (PICU).

The PES-NWIR is a very practical tool for use to measure nurses work environment and its relationship with patient and nurse outcomes. It is a parsimonious tool that can be completed in a timely manner and only contains 31 items on a 4 point Likert scale (1 = strongly agree, 4 = strongly disagree), that are reverse coded to create higher scores for those organizations that have healthy work environments. The mean scores are calculated for each domain. A composite score can also be determined. A new or different instrument was not needed to study Healthy Work Environments because the PES-NWIR can measure the nurse practice environment for collaboration and leadership. In a research study examining seven instruments and 54 studies, Lake (2007) stated that PES-NWIR is proposed as the most useful instrument. The PES-NWIR has a body of evidence that is updated and that the content, length, and performance are either equivalent or superior to other instruments in studying the nurses' work environment (Lake, 2007). (See exhibit 3). The PES-NWIR was chosen to decrease subject burden because it is a 31 item questionnaire. The PES-NWIR tool takes approximately fifteen minutes to complete. The

demographic questionnaire was long enough to gather accurate information, but not so long that it will cause subject burden.

Because of this, the tool is measured annually in hundreds of hospitals that have many different settings. Because these tools have been widely used and there are many publications with data about its usefulness, a pilot study to determine the usefulness of these tools regarding reliability and validity was not done. If these tools did not have the depth of research already published, then further testing would need to be done.

The ICU Nurse-Physician Questionnaire

The ICU Nurse Questionnaire (Short Version) was used to measure nurse to nurse and nurse to physician communication. This questionnaire was originally developed for a very large ICU study done with 42 ICUs across the country given to 134 nurses and 53 physicians to measure of managerial practices and organizational processes (Shortell, Rousseau, Gillies, Devers & Simons, 1991). The authors who developed this questionnaire found in their review of the literature the key practices and processes for organizational and managerial effectiveness were organization culture, leadership, communication, coordination and problem-solving. It was also used among Emergency Department staff and was given to 115 nurses and 18 attending physicians and 33 Emergency Medicine Residents in another hospital about eight years later. In a review of several instruments that measure communication and collaboration, the ICU Nurse Questionnaire was described as a measure for, "… organizational climate, with a focus on the unit culture, leadership, communication, coordination, problem-solving/conflict management, unit cohesiveness and perceived unit effectiveness" (Dougherty and Larson, 2005, p. 249). For the purposes of this study, only the communication questions were utilized as the PES-NWIR measures collaboration and leadership, but not communication. There are two versions of this

questionnaire, the ICU Nurse Questionnaire and the ICU Physician Questionnaire and for the purposes of this study also, the ICU Nurse Questionnaire was utilized and given to RNs in the PICU.

The current ICU Nurse Questionnaire is an 85 item tool, but for the purposes of this study only the 22 communication questions will be used. The ICU Nurse Questionnaire Communication 22 items should take between five and ten minutes to complete. These questions can be found in Exhibit 6. This section of the questionnaire measures Nurse-to-Nurse Relationships, Nurse-to-Physician Relationships, and General Relationships and Communications. The original instrument was developed to identify managerial and organizational processes that would be related to measurement of quality performance in the care provided to patients (Shortell et al., 1991). The ICU Nurse Questionnaire is measured on a Likert scale with a 1 – 5 rating, (1 =strongly disagree and 5 = strongly agree).

In this tool, communication is measured in several dimensions, including openness, accuracy, timeliness, understanding and satisfaction (Shortell et al., 1991). Openness is the extent to which physicians and nurses are able to say what they mean to each other without fear of repercussion or understanding. Accuracy is the degree to which nurses and physicians believe in the accuracy of the information communicated to them. Timeliness refers to the degree to which patient care information is shared promptly. Understanding is the extent in which nurses and physicians believe the communication on their units is comprehensive and effective. And last, satisfaction is the degree of satisfaction with nurse communication with patients, families and other nurses (Shortell et al., 1991).

This questionnaire had both consistency and reliability measured with ICU and ED staff. Descriptive statistics and reliability coefficients were reported in the original study done in 42

intensive care units across the country and the details are reported in a publication by Shortell et al. (1991). These were done with intensive care unit physicians and nurses and later reliability and validity were demonstrated in other populations of nurses and physicians (Boyle, 2007; Dougherty & Larson, 2005; Hansen, Biros, Delaney & Schug,, 1999). Almost all of the scales indicated a good to high reliability using Cronbach's alpha 0.7 as the accepted cut-off, except for communication timeliness that was above 0.6. A factor analysis confirmed content validity with the 3 identified factors listed above loading at 0.40 or above, with an Eigen-value well above 1.0 (Shortell et al., 1991).

Data Collection Procedures

Nurse Managers from over 30 different children's hospitals were approached to support this study prior to submitting anything to the Institutional Review Board at each hospital. Twenty-eight units wanted to participate, but only 10 met criteria. Six required expedited IRB approval, four did not. Nurses were recruited via flyer (Exhibit 7) and letters (Exhibit 8) by the principle investigator and a small token was offered for completing the surveys. The surveys were on-line and could be accessed via the internet. Data were collected regarding the patient outcomes for the previous quarter and/or year that the RNs were completing the questionnaire, with an attempt to get closely matched data regarding the patient and nurse outcomes and the work environment. One research assistant was set up in each of the units to answer any questions from the participants, to encourage participation and act as a resource.

All of the measurements were completed within a close defined period of time. The tool was set up in the units so they can be completed on-line which was more convenient for the participants.

While the PES-NWIR and ICU Nurse Questionnaires have been studied in a variety of settings, they have not been tested with nurses working in the PICU. There were 50 - 100 staff at least in each PICU and a response rate of 35-40% is for each unit is needed to obtain accurate and reliable data (Kramer, Schmalenberg & Keller-Unger, 2009). There were ten units from ten different hospitals participating in this study, which provided between 200 and 400 total participants at a minimum.

Human Subjects

Privacy and Confidentiality Safeguards

Confidential questionnaires were completed via a computer survey. The names of the participants were not collected. The participants will remain anonymous to anyone involved in the study and their coworkers. They reviewed the Consent to Participate in Research (Exhibit 9) and consent was implied if they completed the questionnaire. This informational sheet regarding the study includes information about the potential risks and benefits as well as the confidentiality of the study. This document also had the P.I. contact information should they have further questions.

Each of the PICUs in this study will also remain confidential. Hospitals that participated were coded with a number and only the P.I. will have the list of hospitals and their code number. These coding records will be maintained in a locked cabinet in the P.I.'s office. Institutional Review Board approval was obtained from UCLA. Expedited review by all of the organization's Institutional Review Board's was requested along with a request to waive informed consent because the information is anonymous. No identifiable patient data was collected only a mean score of the outcome data will be obtained from each hospital. A stand alone desk computer was used by the P.I. with a password protection on the computer itself that is known only to the P.I.

Data Analysis

The statistics were run using descriptive statistics including the means and standard deviation for the key variables and Pearson R correlational analysis was used to analyze the relationship between the study variables. Data was analyzed using multiple regression, t tests (two-tailed) and one way analysis of variance (ANOVA). The significance level was set at .05 for this study. SPSS 17.0 statistical software will be used.

Limitations of the study

One limitation was that the samples were convenience samples that can increase bias and may not be representative of the larger population. The other limitation to the study is the sample size of the patient outcome data and nurse outcome data. Only the mean outcome scores will be collected. There will be one mean score for each variable for each unit, leaving only a sample of ten for the outcome data from each hospital. It is not feasible to collect a sample from every patient the nurse is taking care of on each unit.

Summary

This chapter presented the methodology for this study that included the design of the study, sample and settings, data collection procedures, and data analysis. A review of the PES-NWIR and the ICU Nurse Physician Questionnaire was presented that included the validity and reliability of these instruments. The data analysis plan was described and identified the proposed statistics that will be used. And last, the limitations of the study were presented.

CHAPTER 5: RESULTS

Introduction

The focus of this study is on the hospital work environment of nurses in pediatric intensive care units and specifically on three standards identified by the American Association of Critical Care Nurses (AACN) as essential to healthy work environments: communication, collaboration and leadership. These standards were investigated to determine the extent of their influence on the PICU patient outcomes of central line blood stream infections, ventilator associated pneumonia, risk adjusted length of stay, and risk adjusted mortality and the PICU RN outcome of intention to leave. Although there is some research indicating that work environments have improved in the past ten years, there is much we do not know about pediatric work environments (Ulrich, Lavandero, Hart, Woods, Leggett et al., 2009). Providing care to critically ill pediatric patients and their families can be extremely demanding both technically and emotionally. Optimizing the work environment for PICU RNs can make a difference for patients and for satisfaction and retention of these specialty RNs.

This chapter includes three manuscripts that have been prepared to disseminate the findings from this research study. The first manuscript is *The "Healthy Work Environment": A systematic review of the literature related to Pediatric Intensive Care Units*. This is a thorough review of the literature on communication, collaboration and leadership and patient and nurse outcomes. The second manuscript, *The relationship between healthy work environments and patient outcomes in the Pediatric Intensive Care Unit*, presents the results of the relationships between communication, collaboration and leadership in PICUs using multiple regression analysis to identify the influence of these on patient outcomes. The patient outcomes were risk adjusted length of stay, risk adjusted outcomes, central line blood stream infections (CLBSI) and

ventilator associated pneumonias (VAP). The third manuscript, *Healthy work environments and staff retention: The relationship between communication, collaboration and leadership in the Pediatric Intensive Care Unit,* describes the relationship between communication, collaboration and leadership and retention among critical care nurses in the PICU by measuring their intention to leave (ITL) their jobs.

The manuscripts in this chapter describe the reported research on communication, collaboration and leadership as these concepts related to healthy work environments for PICU RNs and the influence of environmental factors on patient outcomes. Research on nurse to nurse and nurse to physician communication, nurse and physician collaboration and nurse manager leadership on patient and nurse outcomes in PICU has not been done before. These manuscripts in this chapter present original research and add to the body of knowledge about factors that influence nurse retention and the influence of structures and processes in the ICU on pediatric patient outcomes.

The "Healthy Work Environment": A Systematic Review of the Literature Related to Pediatric Intensive Care Units

Introduction

Unhealthy and unsupportive work environments in hospitals contribute to unsafe working conditions and medical errors (Aiken, Clarke, Sloane, Lake & Cheney, 2008; American Association of Colleges of Nursing, 2002; American Hospital Association, 2002; Boyle, 2004; Flynn, Liang, Dickson, & Aiken, 2010; Friese, 2005; the Joint Commission, 2002; Kimball and O'Neill, 2002; Knaus, Draper, Wagner, & Zimmerman, 1986; Kramer, Macguire & Brewer, 2011; Kramer, Schmalenberg, & Maguire, 2010; Lake and Friese, 2006; McCusker, Dendukuri, Cardinal, Laplante & Bambonye, 2004; Mitchell & Shortell, 1997; Schmalenberg & Kramer, 2008; Schmalenberg, Kramer, King, Krugman, Lund, Poduska et al., 2005; Shortell, Zimmerman, Rousseau, Gillies, Wagner, Draper et al., 1994; Stone, Mooney-Kane, Larson, Pastor, Zwanzinger, & Dick, 2007). Poor conditions in the nurses' work environment can also negatively affect retention of experienced nurses and successful recruitment of new nurses. It is estimated that between now and 2025, there will be a shortage of 260,000 Registered Nurses (RNs) (Buerhaus, Auerbach, & Staiger, 2009). This shortage will be twice as large as any other shortage seen in nursing in the United States since the early 1960s. The work environment of nurses, the largest segment of the nation's health care work force, needs to be transformed in order to protect patients from healthcare errors (IOM, 2004). Healthy work environments (HWE) are the result of many positive structures and outcomes put in place where nursing care is delivered. The term "Healthy Work Environment" is relatively new in healthcare. Sometimes it is used synonymously with the term "healing work environment" and while similar, it is not the same (Stichler, 2009).

This paper presents a review of the literature about HWEs in Pediatric Intensive Care Units (PICU). Components of a HWE that will be discussed include communication, collaboration, and authentic leadership. In addition, literature on the relationship between these components and patient / nursing outcomes will be explored. The term nurse will be used in this paper to specifically refer to the Registered Nurse (RN).

Search Strategies

Pubmed, Medline, and CINAHL data-bases were searched for publications between 2000-2011 on the nurses' work environment and patient and nurse outcomes.. The search was performed using the following key terms: "healthy work environment", "nurses' work environment", communication, collaboration, leadership, outcomes, nurses' intent to leave and retention. The search terms were expanded to include patient outcomes and nurse outcomes. Only a limited number of articles were identified related to pediatric intensive care unit (PICU) environments. Therefore, the search was expanded to include adult intensive care unit (ICU) environments. NICUs were not included in this search as there was nothing found in the literature. Excluded in this search were editorial, opinion articles, textbooks, and conference abstracts.

The Development of Healthy Work Environments

The concept of HWEs developed from the focus of numerous studies about the nurses' work environment over the past two decades. A HWE can be defined as "a work setting in which policies, procedures, and systems are designed so that employees are able to meet organizational objectives and achieve personal satisfaction in their environment" (Disch, 2002, p.3). It is a work environment where the nurse is able to be productive and give quality patient

care. It is also a satisfying place where personal needs can be met (Kramer & Schmalenberg, 2008).

Healthy Work Environments refer to organizational practices that focus on being the employer of choice such as pay, autonomy, policies and procedures, formal and informal interactions and perceived professional status (Alspach, 2009). It is not one element (or aspect) that makes the work environment healthy, but rather a compilation of several interrelated factors and a cumulative effect of these factors (Alspach, 2009). These factors are the organizational structures and processes that influence the environment and the nurse.

A focus on the development of healthy work environments began in 2001. The Registered Nurses Association of Ontario, Canada in partnership with the Office of Nursing developed one large project aimed at implementing, disseminating and evaluating a suite of HWE Best Practice Guidelines. The policy was known as Health Canada. The purpose of this initiative was to create and sustain HWEs for workers and to improve health service quality, cost effectiveness and workforce renewal (Lowe, 2003). Pearson et al (2006) did a comprehensive systematic review of the evidence related to nursing teamwork that fosters a HWE to identify all of the available evidence internationally. Many of the articles reviewed were from the United States and Canada, but there were other HWE studies done in Europe. The results of this review included nine experimental or quasi-experimental studies, 11 descriptive studies and four qualitative studies. While there were a variety of team compositions identified as a component of HWEs, recommendations from this review noted that team characteristics should include accountability, commitment, enthusiasm and motivation which could lead to healthier work environments (Pearson, O'Brien Pallas, Thomson, Doucette, Tucker, Wienchula et al., 2006).

Healthy Work Environments have been positively associated with increased patient satisfaction, better quality patient care, increased patient safety, and a decrease in medical errors, including medication errors resulting in decreased morbidity and mortality (Aiken et al., 2008; Hart, 2006; Kramer & Schmalenberg, 2008; Manojilovich & Dicicco, 2007; Shirey & Fisher, 2008; Ulrich, Lavandero, Hart, Woods, Leggett, Friedman et al., 2009). The nurses' work environment has also been linked to problems with nurse retention and burnout (Cohen, Stuenkel & Ouyen, 2009; IOM, 2004; Lake & Friese, 2006; McGillis-Hall, 2005).

In 2001, the American Association of Critical Care Nurses (AACN) made a commitment to promote HWE for critical care nurses and for patients. They began a project to better understand the factors in the work environment that impact patient outcomes and professional nursing practice (Heath, Johanson, & Blake, 2004). From these efforts, AACN developed the Healthy Work Environment (HWE) standards as a foundation for dialogue about the realities and problems in the nurses' work environment and to encourage more to be done to address these problems (AACN, 2005). These standards were developed from previous work done by the Nursing Organization Alliance (Boeck, 2005). The six AACN HWE standards are: skilled communication, true collaboration, effective decision making, appropriate staffing, meaningful recognition and authentic leadership.

Skilled communication means that communication skills must be on par with clinical skills (AACN, 2005). It is more than a one-way delivery of information which sometimes is not effective, but a two-way dialogue in which people think and decide together. True collaboration is something that nurses are encouraged to be relentless in pursuing and fostering. AACN describes collaboration as a process that eventually, over time, results in a work unit in which decision making and joint communication is present with other disciplines (AACN, 2005).

Effective decision making exists when nurses have the ability to participate in those areas of clinical practice for which they are held accountable. This refers to nurses having control over their nursing practice and the care environment in which they work. Appropriate staffing is not only making sure that the appropriate numbers of staff are available, but that there is a match between the patient needs and the nurse's competency (AACN, 2005). Recent evidence shows that better patient outcomes result when there is a high proportion of RNs and those RNs are bachelor's prepared at a minimum (Aiken, Clarke, Sloane, Sochalski & Silber, 2002; Blegen, Goode, Spetz, Vaughn & Park, 2011; Needleman, Buerhaus, Mattke, Stewart & Zelevinsky, 2002). The fifth standard is meaningful recognition which is the process of acknowledging the contribution and importance of the nurse role and of the nurse as an individual. Effective recognition programs occur over time when nurse leaders work with the nursing staff to determine what is relevant to them. These programs usually result in policy and procedural changes about how nurses are involved and compensated as partners in the organization. The last AACN HWE standard is authentic leadership. Authentic leadership requires that nurse leaders in the organization become role models and fully embrace HWE (AACN 2005). In order to achieve this, organizations must ensure that nurse leaders receive the support and ongoing development to be role models. Nurse leaders must also be positioned in the organization to be involved in key decisions that influence nursing practice. Therefore, communication, collaboration and leadership are essential to promoting control of nursing practice.

Many studies have been done over the years on the impact of communication, collaboration and leadership on the nurses' work environment and nurses' intent to leave the organization. Most of these were retrospective data base reviews at the organization level. Early on, Aiken et al. (2000) found that the work environment was one of the key elements

related to lower mortality and positive nurse retention. Other studies that followed linked problems with the work environment to nurse outcomes including job dissatisfaction, burnout and nurses' intent to leave an organization (Aiken et al., 2008; Aiken et al., 2002; O'Brien-Pallas, Griffin, Shamian, Buchan, Duffield, Hughes et al., 2006; Schmalenberg & Kramer, 2007; Stone et al., 2007; Ulrich, Buerhaus, Donelan, Norman & Dittus, 2005). Recently in a large national study, over 5,550 nurses reported that the hospital workplace had slightly improved in communication and collaboration, but not in some areas such as overtime hours, sexual harassment and physical violence (Ulrich et al., 2009).

Few studies have linked the nurses' work environment to patient outcomes at the unit level since Knaus' landmark study in adult critical care units in 1986. In the systematic review of the literature, five research studies showed a positive correlation between nurse-physician collaboration and patient outcomes (Aiken et al., 2008; Aiken, 2002; Baggs, Schmitt, Mushlin, Mitchell, Eldredge, Oakes et al., 1999; Flynn et al., 2010; Friese, Lake, Aiken, Silber & Sochalski, 2008; O'Brien-Pallas et al., 2006). Most of these studies linked patient outcome data at the organizational level and not specifically at the unit level.

Communication in the Work Environment

The Webster's dictionary defines communication as, " The imparting or interchange of thoughts, opinions, or information by speech, writing or signs". AACN defines communication as "…two-way dialogue in which people think and decide together" (AACN, 2005, p.13). Others have defined communication as the process by which information is exchanged between a sender and a receiver which occurs both verbally and nonverbally (McGillis Hall, 2005). Effective communication exists when there is true transparency and the team is able to communicate about all issues clearly and efficiently. Numerous issues related to communication

have been identified as the major contributor to adverse events in health care and the largest contributor to nurses' dissatisfaction with their job and intent to leave an organization. These issues are generally related to the nurses' work environment and they include inadequate training or knowledge, distractions, fatigue, stress, overtime and poor staffing (Aiken et al., 2002; Berney & Needleman, 2006; Buerhaus & Needleman, 2000; Mark, Harless & Berman, 2007; Schmalenberg, Kramer, Brewer, Burke, Chmielewski, Cox et al., 2008; Scott, Rodgers, Hwang, & Zhang, 2006).

Problems with communication in health care result in medical errors. One study reported that communication failures in health care arise from vertical hierarchical structures, concerns with upward influence, role conflict, ambiguity and struggles with interpersonal power and conflict (Sutcliffe, Lewton & Rosenthal, 2004). This study was focused on the medical model and not specifically on interactions between nurses and physicians. The Joint Commission reported that communication failures are the leading cause of harm to patients in hospitals today. In one study, communication was a primary root cause for 70% of the errors (Leonard, Graham & Bonacum, 2004). The serious impact of medical errors is that 75% of these patients die unnecessarily (Leonard, Graham & Bonacum, 2004). Other studies found that lack of communication and collaboration are associated with a higher rate of patient mortality and readmissions to the ICU (Baggs et al., 1999; Manojlovich & DeCicco, 2007). Out of 36% of adverse events reported, 6% were preventable and associated with iatrogenesis, human errors, and failure of management factors or communication (Ksouri, Balanant, Tadie, Heraud, Abboud, Lerolle et al., 2010). Many of these studies were in the same geographic area, which may limit generalizing the results to a larger population.

Nurse-to-Nurse Communication

Nurses spend a large portion of their day communicating information about their patients to others. Hand-off communication, whether it occurs at change of shift or when someone is covering a patient while another nurse is away from the unit, is extremely important to maintain continuity of care and to make sure all are aware of the plan of care for the day. Nurses are taught communication skills as a basic competency in their prelicensure programs. Because health care is becoming more demanding and departments are busy in times of high stress, communication frequently breaks down because others are busy. There have been numerous studies that show a relationship between poor nurse-to-nurse communication and poor patient outcomes which included catastrophic harm or death (Cvetic, 2011; Sutcliffe, Lewton & Rosenthal, 2011; Leonard, Graham & Bonacum, 2004). Effective communication between nurses is important for HWEs and patient safety.

Nurse-to-Physician Communication

Effective communication between healthcare professionals is essential for patient safety. Chassin and Becher (2002) analyzed an incident in which the wrong patient underwent the wrong procedure because of poor communication that they referred to as "frightening". Doctors and nurses communicate differently. Many studies have addressed nurse-physician communication and the different perceptions by nurses and physicians. Findings indicate nurses being less satisfied with the communication or interactions with physicians for several reasons including verbal abuse, lack of respect or lack of teamwork (Disch, 2001; Greenfield, 1999; Manijlovich & DeCicco, 2007; Oberle & Hughes, 2001; Schmitt, 2001; Thomas, Sexton, J. & Helmrich, 2003). Several studies have shown a relationship between lack of effective communication between nurses and physicians and an impact on patient outcomes (Baggs et al.,

1999; Evans & Carlson, 1992; Manojlovich, Antonakos & Ronis, 2009; Manojlovich & Diciccio, 2007; Rosenstein, 2002; Rosenstein & O'Daniel, 2005).

Poor communication between RNs and medical doctors (MDs) can lead to medical errors, but there is also sufficient data to show that effective communication can lead to positive outcomes, including improved information flow, more effective patient interventions, improved safety, enhanced employee morale, increased patient and family satisfaction and decreased length of hospital stay (Knaus et al., 1986; Shortell et al., 1994; Zimmerman, Shortell, Rousseau, Duffy, Gillies, Knaus et al., 1993). Effective RN-MD communication is essential for good patient outcomes. Although research shows a correlation between effective communication and good patient outcomes, there are only a few older studies that examine this concept at the unit level..

Collaboration in the Work Environment

One of the recommendations in the first Institute of Medicine (IOM) report, *To Err is Human: Building a Safer Health System,* was to improve collaboration (IOM, 2000). Collaboration is a joint decision-making and communication process among health professionals (Colluccio & McGuire, 1983). In the PICU, this typically means between RNs and MDs. There were few studies that included the use of Nurse Practitioners (NP) even though many PICUs use an NP model. In one qualitative study of MDs and NPs working in nursing homes, different behaviors were identified for collaboration in each of those roles (O'Brien, Martin, Heyworth & Meyer, 2009). Some of the attributes of collaboration are trust, knowledge, mutual respect, good communication, cooperation and shared responsibility (Arcangelo, Fitzgerald, Carroll, & David, 1996). The goal of RN-MD collaboration is to care for the needs of the patient and respect the unique abilities of each other as members of a multidisciplinary team.

A HWE is one that promotes interaction and communication among professionals, a positive and strong working relationship between the staff and activities that are done jointly with the team and the leadership (Barnsteiner, 2001). There are numerous studies of poor nurse-physician relationships, including reports of poor communication (Greenfield, 1999), hierarchical communication (Disch, 2001), unilateral decision making by physicians (Schmitt, 2001), and verbal abuse of nurses by doctors (Disch, 2001).

True collaboration exists when the work group is functioning as a team and all members are valued for the work that they bring to the team.

> Kinnaman and Bleich (2004) stated that collaboration is "A communication process that fosters innovation and advanced problem solving among people who: are of different disciplines, organizational ranks, or institutional settings; band together for advanced problem solving; discern innovative solutions without regard to discipline, rank or institutional affiliation; and enact change based on a higher standard of care or organizational outcome" (p. 311).

Collaboration has also been defined as the "…interaction between nurses and physicians with trust, respect, and joint contributions of knowledge, skills, and value to accomplish the goal of quality patient care"(Krairiksh and Anthony 2001 p. 17). Collaboration must be consistent and occur at all times to sustain a HWE. Every team member must contribute and support the concept. This is essential to provide quality care for patients and families (Barnsteiner, 2001).

Collaboration requires good communication skills and a supportive leadership team, where nurses are not intimidated or afraid to voice their opinions. There are numerous studies in which nurses report poor collaboration and this has resulted in higher morbidity and mortality

(Baggs et al., 1999; Despins, 2009; Knaus et al., 1986; Propp, Apker, Ford, Wallace, Serbenski, & Hofmeister, 2010). Nurse-physician collaboration has also been shown to impact retention (Erickson, Hamilton, Jones, & Ditomaso, 2003; Foley, Kee, Minick, Harvey & Jennings, 2002; Rosenstein, 2002). In a large, multisite study in 42 ICUs, collaboration among caregivers in the ICU was significantly associated with lower nurse turnover (Shortell et al., 1994).

Authentic Leadership

The importance of authentic leadership in supporting good patient outcomes and nurse retention cannot be underestimated. Fontaine and Gerardi (2005) stated, "When leaders don't fully embrace the notion of HWEs , authentically live it, and engage others in it actions, there's no foundation for change" (p. 36). Authentic leadership is when the leader "walks the talk", provides the leadership needed by the nursing staff and believes and contributes to the promotion of a healthy work environment. Studies supporting HWE and authentic leadership have been published over the last fifteen years (Cummings, MacGregor, Davey, Lee, Wong, Estabrooks et al., 2009; Kramer et al., 2007; Kramer & Schmalenberg, 2004; McNeese-Smith, 1997; Shirey, 2009; Tomey, 2009). Cummings et al. (2009) performed a systematic review of the literature on the relationship between various styles of leadership and their outcome for the nursing workforce and the nursing work environment. Relational leadership styles that also focused on collaboration and communication had a positive correlation with healthy work environments, retention, and organizational commitment (Cummings et al., 2009; Leach, 2005). Avolio et al. (2004) described authentic leadership as the effective leadership needed to promote a HWE. Findings indicate that in the units where nurses perceive strong nursing leadership, there is higher job satisfaction and lower intent to leave the organization over the next year.

Kramer and Schmalenberg (2004), in their studies on the Essentials of Magnetism found that nurse manager support affects nursing productivity recruitment, retention and job satisfaction. Their research found nine nurse manager role behaviors that characterize supportive leadership. These behaviors are being approachable and safe, caring, walking the talk, motivating development of self-confidence, giving genuine feedback, providing adequate and competent staffing, promoting group cohesion and teamwork, and resolving conflicts constructively and someone who "watches our back" (Kramer et al., 2007).

A work environment that is healthy fosters leadership growth in the RNs. In these units, the nurse leaders in the organization recognize the importance of developing leaders to help support the unit structure and the nursing staff. Erenstein and MacCafferty (2007) recommend, based on a comprehensive review of the literature, that nurse leaders work with the nursing staff to build HWEs that include, trust, support, communication, and collaboration to achieve retention. Nurse leaders are critically important for modeling communication, collaboration and leadership. Strong leadership is important to create a safe work environment where staff feels supported (Stichler, 2009). A transformational leadership style and participative management are important to professional nursing practice and to create and sustain a HWE (Heath, Johanson & Blake, 2004; Kramer, Schmalenberg & Maguire, 2010; Leach, 2005; Shirey, 2009; Stichler, 2009; Stuenkel, Nguyen, & Coyne, 2007).

Healthy Work Environment and Patient Outcomes

In the IOM report *Keeping Patients Safe: Transforming the Work Environment of Nurses*, (2004), there are factors in the nurses' work environment that contribute to errors and the report called for these to be addressed immediately. Reason (2000) found a combination of poor staffing levels, high acuity, fatigue and heavy workloads caused nurses to miss changes in the

patient's condition or make mistakes when preparing medications. Medication errors, burnout, high staff turnover, ineffective delivery of patient care, high stress levels and unsafe working conditions are negative impacts that occur and can result from unhealthy work environment (Miracle, 2008). Problems with nurses' work environment can contribute to both nurse dissatisfaction and patient harm (Barron McBride, 2005; McCauley & Irwin, 2006; McGillis, Doran, & Pink, 2008; Wolf, 2006). Aiken and Patrician (2000) defined theoretical relationships that linked organizational attributes of the nurses' work environment with improved nurse and patient outcomes. They specified empirical outcomes to measure for both nurse and patient outcomes. These empirical outcomes were higher patient satisfaction and lower mortality, lower burnout and fewer needlestick injuries (Aiken & Patrician, 2000). Others have noted how unhealthy work environments are associated with poor communication practices, lack of leadership, abusive relationships and ineffective collaboration (Heath, Johanson, & Blake, 2004). One group found that organizations that strive for multidisciplinary teamwork and better patient outcomes have to proactively reinforce communication and collaboration (Propp et al., 2010).

Aiken et al. (2002) identified the attributes of evidence-based work environments that are associated with positive patient outcomes, as well as positive nurse outcomes. These attributes are staffing adequacy, positive physician-nurse relationships, and administration support services for the nurses (Aiken et al., 2002). One key patient outcome is a preventable adverse event (AE). An additional study done by Aiken et al. (2011) showed similar results across nine countries (Aiken, Sloane, Clarke, Poghosyn, Cho, You et al., 2011). The PES-NWI was used to measure the nurse's perception of the work environment and determine the relationship to AE that occurred at the hospitals. This study only compared the AE at the hospital level and didn't look at AE at the unit level (Aiken et al., 2011).

The IOM report *Preventing Medication Errors* (2006) estimates that there are at least 1.5 million preventable AEs due to systems issues, not due to incompetent professionals. A healthy nurse work environment positively impacts patient outcomes with fewer central line infections, lower incidence of ventilator assisted pneumonia and urinary tract infections (Stone et al., 2007). There are numerous studies that positively link HWEs to patient satisfaction, excellence in patient care and patient safety, reduced infections and medical errors and higher nurse retention (Friese et al., 2008; Kramer & Schmalenberg, 2008; Manijlovich & DiCicco, 2007; Shirey, 2006; Ulrich et al., 2009). Aiken et al. (2008) reported lower risks of death and morbidity where nurses report better work environments and believed that approximately 40,000 deaths per year could be avoided by improving the work environment, staffing and education.

Mitchell & Shortell (1997) found that AEs may be a more closely related to organizational factors and structures. Flynn et al. (2010) found a relationship between the work environment and pressure ulcers which determined that a more supportive work environment was associated with better outcomes, especially a lower percentage of pressure ulcers. Shortell et al. (1994) referred to the work environment as the organizational culture. Organizational culture involves the norms, values, beliefs and expectations shared by the people working in the unit. In research investigating collaboration and nurses' involvement in decision-making, a positive culture in the ICU was significantly associated with lower rates of risk-adjusted length of stay, nurse turnover and provider-rated quality care. Baggs et al. (1999) also reported that collaboration had a positive relationship with lower rates of hospital readmission and mortality. Organizational decisions related to staffing, communication and collaboration are important aspects that have been positively associated with patient safety outcomes. Schmalenberg and colleagues (2005) also looked at the impact of patient mortality and nursing care. Many of their

studies focused on front line management, staffing and nurse-doctor relationships as a predictor of patient mortality.

Intensive care unit structures and processes have been reported to have a relationship with the work environment. In a landmark study of 5030 ICU patients in 13 tertiary hospitals using the Acute Physiology and Chronic Health Evaluation (APACHE) II methodology for risk-adjustment, findings revealed that the degree of coordination in the adult ICUs significantly influenced unit effectiveness (Knaus et al., 1986). The APACHE II is a physiologically based classification system used in adult ICUs for measuring severity of illness in groups of critically ill patients. These authors looked at the structures and processes in the ICU and the effect on patient outcomes. Subsequently, these authors found that caregiver interaction comprising the culture, leadership, coordination, communication and conflict management abilities were significantly associated with lower risk-adjusted length of stay and lower nurse turnover (Shortell et al., 1994). These studies found that ICUs that promoted good nurse-physician collaboration and autonomous decision making had better patient outcomes and lower mortality than ICUs not reporting these features. However, there are no studies that have assessed the relationships between risk adjusted mortality and illness adjusted length of stay in the PICU population.

Healthy Work Environment and Nurse Outcomes

Numerous studies support the fact that nurses identify that communication, collaboration and leadership are key areas that need to be in place to have a HWE (Gunnarsdottir, Clarke, Rafferty, & Nutbeam, 2006; Kramer & Schmalenberg, 2007; McCusker et al., 2004; McGillis Hall, Doran & Pink, 2008; Schmalenberg et al., 2008; Stuenkel, Nguyen, & Cohen, 2007; Gardner, Thomas-Hawkins, Fogg & Latham, 2007). With a shortage of nurses coming in the

next 10 years, nurse leaders need to be creative and do what they can to improve the work environment. Creating a positive work environment is highly desirable. There is strong support in the literature that HWEs have a positive effect on staff retention (VanOyen Force, 2005). One study found that nurses who expressed the intent to leave rated their work environment more negatively than those that expressed intent to stay (Gardner, Thomas-Hawkins, Fogg, & Latham, 2007). Previous researchers have reported a direct relationship between RN-MD communication and nursing job satisfaction (Manojlovich, 2005; Sengin, 2003). Baernholt and Mark (2009) found that job satisfaction and turnover rates were associated with both nursing unit characteristics and the work environment. Gardner et al. (2007) looked specifically at the work environment in hemodialysis units and also found that the nurses that rated their work environment favorably, indicated they did not intend to leave the organization.

The IOM report (2004) included evidence that unless the work environments are healthy, patient safety continues to be threatened. Latent conditions which the front line staff have no control over, such as poor supervision and poor design of work are the primary source of errors. The strongest predictor of nurses' intent to leave an organization are problems with their work environment (Paris & Terhaar, 2010; Zangaro & Soeken, 2007). Although studies have been done with nurses in other countries and among nurses in adult intensive care units, no published studies were found that compare the work environment for PICU nurses and the relationship to nurses' intent to leave their organization.

Healthy Work Environment and Magnet Designation

The original Magnet hospital studies were done between 1983 and 1989 (Kramer & Schmalenberg, 2005) and were structure-outcome studies. The researchers studied hospitals with good outcomes and retention and the hospital's organizational structure and nursing hierarchy.

In later studies, researchers began to look at the nurse manager support as well as the RN/MD relationship to see how these two issues impacted the nurses' control over their practice as well as their job satisfaction. During the late 1980s and the 1990s, studies reported the process features that were consistent in successful organizations were autonomous practice, constructive RN/MD relationships and nurse manager support (Kramer & Schmalenberg, 2005).

Many of the research studies on Magnet hospital focused on the work environment and the hospital structures. Kramer, Schmalenberg and Maguire (2010) define a work environment as "…a set of interconnecting surroundings, circumambience's, and conditions that determine, influence, and guide growth and action" (p.4). They further define a healthy work environment as one where the leader provides the structures, practices, systems and policies that allow the nurses to engage in processes and relationships essential to safe and quality patient outcomes. Aiken et al. (2008) found that the features of a Magnet model were associated with a significantly improved nursing work environment as well as improved job-related outcomes for nurses and for patients. The empirical evidence on Magnet hospitals has consistently shown better patient and nurse outcomes and a better, more supportive work environment for nurses (Brady-Schwartz, 2005; Cimiotti, Quinlan, Larson, Pastor, Lin & Stone, 2005; Kramer & Schmalenberg, 2005; Kramer, Schmalenberg, Maquire, Brewer, Burke, Chmielewski et al., 2008; Lake & Friese, 2006).

Conclusion

Communication and collaboration are tightly woven concepts and some overlap exists between them. Both communication and collaboration are important elements in HWE. In addition, authentic leadership highlights the role of nurse leaders and demands that they play a key role in sustaining and developing HWEs. There are some studies that show a significant

positive relationship between good communication, collaboration and leadership and a HWE (Aiken et al., 2008; Aiken et al., 2002; Baggs et al., 1999). Reviewing the empirical evidence of the past two decades, there are characteristics of the work environment that have a significant impact on nurse and patient outcomes. However, there is little evidence that these relationships, and specifically between communication, collaboration and leadership have been studied in the PICU population.

This comprehensive review of the literature supports the need for future studies to assess the HWEs concepts of communication, collaboration, and authentic leadership and the influence of these concepts on patient and nurse outcomes in the PICU environment. Furthermore, there is no research on the relationship between the nurses' perception of their work environment in the PICU and patient and nurse outcomes. Assessing unit-based HWEs and patient outcomes are important areas for future research.

The Relationship between Healthy Work Environments and Patient Outcomes

ABSTRACT

Background: Improved patient outcomes, reduced medical errors and reduced Registered Nurse (RN) turnover have been associated with a healthy work environment (HWE). However, little is known about the HWE from the unit perspective in Pediatric Intensive Care Units (PICU).

Specific Aims: Examine the effects of the HWE (communication, collaboration, and leadership) on patient outcomes (risk-adjusted length of stay (LOS), central line blood stream infections (CLBSI), ventilator associated pneumonia (VAP), risk-adjusted mortality) and RN turnover.

Methods: Exploratory, cross-sectional, correlational design. Ten Pediatric Intensive Care Units (PICU) and their RN staff completed the Practice Environment Scale of the Nursing Work Index Revised (PES-NWIR) and a subscale of the Intensive Care Unit Nurse Physician Questionnaire. Hospitals provided data on RN turnover, CLBSI, VAP, risk adjusted LOS, and risk adjusted mortality. Statistical analysis included correlations, multiple linear regression, t-tests (two-tailed) and one way analysis of variance (ANOVA).

Results: A total of 415 RNs completed the survey. All 10 hospitals submitted hospital and patient outcome data. RN's were mostly female (94%), Caucasian (95%), with a bachelor's degree (75 %), and 1-10 years as a PICU RN (70%). There was an inverse relationship between CLBSI and collaboration and communication ($p<.01$) but no association between communication, collaboration, or leadership and VAP. Risk adjusted mortality was inversely related to collaboration and communication ($p<.05$). Risk adjusted LOS was inversely related to collaboration and communication ($p<.05$).

Conclusion: Communication and collaboration in the PICU between RNs and between RNs and MDs are vital for patient safety, preventing complications and increased risk of death and to reduce hospital costs at the unit level.

Introduction

Background

Medical errors, which seriously impact hospital resources, cost over $50 billion annually. Zhan & Miller (2003), using the Agency for Healthcare Research and Quality (AHRQ) safety indicators, estimated that increased length of stay for postoperative sepsis could cost hospitals up to $60,000 per patient and extend a patient's stay as long as 11 days. "Safe patient care is directly and positively linked to the quality of the staff nurses' environments" (Kramer & Schmalenberg, 2008, p.56). Nurses represent the largest discipline in hospitals today. It is important to identify factors such as the quality of care and work relationships that can influence the work environment of nurses because these factors can influence their job satisfaction and their retention. The environment in which patient care is delivered can also influence the outcomes of that care in terms of the patient's recovery, for example, the length of the hospital stay. Little is known about the extent to which the factors that contribute to a healthy work environment (HWE) in pediatric intensive care units (PICU) influence pediatric critical care nurses and the outcomes of care for pediatric patients.

Significance

Healthy work environments are critical to the delivery of safe patient care. Unhealthy work environments have been associated with adverse events (AE) and poor patient outcomes (Aiken, Clarke, Sloane, Lake & Cheney, 2008; Boyle, 2007; Aiken, Sloane, Clarke, Poghosyan, Cho, et al., 2011; Baggs, Schmitt, Mushlin, Mitchell, Eldredge et al., 1999; Flynn, Liange, Dickson, & Aiken, 2010; Friese, 2005; Friese, Lake, Aiken, Silber & Sochalski, 2008; Gunnarsdottir, Clarke, Rafferty & Nutbeam, 2007; Manojlovich& DiCiccio, 2007; Manojlovich, Antonakos & Ronis, 2009; Mitchell & Shortell, 1997; Zimmerman, Shortell, Rousseau, Duffy,

Gillies et al., 1993). Some of the AEs that have occurred include medication errors, wrong site surgeries and even death. Hospitals can no longer afford to be complacent about even a small number of AEs/outcomes. With the changes in reimbursement that the Centers for Medicare and Medicaid (CMS) are making, hospitals will not receive payment for care or treatment that was prolonged or when the patient was harmed because of an AE. Understanding the characteristics of the work environment in PICUs is particularly important because critically ill pediatric patients are quite vulnerable and their safety is paramount.

Healthy Work Environments

Numerous characteristics have been identified to determine what makes an environment healthy. The American Association of Critical Care Nurses (AACN) identified six standards that constitute a Healthy Work Environment (HWE). These standards are skilled communication, true collaboration, effective decision making, appropriate staffing, meaningful recognition and authentic leadership (AACN, 2005). The focus of this article will be on three of these areas: communication, collaboration and leadership. These three areas were chosen because they are very important in the Pediatric Intensive Care unit and research has shown in adult ICUs that these three variables have an impact on patient and nurse outcomes.

The term HWE is relatively new in healthcare. Healthy work environments are defined as environments that are "productive, able to give good quality care, satisfying, and able to meet personal needs" (Kramer & Schmalenberg, 2008, p.56). In addition, a HWE can be defined as "a work setting in which policies, procedures, and systems are designed so that employees are able to meet organizational objectives and achieve personal satisfaction in their environment" (Disch, 2002, p.3). These environments support nurses in a team approach to provide safe care.

Many of the studies related to HWE cite the Institute of Medicine's (IOM) report *Keeping Patients Safe: Transforming the Work Environment of Nurses (2004)* and the committee's identification of the factors in the work environment that contribute to errors including: frequent failure to follow management practices necessary for safety, unsafe workforce deployment, unsafe work and workspace design and punitive cultures that hinder the reporting and prevention of errors (Barron McBride, 2005; McCauley & Irwin, 2006; McGillis, Doran & Pink, 2008; Wolf, 2006).

A HWE must be a place where nurses can communicate effectively with each other and nurses and physicians can communicate well in-person and on the phone. Their ability to collaborate optimizes the contribution of each and can create a synergy. Given the history of medicine and nursing that is replete with power and conflict struggles, leadership becomes an essential component of a HWE to foster the communication and collaboration necessary that perhaps has not come naturally nor been developed in training or professional role socialization.

Communication

Effective communication exists when critical care nurses and physicians as a healthcare team are able to communicate about all issues clearly and openly and there is no fear of retribution. Poor communication is a major contributor to AE in health care (Shortell, Zimmerman, Rousseau, Gillies, Wagner et al., 1994; Apker, Propp, Ford & Hofmeister, 2006; Leonard, Graham & Bonacum, 2004; Manijlovich & DiCiccio, 2007). Poor communication can lead to numerous safety issues because of the number of hand-offs that occur daily in healthcare. In fact, poor communication leads to dissatisfaction among nurses and intention to leave an organization. Ineffective communication can also affect patients.

The Joint Commission (JC) reported that communication failures are the leading cause of harm to patients in hospitals today. The JC concluded in one study that the primary root cause for 70% of the errors was communication (Leonard, Graham & Bonacum, 2004). In fact, 75% of the patients involved in sentinel events reported to the JC die unnecessarily from medical errors in hospitals (Leonard, Graham & Bonacum, 2004). Additional studies showed that lack of communication and collaboration were associated with higher readmissions to the ICU and a higher rate of patient mortality (Baggs, Schmitt, Mushlin, Mitchell, Eldridge et al., 1999; Manojlovich & DeCicco, 2007; Manojlovich, Antonakos & Ronis, 2009; Rosenstein & O'Daniel, 2005). In another study, many of the AEs were found to be preventable and were associated with iatrogenesis, human errors, and failure of effective management or communication (Ksouri, Balanant, Tadie, Heraud, Abboud et al., 2010). Several other studies have shown a relationship between poor communication and negative patient outcomes (Baggs et al., 1999; Evans & Carlson, 1992; Manojlovich, Antonakos & Ronis, 2009; Rosenstein, 2002; Rosenstein & O'Daniel, 2005). Additionally, multiple problems with communication have resulted in wrong site surgery (Chassin & Becher, 2002).

Communication is a "two way dialogue" according to AACN (AACN, 2005). It has also been defined as a process which requires both a sender and a receiver. When effective communication exists, the team is able to dialogue about all issues and there is transparency on all topics. Effective communication between healthcare professionals is essential for patient safety.

Doctors and nurses communicate differently. Numerous studies have found that physicians are usually more satisfied with communication than nurses. Nurses report feeling a lack of respect and even abuse following interactions with physicians (Disch, 2001; Greenfield,

1999; Manijlovich & DiCiccio, 2007; Oberle & Hughes, 2001; Schmitt, 2001; Thomas, Sexton & Helmreich, 2003). The quality of the communication between nurses and physicians is an element of how well they can collaborate.

Collaboration

Collaboration between the healthcare team involves joint decision making and communication. AACN encourage nurses to be "relentless" in striving for true collaboration in their work environment (AACN, 2005). Collaboration must be present at all times in order to maintain a HWE. Numerous studies can be found in the literature in which poor collaboration has resulted in AEs and poor patient outcomes (Knaus, Draper, Wagner & Zimmerman, 1986; Despins, 2009; Propp, Apker, Ford, Wallace, Serbenski et al., 2010). These studies found that ICUs with structures where good nurse-physician collaboration and autonomous decision making are promoted had lower risk adjusted mortality than ICUs not reporting this structure. Collaboration needs to be in place both within groups in the ICU (RN-RN) and between groups (RN-MD) and policies need to be in place to prevent inappropriate behavior that results in poor collaboration and communication (Barnsteiner, 2001). In a study about nurse-physician collaboration in three ICU's collaboration was associated with a lower risk of a negative outcome (Baggs et al., 1999). Still another study found that the teamwork and communication, which are the two key factors in collaboration, also had decreasing AE and teamwork (Apker, Propp & Ford, 2009). The strongest factor in that study was the ability for the team members to be comfortable speaking up when they saw something that they were concerned about with a patient (Pronovost, 2006).

Leadership

Organizational leadership is foundational for HWEs. Leadership is when the leader

"walks the talk" and supports the staff in the pursuit of a HWE. Many studies have been published that support the standard of authentic leadership as a component of HWEs (Cummings, MacGregor, Davey, Lee, Wong et al., 2009; Kramer, Maguire, Brewer, Chmielewski, Kishner et al., 2007; Kramer & Schmalenberg, 2007; McNeese-Smith, 1997; Shirey, 2009; Tomey, 2009). Upenieks revealed that "nurses with well-established, effective relationships with physicians and managers will be trusted to function independently and have greater opportunities to demonstrate their expertise" (Upenieks, 2003, p.97).

Healthy Work Environment and Patient Outcomes

Patient outcomes that have been linked to environmental factors include mortality and infections. A landmark ICU study by Knaus et al. (1986) found differences between predicted and observed death rates for patients that appeared to be related to the interaction and communication between physicians and nurses (Knaus, Draper, Wagner & Zimmerman, 1986). This study compared 13 intensive care units (ICU) and used the Acute Physiology and Chronic Health Evaluation (APACHE) instrument to compare the ratio of actual to predicted mortality. Shortell working with Knaus and others (1994) found that a positive environment in the intensive care unit was significantly associated with lower risk adjusted length of stay and providers reporting that the quality of care was better for the patients (Shortell, Zimmerman, Rousseau, Gillies, Wagner et al., 1994). In these studies, an association with risk adjusted mortality and caregiver interaction was not evident, but a relationship between caregiver interaction and risk adjusted length of stay was demonstrated. These adult ICU studies support the need for more evidence to be gathered in the PICU population.

The IOM Committee on the Work Environment for Nurses and Patient Safety in 2004 suggested interventions to improve the nurses' work environment. These recommendations for

improvement included evidence-based staffing standards, the creation of interdisciplinary teams, and the establishment of visible and responsive nursing leadership (IOM, 2004).

The IOM report *Preventing Medication Errors* (2006) estimated that there are at least 1.5 million preventable AE due to systems issues and not incompetent professionals. However, a positive, healthy nurse work environment impacts patient outcomes with a decrease in central line blood stream infections, ventilator assisted pneumonias and urinary tract infections (Stone, Mooney-Kane, Larson, Pastor, Smolowitz et al., 2007). Aiken (2008) reported lower risks of death and failure to rescue in hospitals where nurses report better work environments. Aiken and colleagues also looked at the impact of patient mortality and nursing care. Many of their research studies focused on front line management, staffing and nurse-doctor relationships as a predictor of patient mortality (Kramer & Schmalenberg, 2005).

There were a few other studies that examined patient outcomes and communication. Manijlovich et al. (2009) looked at the relationship between the practice environment, communication and patient outcomes such as central line infections, ventilator associated pneumonias and pressure ulcers. They found that when they measured numerous communication domains (timeliness, accuracy and openness) together, as opposed to looking at the communication domains separately, there was not a statistically significant relationship with the selected adverse outcomes that they chose.

As we are entering into a time of great concern for our workforce with so many nurses needed and so few training programs available, it is important for hospitals to retain their staff. However, a thorough understanding is needed of the impact of communication, collaboration and leadership issues on nurses' job satisfaction; otherwise, the profession will continue to have high turnover and poor patient outcomes. Despite these findings, organizations continue to struggle

with how to improve the work environment and subsequently improve patient outcomes and increase staff retention. The areas that continue to be a challenge for hospitals are in communication (RN-RN and RN-MD), collaboration and leadership. Therefore, the purpose of the present study was to determine the relationship between HWEs, specifically communication, collaboration and leadership, and CLBSI, illness adjusted mortality, illness adjusted length of stay, VAP and nurse intent to leave in the PICU. Because most of the studies done in ICUs up to this point have been in adult ICUs, more information needs to be gathered on the relationship in the PICU.

Objectives

The specific research aims for this study were to:

1. Determine the relationship between the elements communication, collaboration and leadership and ventilator associated pneumonia (VAP) and central line blood stream infections (CLBSI) in the PICU.
2. Investigate the association between communication, collaboration and leadership and risk adjusted mortality in the PICU.
3. Establish the relationship between communication, collaboration and leadership and risk adjusted length of stay (LOS) in the PICU.

Methods

Design

An exploratory, cross-sectional design was used to gather information from nurses about their perceptions of the leadership, collaboration and communication in their PICU work environment.

Setting

Information about the study aims and procedures was sent to thirty-five PICUs across the United States. Twenty-eight agreed to participate, but only ten met the inclusion criteria and could complete the IRB approval process within the time period that was necessary. Many of the units did not have the risk adjusted length of stay or risk adjusted outcome data collected for the quarter that was needed to coincide with the nurses' participation in the survey. Ten PICUs from different parts of the country participated in the study. The units must have current data submitted to the national PICU database that receives outcome data from over 100 PICUs. These units collect data with the PRISM (Pediatric Risk of Mortality Score) III score which is the only pediatric risk score that measures risk adjusted length of stay and risk adjusted mortality. To reduce variation across two units unrelated to study goals that might affect the outcome of interest, units asked to participate in the study were restricted to those with more than ten beds and pediatric critical care fellowship programs. In four of the units, IRB submission was not necessary. The other six units were given expedited review through IRB.

Population and Sample

A convenience sample of PICU RNs from the PICUs in the sample who worked in the unit greater than six months was used. In order to get a representative sample of RNs from each of the units in relation to HWE, 35 questionnaires from each unit were needed. A power analysis was done to determine the sample size for each unit. Because there was one mean score for each of the outcome variables for each hospital it was determined that the effect size would be small. The effect size was set at 0.3 with a power of 0.8 and an alpha of 0.05. This would result in 35 staff needed to complete the survey from each of the units or a total sample size of at least 352.

This should be a sufficient sample to generalize the results to the larger population of PICU nurses.

The unit managers provided the risk adjusted length of stay and risk adjusted outcome data for the quarter prior to the beginning of the RN survey. The risk adjusted mortality and risk adjusted length of stay were based on PRISM III scores. Additional data was collected related to the unit and the hospital, such as nursing hours per patient day, overtime usage, percentage of certified RNs, union representation and whether or not the manager managed other units.

Instruments and Measures

The Practice Environment Scale of the Nursing Work Index Revised (PES-NWIR) was used to measure the nurse practice environment. The PES-NWIR was developed in 2002 by Lake. It was revised from the Nursing Work Index (NWI) developed by Kramer and Hafner (1989) from their work on measuring Magnet hospital structures and later updated by Aiken and Patrician in 2000 (NWI-R). The PES-NWIR has 5 domains: Nurse participation in hospital affairs, nursing foundations for quality care, nurse manager ability/leadership and support of nurses, staffing and resource adequacy, and collegial nurse-physician relations. It is a 31 item instrument used to measure the practice environment (Lake, 2002). It is a parsimonious tool that can be completed in a timely manner. Higher scores based on a mean score for each domain and a composite score indicate those organizations that have HWE.

In 2004 the PES-NWIR was selected by the National Quality Forum (NQF) as a Nursing Performance Measure; thus it has been validated in many populations and settings, including oncology, medical surgical units, dialysis units and with Asian nurses (Lake, 2007). In 2006, the National Database of Nursing Quality Indicators (NDNQI) which is affiliated with the American Nurses Association (ANA) and the American Nurses Credentialing Center (ANCC) began to

offer it as part of the nurses' annual satisfaction survey (NDNQI, 2006). The Cronbach's alpha was high measuring from .80 to .96 (Lake, 2002; Liu & Cheng, 2009; Hanrahan, 2007). The same results were found in this study.

ICU Nurse-Physician Questionnaire was used to measure communication, coordination, conflict management, leadership, perceived unit team effectiveness and related factors in the ICU (Shortell, Rousseau, Gillies, Devers & Simons, 1991). Only 22 questions were used from this tool. The questions that measure RN-RN and RN-MD communication were used. There are five domains of communication measure by this tool: Within group openness, between group openness, within group accuracy, between group accuracy and communication timeliness. This questionnaire had both consistency and reliability measured with ICU and ED staff (Dougherty & Larson, 2005; Shortell, Rousseau, Gillies, Devers & Simons, 1991) and good to high reliability (Cronbach's alpha 0.7) except for communication timeliness that was above 0.6 among populations of intensive care unit physicians and nurses (Shortell et al., 1991; Boyle, 2007; Dougherty & Larson, 2005; Hansen, Biros, Delaney & Shug, 1999). Cronbach's alpha measured for this study was also good to high reliability (0.7-.9) in all communication domains.

Demographic data were collected about the RNs. These included information about age, sex, education, experience in nursing, experience in pediatric intensive care nursing, as well as nurses' intent to leave their organization. This data was collected to explore the possibility if these variables may influence patient outcomes.

Hospital and unit specific data were collected including information about the nursing leadership, the medical leadership, the physician staffing, type of hospital (Pediatric versus non-Pediatric, magnet versus non-magnet, Beacon versus non-Beacon unit), ownership of the hospital, patient days, union representation and nursing hours per patient day for that unit. Data

regarding the hospitals and the unit characteristics were provided by the manager via a one page survey.

Patient outcome data for the third quarter in 2011 was retrieved by the unit manager via the data base. This was the quarter just prior to the nurses' survey. This included the pediatric risk of mortality and risk adjusted outcome on the (PRISM III) score. The Prism III score is an adequate indicator of mortality probability for heterogeneous patient groups in PICU and can measure the risk adjusted mortality and length of stay (Reinoud, Gemke & van Vught, 2002). The specific data items that were requested were the PICU Standardized Mortality Ratio and the PICU Severity-Adjusted length of stay, both of which are Nursing Quality Forum (NQF) endorsed indicators. The CLBSI and VAP information were reported by the hospitals for the previous year. These are also NQF endorsed indicators (NQF, 2004). The CLBSI were collected per 1,000 line days and the VAP were collected per 1,000 ventilator days to have a consistent method of reporting across hospitals.

Procedures/Data Collection

Nurse managers from the different children's hospitals were approached to participate in this study. Once they agreed the Institutional Review Board (IRB) was contacted to determine if submission was necessary. Applications were completed and the process took anywhere from one to six months to get approval. Nurses at the respective hospitals were recruited via email from the principle investigator and a small token was offered for completing the surveys in the form of a Starbuck's gift card. The surveys were anonymous, completed on-line, and were accessed via the internet. The data collection periods were chosen in an attempt to get closely matched data regarding the patient and nurse outcomes and the work environment.

Statistical Analysis

Statistical analysis was done using SPSS 17.0. Descriptive statistics are reported as mean plus or minus the SE and median and interquartile ranges for the continuous variables. Pearson correlation in the form of a correlation matrix was used to examine the relationships of the communication, collaboration and leadership and the outcome measures. Multiple regression and One Way Analysis of Variance (ANOVA) was used to estimate models when significant correlations were found. A strong positive correlation was found with collaboration and communication between groups (RN-MD), so one of the variables was removed and correlations were run again with the same results. The significance level was set at .05 for this study. Collinearity diagnostics were also run for the dependent variables. Reliability statistics (Cronbach's alpha) were performed for the tools used. Intraclass correlation coefficients were also run.

Results

There were 415 completed surveys for an overall response rate of 47% with at least 35 RN participants who completed surveys from each unit in the sample. The majority of the participants were female (94%), Caucasian (88%) and non Hispanic (95%). Most of the participants had their BSN (75%) and worked full-time (82%). Certified nurses composed 46% of the sample and they were certified in either critical care, pediatrics or both. Years of experience as an RN ranged from 6 months to 64 years, with years of experience in their current position ranging from 6 months to 40 years. The characteristics of the RN participants can be viewed in Table 1.

All ten units in the sample were in freestanding children's hospitals that were academic medical centers. Eight out of ten of the hospitals were ANCC Magnet designated hospitals with

three of those PICUs in the sample also having Beacon designation at the unit level. The patient days for 2011 in each unit ranged from 2000 to 15,720 PICU patient days. The nursing hours per patient day (HPPD) ranged from 19.20 to 22.85 hours out of 24 hours. In six of the units, the nurse managers supervised only that unit while four of the units shared a manager with another unit. Nurse Practitioners (NP) were used in eight out of ten units and seven units had an attending physician in-house 24 hours a day. In four of the hospitals, the nurses were represented by a union. The hospital unit characteristics can be viewed in Table 2.

In order to control for severity of illness as an influence on patient outcomes, the patients' length of stay and the mortality rate were risk adjusted. Two of the sample units, however, were not able to provide this data. All of the units did provide the CLBSI and VAP data. The mean, standard deviation and correlation for collaboration, communication and leadership and the patient outcome variables are presented in Table 3.

Correlations were performed using the outcome variables, the predictor variables and some of the unit and nurse variables (Table 4). Predictor variables were significantly associated with all the outcome variables except for RN-RN communication accuracy and the incidence of VAP, RN-MD communication accuracy and CLBSI; communication accuracy for both groups with risk-adjusted length of stay, mortality, and HPPD and communication timeliness with mortality and HPPD. Because several studies have found a statistically significant correlation with staffing ratios and patient outcomes, this variable was included in the testing. Central Line Blood Stream Infections were inversely associated with collaboration, leadership and all ratings for communication ($p<.01$). Risk adjusted mortality was inversely related to collaboration and all communication scales except for accuracy between groups. The incidence of VAP was negatively correlated with nurse staffing levels indicating the better the staffing, the lower the

occurrence of VAP. Additionally, the predictor variables collaboration, leadership and communication had statistically significant correlations with each other. HPPD had a significant correlation with CLBSI, risk adjusted length of stay and risk adjusted mortality not in the direction that was expected.

Regression models were completed to test predictors of the patient outcome variables with the independent variables. Correlated variables were utilized in the regression models to determine if they were a true predictor of positive outcomes. All models were significant at the .05 level. All models were originally performed using communication, collaboration and leadership as the predictor or independent variables. Multiple models were performed. Only one model for each of the outcomes is listed in Table 5.

Model 1 tested the relationship between the outcome variable risk adjusted length of stay and communication, collaboration, leadership, as well as hospital outcomes of Magnet and nursing hours per patient day (HPPD). When the original model was run with just communication, collaboration and leadership, the model was statistically significant but only accounted for 6% (R2=.56) of the variability in risk adjusted length of stay. Magnet designation and HPPD were added. The final Model 1 was statistically significant ($p<.01$) accounting for 27% of the variability (R2=.267). Magnet and HPPD were statistically significant, but not in the direction expected.

Model 2, tested the relationship between collaboration, leadership and HPPD and risk adjusted mortality. The model was originally tested with the predictor variables collaboration, leadership and all five domains of communication but was not statistically significant ($p=.634$). All communication variables were removed and another model was performed with just collaboration and leadership predictor variables. This model was also not statistically significant

(p=.996). The HPPD variable was added to the model with collaboration and leadership and the model was statistically significant (p<.01). This model accounted for 23% of the variability (R2=.234) and collaboration had a negative relationship to risk adjusted mortality. As was found in the correlations, HPPD had a significant relationship, but not in the direction expected.

Model 3 shows the relationship between communication, collaboration and Magnet designation with the outcome variable CLBSI. The original model was tested using all three predictor variables of communication, collaboration and leadership and the outcome variable CLBSI. The original model was statistically significant (p<.01), but only accounted for 6% (R2=.56) of the variability. The model was tested again removing the leadership variable and adding the Magnet variable. This model was statistically significant (p<.01) and it accounted for 39% of the variability (R2=.389). Communication timeliness, RN-MD communication openness and RN-RN communication accuracy all had an inverse relationship. Magnet had a statistically significant relationship, but not in the direction expected.

Model 4 tested the relationship between collaboration, communication and leadership and the outcome variable VAP. This model was statistically significant (p<.01) and accounted for 11% of the variability (R2=.114). This model was also tested with Magnet and HPPD however, the predicted variability continued to stay between 11 and 12% so Magnet and HPPD were removed. There was an inverse relationship with RN-RN communication accuracy. Collinearity diagnostics were also run for the variables that showed multicollinearity was not present. In addition, because of the risk of clustering in units, intraclass correlation coefficients (ICC) were performed. These ICC were .129 - .488 reflecting some association, but showing independence and not requiring further multilevel modeling.

Limitations to the study

There are a number of limitations to this study. Because the size of the sample was only ten PICUs, and mean scores for the unit's outcome data were used, there is an increased risk of a Type II error (failure to find significant relationships) and a possible problem with not having a large enough sample. The ability to generalize to all PICUs is limited. There could also be a problem with using the dependent variable and predictor values associated with a unit for each nurse in that unit, which does create a clustering or hierarchy and potentially create non-independent observations for regression analysis. Intraclass correlations were run to control for this. Another limitation to this study is that it is an exploratory, cross-sectional design which does not allow for changes over time or assess causality. Even though the sample was from hospitals throughout the United States, the variables are very similar. There could also be a problem with response bias and the fact that it is self-selection bias which can be found in on-line surveys.

Discussion

Although the sample was from ten units from all over the country, the group was not very ethnically diverse, with the largest population being Caucasian and non-Hispanic. A large percentage of these nurses were full-time and BSN prepared.

Communication, collaboration and leadership are important in healthcare to maintain a HWE. This study found some interesting findings with the relationships between communication collaboration and leadership and patient outcomes in the PICU. The results suggest an inverse relationship between some of the predictor variables and all four patient outcomes studied.

Ventilator Associated Pneumonia

Communication, collaboration and leadership did not predict a lower incidence of VAP. Rather, there was a significant positive relationship which is unexplained. While this variable is a nurse sensitive indicator, there are other things that may be causing these results. This could mean that factors in the environment do not influence the development of this complication now that a new standard of bundled interventions to prevent VAP have been widely implemented and minimized the incidence of VAP (Bigham, Amato, Bondurrant, Fridriksson, Krawczeski et al., 2009). Work environment factors may not be influencing this outcome because the ventilator is managed by a variety of people including the respiratory care practitioner and this discipline was not studied. When introduced into the model as found in Model 4, there was a negative correlation between RN-RN communication accuracy, suggesting that if communication between RNs improves, the incidence of VAP decreases as found in other studies (Stone, Mooney Kane, Larson, Pastor, Zwanziger et al., 2007). Because of the other findings above, this could just be a random finding and not really be a significant finding.

Central Line Blood Stream Infections

This area had the most significant findings. The correlation matrix demonstrated a statistically significant inverse relationship at the .05 level with collaboration, RN-RN communication accuracy, RN-MD communication accuracy, RN-RN communication openness, RN-MD communication openness and communication timeliness. The regression model also showed an inverse relationship with three of the communication variables. As communication improved, the CLBSI went down. Collaboration and timely and open communication between RNs and RNs and MDs was associated with fewer CLBSI. These findings are similar to the results found by Shortell et al. (1994) and others (Shortell et al., 1994; Manijlovich, Antonakos

& Ronis, 2009; Manijlovich & DiCicco, 2007; Stone, Mooney Kane, Larson, Pastor, Zwanziger et al., 2007). No relationship was found between CLBSI and leadership.

Risk Adjusted Length of Stay

Communication timeliness, open communication between groups and collaboration all showed a negative correlation which supports what other studies have found that as communication (RN-MD), collaboration and communication timeliness improve, the length of stay decreases. Other studies have found that as communication (RN-MD), collaboration and communication timeliness improve, the length of stay decreases (Shortell, Zimmerman, Rousseau, Gillies, Wagner et al., 1994).

Risk Adjusted Outcomes

Collaboration was a predictor of lower risk adjusted mortality which is consistent with results from other studies that found as collaboration goes up, risk adjusted mortality goes down (Knaus, Draper, Wagner & Zimmerman, 1986). This finding suggests that as the degree of coordination with the multidisciplinary team goes up, patient mortality decreases.

Leadership

Because eight out of ten of the units were in Magnet hospitals, that might explain why there wasn't a statistically significant difference between leadership and the outcome variables in all of the models. Magnet structures many times have structures in place that supports the staff at the unit level and with more of a collaborative governance structure, there may not be a need for strong leadership from a manager. Leadership did not influence VAPs, CLSBI, risk adjusted length of stay or risk adjusted outcomes.

Staffing

Nurse staffing (HPPD) was positively correlated with patient outcomes which is different

than findings in other studies (Aiken et al., 2008; Friese et al., 2007; Needleman, Buerhaus, Mattke, Stewart & Zelevinsky, 2002; Blegen, Goode, Spetz, Vaughn & Park, 2011). One would expect that decreased nurse staffing levels are associated with poor patient outcomes.

Magnet

Designation as a Magnet hospital was not associated with lower CLBSI, VAP, LOS and Mortality. Eight out of ten of the units were in Magnet hospitals which could be a factor contributing to this finding. The designation of excellence at the unit level, the Beacon award, however was not associated nor was education level of the PICU RNs.

Conclusion

The results of this study support the relationship between communication, collaboration and leadership and patient outcomes in the PICU. In general, the PICU nurses in this study rated their leadership (2.98) and collaboration (3.30) high on a scale of 1-5. Openness (RN-RN) within groups also was high (4.11). There was a moderate inverse correlation between collaboration and CLBSI, risk adjusted length of stay and risk adjusted mortality. This suggests that RN-MD relations have a strong and consistent association with a decrease in adverse patient outcomes. This is consistent with findings in other studies (Knaus, Draper, Wagner & Zimmerman, 1986; Despins, 2009; Propp, Apker, Ford, Wallace, Serbenski et al., 2010).

Leadership did not show a statistically significant consistent correlation with any of the patient outcome variables and did not suggest an inverse relationship as the leadership went up, negative patient outcomes decreased, but it was effective in increasing the explanation of the variability. Because many of these units were in hospitals with ANCC Magnet designation there could be a form of collaborative governance in place which could be providing the leadership

and it may not be as important from a manager. Of all of the predictor variables, leadership was not found to impact CLBSI as it was with the other outcome variables.

Communication was not found to impact the regression model with risk adjusted mortality as it was with the models for risk adjusted length of stay, CLBSI and VAP. This outcome was found in other studies (Stone, Mooney Kane, Larson, Pastor, Zwanziger et al., 2007; Manijlovich & DiCiccio, 2007). There are five domains in the ICU Nurse-Physician Communication questionnaire. Communication timeliness was inversely associated with outcomes in two of the models. This would suggest that timely communication can decrease poor patient outcomes. Communication accuracy between groups had a negative relationship with CLBSI and risk adjusted length of stay. Communication openness between groups also was significant with inversely with all outcome variables but VAPs. This suggests that some of the communication domains are directly associated with improved patient outcomes.

Communication, collaboration, leadership, Magnet designation and HPPD explained 27% of the variance in risk adjusted length of stay. This would suggest that good communication and collaboration are associated with lower lengths of stay. Findings suggest more work needs to be done to create HWEs to lower patient's lengths of stay in the PICU.

With infections and longer lengths of stay because of AE and poor patient outcomes, hospitals are being held financially accountable for certain events making it even more important to reduce AE/infections and eliminate them if possible. Results in this study support more emphasis in healthcare on communication within groups (RN-RN) and between groups (RN-MD), collaboration and leadership to improve patient outcomes and decrease AE. These important components of HWE and effective care delivery influence patient outcomes. This

supports continued emphasis within healthcare organization to improve the work environment of nurses in the PICU.

More research is needed on interventions to improve patient outcomes by developing effective communication, collaboration and leadership. Additionally, more research is needed to determine the extent of the interventions needed to improve these outcomes in the PICU. Communication, collaboration, and leadership are important to clinical outcomes among PICU patients as well as the costly outcome of the length of the hospital stay. To achieve patient-centered care for the patient and their family in the PICU, we need to understand how the unit characteristics of communication, collaboration, and leadership contribute to patient-centered care.

Table 1: Participant Demographic Variables

Variable		Number	Percentage
Sex	--Male	25	6
	--Female	390	94
Race	--American Indian/Alaskan Native	5	1
	--Asian	36	9
	--Hawaiian/Pacific Islander	4	1
	--Black/African American	7	2
	--Caucasian/White	363	87
Ethnicity	--Hispanic/Latino	20	5
	--Non-Hispanic or Latino	395	95
Education	--Diploma	19	5
	--Associate's Degree	71	17
	--Bachelor's Degree	311	75
	--Master's Degree	13	3
	--Doctorate	1	<1
Highest Education	--Diploma	11	3
	--Associate's Degree	35	8
	--Bachelor's Degree	322	78
	--Master's Degree	46	11
	--Doctorate Degree	1	<1
Certification	--Yes	192	46
	--No	223	54
Current Status	--Full Time	339	82
	--Part Time	60	14
	--Per Diem	16	4
Age in Years*	--23-30	144	41
	--31-40	102	29
	--41-50	65	18
	--51-60	37	10
	--61+	6	2
Years as RN	--1-10	270	65
	--11-20	66	16
	--21-30	58	14
	--31-40	20	5
	--40+	1	<1
Years as PICU RN	--1-10	292	70
	--11-20	64	15
	--21-30	50	12
	--31-40	9	3
Years in current position	--0-10	332	80
	--11-20	44	11
	--21-30	34	8
	--31-40	5	1

* One unit did not allow collection of age

Table 2: Characteristics among hospitals of PICUs sampled

Hospital	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Children's Hospital	X	X	X	X	X	X	X	X	X	X
Academic Medical Center	X	X	X	X	X	X	X	X	X	X
MD Fellowship	X	X	X	X	X	X	X	X	X	X
Magnet	X	X	X	X	X	X	-	X	-	X
Beacon	X	-	-	-	X	X	-	-	-	-
Union	-	-	X	X	-	-	X	-	X	-
Manager Supervises only this unit	X	X	-	-	X	X	-	X	-	X
CNS	X	X	X	X	X	-	X	X	X	X
Nurse Practitioner	X	X	-	-	X	X	X	X	X	X
Patient Days 2011	6240	5065	4513	4031	2000	9892	5354	8319	15750	3010
Nursing hours per patient day	19.2	21.0	19.90	22.85	21.38	21.00	20.83	20.00	22.60	19.32

Table 3: Summary Statistics for Predictor Variables

Variable or Outcome	Mean (SD)	Range	Possible Range
Risk Adjusted Mortality (PRISM)	1.86 (1.16)	0.33 - 3.47	
Risk Adjusted Length of Stay (PRISM)	2.45 (0.60)	1.24 – 3.40	
VAP	0.63 (0.33)	0.00 – 0.99	N/A
CLBSI	1.33 (0.49)	0.18 – 1.94	N/A
Leadership (From PES-NWI)	2.98 (0.59)	1 - 4	1-4
Collaboration (From PES-NWI)	3.30 (0.49)	1 - 4	1-4
Shortell's Communication Scales			
-Within Group Openness (RN-RN)	4.11 (0.63)	1.75 - 5	1-5
-Between Group Openness (RN-MD)	3.98 (0.65)	1.75 - 5	1-5
-Within Group Accuracy (RN-RN)	3.26 (0.70)	1.50 - 5	1-5
-Between Group Accuracy (RN-MD)	3.60 (0.71)	1.67 - 5	1-5
-Communication Timeliness	3.99 (0.49)	2.25 - 5	1-5

VAP = Ventilator Associated Pneumonias are per 1,000 ventilator days

CLBSI = Central Line Blood Stream Infections are per 1,000 line days

PRISM = Pediatric Risk of Mortality Scoring which is the only pediatric risk score that measures risk adjusted length of stay and risk adjusted mortality

Table 4: Pearson Correlation Among Predictor Variables and Outcomes

	1	2	3	4	5	6	7	8	9	10	11	12
1												
2	-.505	-										
3	-.437[a]	.782[a]	-									
4	.236[a]	.305[a]	-.016	-								
5	.239[a]	-.137[a]	-.143[a]	-.143[a]	-							
6	.221[a]	-.088	.006	.006	.475[a]	-						
7	.284[a]	-.186[a]	-.141[b]	-.141[b]	.512[a]	.479[a]	-					
8	.254[a]	-.178[a]	-.178[a]	-.178[a]	.709[a]	.355[a]	.275[a]	-				
9	.097	-.120[b]	-.040	-.048	.234[a]	.232[a]	.280[a]	.190[a]	-			
10	.191[a]	-.059	-.036	.068	.402[a]	.238[a]	.275[a]	.410[a]	.436[a]	-		
11	.260[a]	-.174[a]	-.153[a]	-.006	.466[a]	.366[a]	.495	.533	.276[a]	.419[a]	-	
12	-.168[a]	.342[a]	.451[a]	.469[a]	-.144[a]	-.263[a]	-.177[a]	-.144[a]	-.080	-.046	-.076	-

a Correlation is significant at the 0.01 level (two-tailed)

b Correlation is significant at the 0.05 level (two-tailed)

Variable:

1. Ventilator Associated Pneumonia (VAP)
2. Central Line Blood Stream Infection (CLBSI)
3. Risk Adjusted Length of Stay
4. Risk Adjusted Mortality
5. Collaboration Score (PES-NWI)
6. Leadership Score (PES- NWI)
7. Communication Openness within groups (ICU Communication)
8. Communication Openness between groups (ICU Communication)
9. Communication Accuracy within groups (ICU Communication)
10. Communication Accuracy between groups (ICU Communication)
11. Communication Timeliness (ICU Communication)
12. Unit Hours per Patient Day (HPPD)

Table 5: Multiple Regression Models

	Outcome											
	LOS			Mortality			CLBSI			VAP		
Variable	Coef	SE	t	Coef	SE	t	Coef	SE	t	Coef	SE	t
Comm-Timeliness	**-0.153**	**0.079**	**-1.94**				-0.036	0.051	-0.71	0.064	0.040	1.60
Comm-Accuracy BG	0.054	0.050	1.08				**-0.066**	**0.032**	**-2.06**	-0.018	0.025	-0.72
Comm-Accuracy WG	0.007	0.050	0.14				**0.095**	**0.034**	**2.79**	0.035	0.026	1.35
Comm-Openness BG	-0.035	0.065	-0.54				0.031	0.040	0.78	**0.077**	**0.032**	**2.41**
Comm-OpennessWG	0.021	0.066	0.32				-0.043	0.043	-1.00	0.031	0.034	0.91
Collaboration	**-0.142**	**0.068**	**-2.09**	-0.019	0.11	-0.17	0.008	0.217	0.04	0.005	0.035	0.14
Leadership	**0.290**	**0.063**	**4.60**	**0.286**	**0.108**	**2.65**				0.041	0.031	1.32
Magnet	**0.607**	**0.080**	**7.59**				**0.774**	**0.053**	**14.60**			
HPPD	**0.060**	**0.025**	**2.40**	**0.447**	**0.045**	**9.93**						
R-square	0.267			0.234			0.389			0.114		

Bold p<0.05
Shaded/large font: significant association in predicted direction
Shaded/small font: significant assocation in direction opposite to prediction

VAP = Ventilator associated pneumonias are per 1000 ventilator days
CLBSI = Central line blood stream infections are per 1000 line days
LOS = Risk adjusted length of stay
Mortality = Risk adjusted mortality

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Healthy Work Environments and Staff Nurse Retention: The Relationship Between Communication, Collaboration and Leadership in the Pediatric Intensive Care Unit

ABSTRACT

Background: A healthy work environment (HWE) can improve patient outcomes and Registered Nurse (RN) turnover. Creating cultures of retention and fostering HWEs are two major challenges facing nurse leaders today and little is known about HWEs from the unit perspective in Pediatric Intensive Care Units (PICU).

Specific Aims: Examine the effects of the HWE (communication, collaboration, and leadership) on RN turnover from data collected from a research study on the effect of a HWE on nurse and patient outcomes.

Methods: Descriptive, cross-sectional, correlational design. Pediatric critical care RNs from ten Pediatric Intensive Care Units (PICU) in ten different hospitals completed the Practice Environment Scale of the Nursing Work Index Revised (PES-NWIR) and a subscale of the Intensive Care Unit Nurse Physician Questionnaire. In addition, these bedside staff nurses were asked if they intend to leave their current job in the next six months. Statistical analysis included correlations, multiple linear regression, t-tests (two-tailed) and one way analysis of variance (ANOVA). Donabedian's conceptual framework was used.

Results: 415 RNs completed the survey and all 10 PICUs submitted hospital data. RN's were mostly female (94%), Caucasian (95%), with a bachelor's degree (75 %), and 1-10 years as a PICU RN (70%). There was a statistically significant relationship between leadership and the outcome variable intent to leave (ITL) ($p<.05$). None of the communication variables: timely, open, accurate communications between RNs and among RNs and MDs or collaboration were significantly associated with PICU nurses' ITL. There was also an inverse relationship between

years of experience and ITL. **Conclusion:** Effective leadership in the PICU is important to PICU RNs and significantly influences their decisions about staying in their current job. To reduce turnover and decrease hospital costs at the unit level strong leadership and leadership development needs to be supported.

Background

Healthy work environments (HWE) have been associated with positive patient and nurse outcomes (Heath, Johanson & Blake, 2004; Kramer & Schmalenberg, 2007; Kramer & Schmalenberg, 2008). Creating cultures of retention and fostering HWEs are two major challenges facing nurse leaders today (Kramer, Halfer, Maguire & Schmalenberg, 2012). In the Institute of Medicine's (IOM) report, *Keeping Patients Safe: Transforming the Work Environment of Nurses*, concerns about organizational practices, work design, and organizational culture were identified (IOM, 2004). Recommendations to improve these problems included evidence-based staffing standards, the creation of interdisciplinary teams, and the establishment of visible and responsive nursing leadership (IOM, 2004).

One reason Registered Nurses (RN) leave their current position is to find better leadership (Ritter, 2010). Historically, about 10 – 30% of new graduate RNs have left their current positions within the first two years (Larrabee, Janney, Ostrow, Withrow, Hobbs & Burant, 2003). Research on organizational climate and intent to leave (ITL) among RNs showed that 17% of the critical care RNs sampled intended to leave their jobs within one year (Stone, Larson, Mooney-Kane, Smolowitz, Lin et al., 2009). Problems in the work environment are associated with retention issues. In addition, many studies have demonstrated a relationship between the work environment and medical errors (Aiken, Clarke, Sloane, Lake & Cheney, 2008; Boyle, 2004; Flynn, Liang, Dickson & Aiken, 2010; Friese, 2005; the Joint Commission,

2002; Knaus, Draper, Wagner & Zimmerman, 1986; Kramer, Macguire & Brewer, 2011; Stone, Mooney-Kane, Larson, Pastor, Zwanzinger & Dick, 2007).

Communication and collaboration have been associated with nurses' attachment to their organization and improving nurse retention (Apker, Propp & Ford, 2009; Manojlovich, 2005; Aiken, Clarke, Sloane, Lake & Cheney, 2008; Schmalenberg, Kramer, King, Kingman, Lund et al., 2005). For RNs, working in a hospital with a better practice environment has been found to be associated with significantly lower odds of developing burnout, job dissatisfaction, and the intention to leave (Aiken, Sloane, Clarke, Poghosyan, Cho et al., 2011). With an expected shortage between now and 2025 of over 260,000 RNs, it is important to understand the relationship between HWEs, specifically communication, collaboration and leadership, in order to improve retention (Buerhaus, Auerbach & Staiger, 2009). The shortage is expected to be twice as large as any other shortage seen in the United States in the past since the early 1960s. Nurses with Pediatric Intensive Care (PICU) experience are hard to find and hospitals are aggressively recruiting nurses away from each other. One study, done in 2000, estimated the cost to replace a registered nurse (RN) was $42,000 for a medical surgical nurse and $64,000 for a critical care nurse (Kerfoot, 2000). Those costs have increased significantly since that time. Recruiting costs and agency staffing that result from turnover are costly to hospitals. In addition to increased costs, shortages at the unit level and higher nurse to patient ratios have been associated with poor patient outcomes and adverse events (Needleman, Buerhaus, Pankratz, Leibson, Stevens & Harris, 2011; Aiken, Clarke, Sloane, Lake & Cheney, 2008; Blegen, Goode, Spetz, Vaughn & Park, 2011). Therefore, it is important for nurse leaders to manage retention of nurses in specialty areas such as pediatric intensive care and decrease nurse turnover in PICUs. A better understanding is needed of the relationship between communication, collaboration and

leadership in PICUs and intent to leave (ITL) among pediatric intensive care RNs. The purpose of this article is to present findings from an analysis of communication, collaboration, and leadership on ITL that was part of a larger research study of factors influencing the work environment of PICU nurses (Blake, Leach, Pike, Robbins, & Needleman, 2012).

Conceptual Framework

The conceptual framework for this study was Donabedian's Structure, Process, Outcome model (Donabedian, 1980). This is a linear model that assumes structure effects process and process effects outcomes (Mitchelle, Ferketich & Jennings, 1998). A diagram of how this model was applied in this study is shown in Figure 1. This model has been used to assess health care systems for over four decades (Schmalenberg & Kramer, 2008). Kramer, Schmalenberg and Maguire (2010) used Donabedian's model in their research on the work environment of nurses in Magnet hospitals and the impact on patient outcomes. Accordingly, it is practical model for analyzing current conditions of the work environment and in developing strategies to improve the work environments in hospitals today (Kramer, Schmalenberg, & Maguire, 2010).

The structures in the health care system are the characteristics of the providers and the physical and organizational setting (Donabedian, 1980). This includes the physical layout of the facility, the systems, programs, policies and characteristics of the nurses and how nursing care is organized in the hospital. The processes are the actual activities involved in delivering care that involve patients, nurses, and families. The outcomes are the impact on the patients and/or staff that result from care delivery structures and processes (Kramer, Schmalenberg & Maguire, 2010). In describing the components of this model, Schmalenberg et al. explained structure as – "having the right things"; process as – "doing the right things"; and outcomes as – "having the

right things happen" (Schmalenberg & Kramer, 2008, p. 65). All three need to be present in a HWE. This manuscript will only address nurse outcomes.

Healthy Work Environments

Healthy work environments are those settings in which a nurse is able to be productive and provide good quality care and the nurse also has job satisfaction. Disch was one of the first nurse leaders to use the term HWE. She defined a HWE as "a work setting in which policies, procedures, and systems are designed so that employees are able to meet organizational objectives and achieve personal satisfaction in their work environment" (Disch, 2002, p.3). The original Magnet hospital studies were done to look at the environments in which the work setting was reported as being good and structures and processes were in place with good patient outcomes and strong retention (McClure & Hinshaw, 2002). These hospitals were chosen from a poll done with Fellows in the Academy of Nursing who identified hospitals from their region that nurses considered a good place to work, where good quality care was given and turnover was low. Researchers found good outcomes in these hospitals and examined the organizational structures that supported those units. The "ingredients" for magnetism that they found were nursing administration/leadership, professional practice and professional development (McClure & Hinshaw, 2002). In addition to these items, the follow up studies on Magnet hospitals found empirical evidence for positive patient outcomes and nurse outcomes, as well as a supportive work environment for nurses (Brady-Schwartz, 2005; Cimiotti, Quinlan, Larson, Pastor, Lin & Stone, 2005; Kramer, Schmalenberg, Maguire, Brewer, Burke, Chmielewski et al., 2008; Lake & Friese, 2006). These Magnet environments were HWEs although not labeled as such at that time. In 2005, the American Association of Critical Care Nurses (AACN) published six standards that make up a HWE. The HWE standards are skilled communication, true

collaboration, effective decision making, authentic leadership, appropriate staffing and meaningful recognition (AACN, 2005). Prior to the publication of these HWE standards, Heath did a validation of the literature on what constitutes a HWE (Heath, Johanson & Blake, 2004). In that study, focus groups listed what they described could be found in a HWE. These characteristics of a HWE were collaborative relationships, caring practices, respect from colleagues, teamwork and "can do" attitudes, strong leadership with open communication and trust and where their contributions are valued (Heath, Johanson & Blake, 2004). Following their work to promote HWE standards and continuing their emphasis on nursing excellence, AACN established the Beacon award. The Beacon Award is a unit specific designation that is awarded by AACN to intensive care units that meet certain outcome criteria. An extensive application process and review of performance criteria at the unit level is required. The award is received because an ICU has improved outcomes and greater overall satisfaction for patients and nurses and demonstrates excellence.

With the development and emphasis on the standards for a HWE, communication, collaboration and leadership have been the focus of many studies surrounding the relationship between the nurses' work environment and nurses' intent to leave their jobs (Baernholdt & Mark, 2009; Cohen, Stuenkle & Quyen, 2009; Erenstein & McCaffery, 2007; O'Brien-Pallas, Griffin, Shamian, Buchan, Duffield et al., 2006; Hall, Doran & Pink, 2008; Propp & Ford, 2009; Baernholdt & Mark, 2009). Understanding what the front line staff nurse at the bedside perceives as a HWE is essential in order for HWEs to be realized.

Communication

Because patients in the PICU are critically ill, the complexity of their needs, the type of treatments that are used, and the stress to the families adds additional challenges to

communication among the healthcare team caring for these patients. It is important that team communication between nurses and physicians be timely and accurate (Shortell, Zimmerman, Rousseau, Gillies, Wagner, et al., 1994). Numerous studies have linked job satisfaction and intent to leave with the quality of communication in the work environment (Apker, Propp & Ford, 2009; Manojlovich, 2005; Aiken, Clarke, Sloane, Lake & Cheney, 2008; Schmalenberg, Kramer, King, Kingman, Lund et al., 2005). Research findings showed that nurses were less likely to leave a job if they felt that there was good communication between the team (Apker et al., 2009). Another study suggested that nurses' ITL was related to the leader's style of communication (Cummings, Midodzi, Wong & Estabrooks, 2010).

Several studies indicate that nurses and physicians communicate differently (Disch, 2001; Greenfield, 1999; Manijlovich & DiCiccio, 2007; Schmitt, 2001) In fact, nurses are frequently less satisfied with communication and interactions with physicians. The reasons for this include verbal abuse, lack of respect or lack of teamwork. Other studies have shown a relationship between poor communication and poor patient outcomes (Baggs, Schmitt, Mushlin, Michelle, Eldridge et al., 1999; Evans & Carlson, 1992; Manojlovich, Antonakos & Ronis, 2009; Manojlovich & DiCiccio, 2007; Rosenstein, 2002; Rosenstein & O'Daniel, 2005). This reinforces the need for nurse leaders to improve the work environment in the PICU.

Collaboration

There are numerous studies in which nurses have reported poor collaboration which have resulted in increased patient morbidity and mortality and nurse turnover (Knaus et al, 1986; Baggs et al., 1999; Rosenstein, 2002: Propp, Apker, Ford, Wallace, Serbenski & Hofmeister, 2010; Erickson, Hamilton, Jones & Ditomassi, 2003; Foley, Kee, Minick, Harvey & Jennings, 2002; Miller, 2001). The IOM report (2004) recommended that collaboration be improved

(IOM, 2004). Collaboration is a process in which health care professionals employ joint decision-making and communication (Colluccio & McGuire, 1983). Attributes of collaboration include trust, mutual respect, knowledge, good communication, shared responsibility and cooperation (Arcangelo, Fitzgeraldd, Carroll & David, 1996). Collaboration between RN-MD is a process to care for the needs of the patient and respect the unique abilities of each other as members of a larger multidisciplinary team. Collaboration must be in place at all times in a HWE. RN-MD collaboration has been shown to impact retention and ITL among nurses (Baggs et al., 1999; Miller, 2001; Erickson, Hamilton, Jones & Ditomaso, 2003; Foley, Kee, Minick, Harvey & Jennings, 2002; Rosenstein 2002). In a large, multisite study in 42 ICUs across the U.S. and Canada, collaboration among caregivers in the ICU was significantly associated with lower nurse turnover (Shortell et al., 1994).

Leadership

Leadership is one of the main factors that helps reduce turnover and ITL among nurses in acute care hospitals. Numerous studies have linked leadership styles (Raup, 2008; McNeese-Smith, 1997; Leach, 2005; Avolio, Walumbwa & Weber, 2009; Wong, Spence Laschinger & Cummings, 2010) and participative governance (McGillis Hall, Doran & Pink, 2008; Kramer, Maguire & Brewer, 2011; Krairiksh & Anthony, 2001) to the desired outcomes of nurse satisfaction, commitment and retention. In order to be effective, the nurse leader needs to champion the core values associated with leadership and demonstrate the leadership behaviors (Schmalenberg et al., 2005). Wong et al., found that authentic leadership is truly a guide to help build HWEs (Wong, Spence Laschinger & Cummings, 2010).

Research has revealed that the nurse manager's leadership was important for retention and quality in the unit because the nurse leaders values and influence on the groups achievement

of the unit's goals (Anthony, Standing, Glick, Duffy, Paschal et al., 2005). A systematic review of the literature on leadership showed strong positive relationships between relational leadership practices, such as transformational leadership and staff nurses' intent to stay (Cowden, Cummings and Profetto-McGrath, 2011).

Intent to Leave

Intent to leave is the strongest predictor of actual turnover. Studies that have looked specifically at ITL have shown a relationship between nurses' stating their ITL and their actual leaving/exit from their positions (Apker, Propp & Ford, 2009). Scientists studying social behavior have identified that intentions are the most immediate determinants of actual behavior (Ajzen & Fishbein, 1980; Alam & Mohammad, 2010; Lin, Chiang & Chen, 2011). Findings from one study showed that nurses who intended to stay found their work environment far more favorable that those that ITL (Lin, Chiang & Chen, 2011). Intention to leave has been defined as the employee's plan to quit their present job in the near future (Coomber & Barriball, 2007). There are numerous studies that support the work environment as the predominant factor that impacts a nurses' decision to leave their current job (Liu, Chiang, & Chen, 2011; Baernholdt, & Mark, 2009; Stone, Mooney-Kane, Larson, Pastor, Zwanziger et al., 2006; Aiken, Clarke, Sloane, Sochalski & Silbur, 2002). Intent to leave has not been studied in the PICU. Pediatric intensive care units are stressful environments where nurses provide highly technical care for some of the most fragile children. Patients in the PICU range in age from newborn to young adult. Because physiological assessment parameters are significantly different in these age groups, additional competencies are needed by RNs to practice in this specialized area of critical care nursing. Critically ill pediatric patients have multiple diagnoses and their acuity can require one-to-one nursing care. Accordingly, training programs for RNs in specialty units is very

extensive. When a PICU nurse leaves, not only is it costly to the hospital but it is also very difficult to fill the open position with a pediatric critical care RN with similar experience. To maximize retention of PICU RNs, it is critical to know the factors that contribute to PICU nurses' ITL.

Methods

A cross-sectional, correlational design was used. Nurses completed a survey questionnaire regarding their perceptions of communication, collaboration and leadership in their current work environment and their ITL their current position.

Setting

Ten PICUs from different parts of the country participated in this study. Requests for participation went out to thirty-five PICUs across the United States. Twenty-eight agreed to participate, but eighteen did not meet criteria. To reduce variation across units unrelated to study goals that might affect the outcomes, units asked to participate in the study were restricted to those with more than ten beds and pediatric critical care medicine fellowship programs. Only ten units met the criteria and could complete the IRB approval process within the time period that was necessary. Institutional Review Board (IRB) application was completed for UCLA and expedited reviews were completed for the six units that required IRB approval.

Population and Sample

A convenience sample of the PICU RNs who worked in the study units for more than six months was used. A power analysis was done to determine the sample size. With an effect size set at 0.3, power at 0.8 and an alpha of .05, a total of 352 RNs were needed with at least 35 RNs from each unit.

Instruments and Measures

The Practice Environment Scale of the Nursing Work Index Revised (PES-NWIR) was used to measure the nurse practice environment. The PES-NWIR was developed by Lake from the Nursing Work Index (NWI) that Kramer and Hafner (1989) created from their work in measuring Magnet environments which was later updated by Aiken and Patrician (NWIR) (Lake, 2002). The PES-NWIR is a 31 item instrument used to measure the practice environment (Lake, 2002). The scale has 5 domains. They are nurse participation in hospital affairs, nursing foundations for quality care, nurse manager ability, leadership and support of nurses, staffing and resource adequacy, and collegial nurse-physician relations (Lake, 2002). It is a parsimonious tool that is brief and takes about 15 minutes to complete using a 4 point likert scale (1 = strongly agree, 4 = strongly disagree). The mean scores for each subscale are figured with a high score being favorable and correlating with a HWE.

The PES-NWIR was selected as a Nursing Performance Measure by the National Quality Forum (NQF) in 2004. It has been validated in many populations of nurses and settings, including oncology, medical surgical, and dialysis units (Lake, 2007). In 2006, the National Database of Nursing Quality Indicators (NDNQI) began to offer it as part of the nurses' annual satisfaction survey (NDNQI, 2006). The reported Cronbach's alpha ranges from .80 to .96 (Lake, 2002; Liu & Cheng, 2009; Hanrahan, 2007). The Cronbach's alpha from this study yielded the same results.

ICU Nurse-Physician Communication Tool is a questionnaire used to measure five domains of communication in the ICU. These include: within-group communication openness (RN-RN), between-group communication openness (RN-MD), within-group communication accuracy (RN-RN), between-group communication accuracy (RN-MD) and communication

timeliness. Only 22 questions that are directly related to communication were used from this tool. These questions measured RN-RN and RN-MD communication. The ICU Nurse-Physician Communication questionnaire had both consistency and reliability when measured among staff in ICU and hospital emergency departments (ED) (Dougherty & Larson, 2005; Shortell, Rousseau, Gillies, Devers & Simons, 1991). Reliability and validity have been demonstrated among intensive care unit physicians and nurses and in other populations of nurses and physicians (Shortell, 1991; Boyle, 2007; Dougherty & Larson, 2005; Hansen, Biros, Delaney & Shug, 1999). All but one of the scales, communication timeliness, indicated a good to high reliability using Cronbach's alpha of 0.7 as the accepted cut-off (Shortell et al., 1991). Communication timeliness was at 0.6. The Cronbach's alpha results from this study were above 0.8 in all domains.

Demographic data were collected from RN participants. These demographic variables included were age, sex, education, experience in nursing, experience in pediatric intensive care nursing, as well as their intent to leave their organization.

Hospital and unit specific data were obtained. Information regarding the nursing leadership structure, the medical leadership, the physician staffing and availability, type of hospital (Pediatric versus non-Pediatric, Magnet versus non-Magnet) Beacon versus non-Beacon unit, union representation, patient days, ownership of the hospital, and nursing hours per patient day (HPPD) for each unit were collected. The manager of the participating units provided this data.

Nurses' intent to leave was measured by one question in the demographic portion of the questionnaire. The question was, "Do you intend to leave your job in the next six months?"

Procedures/Data Collection

Prior to contacting eligible PICUs to participate, the UCLA Institutional Review Board (IRB) approved the study. Packets were mailed to nurse managers from the different children's hospitals across the country and they were approached to participate in this study. If they agreed and met the study inclusion criteria, the IRB at the hospital was contacted to determine if submission was necessary. The process took anywhere from one to six months to get approval. Once approval was completed, nurses were recruited via email from the principle investigator. A small token was offered for completing the surveys in the form of a Starbuck's gift card. The surveys were accessed via the internet and the entire questionnaire was completed on line. Data was collected regarding the patient outcomes for the previous quarter for each of the study units. This was an attempt to get closely matched data regarding the patient and nurse outcomes and the work environment. Questionnaires were anonymous and confidentiality was maintained. A coding system was used to de-identify the participating hospitals.

Statistical Analysis

SPSS 17.0 was used to perform the statistical analysis. Descriptive statistics (mean plus or minus the SE and median and interquartile ranges for the variables). The frequencies and percentages of responses from sites to the post-trial survey were quantitatively provided by Survey Monkey (SurveyMonkey.com, Limited Liability Company, Palo Alto, California). Correlations to examine the relationships of the communication, collaboration and leadership and the nurses intent to leave were analyzed. Multiple regression and one way analysis of variance (ANOVA) was used to estimate models when significant correlations were found. The significance level for this study was 0.05. Collinearity diagnostics were also run for

the dependent variable. Reliability statistics (Cronbach's alpha) were performed for the tools used.

Results

A total of 415 completed surveys were obtained. This was an overall response rate of 47% which was good. The largest numbers of participants were female (94%). The group was not very ethnically diverse with the majority of the participants being Caucasian (88%) and non-Hispanic (95%). The majorities of participants had a BSN (75%) and were full time employees (82%). Almost half of the sample was certified (46%) either in pediatrics or critical care. Years in their current position ranged from six months to 40 years, most of them having less than ten years of experience (80%). Overall, the years of experience of the RNs ranged from six months to 45 years, with the majority having less than ten years of experience (65%). The demographic data is shown in Table 1.

All of the PICUs in the sample were in freestanding children's hospitals affiliated with academic medical schools and they all had PICU fellowship programs. Eight out of ten of the hospitals had ANCC Magnet designation with three PICUs also having Beacon designation. The nursing hours per patient day (HPPD) ranged from 19.2 to 22.85. The patient days in 2011 for these units ranged from 2,000 to 15, 720. In six of those units, the managers supervised only that unit whereas four of the units shared a manager with another unit. Nurses were represented by a union in four of the units. Nurse practitioners were part of the care delivery team in eight out of the ten units. See Table 2.

The scores for intent to leave were from 1 – 2 with a score of 1 being that they intend to stay in their current position and a score of 2 would be leaving their current position for another one. The mean score was a 1.37 indicating most of them wanted to stay in their current position.

The overall mean score for collaboration was 3.30 on a 4 point scale with the majority of the nurses scoring their units high on collaboration. The mean score for leadership was 2.98 on a 4 point scale. The mean scores for communication ranged from 3.26 – 4.11 on a 5 point scale. See Table 3.

Correlations for the main variables intent to leave, communication, collaboration and leadership as well as the demographic variables of the nurses and the unit and hospital variables were determined. The Pearson Correlations for these variables are shown in Table 4. Although there was a statistically significant correlation between collaboration and open communication between groups (RN-MD) (.709), no multicollinearity was found when collinearity diagnostics were run. To check for non-independence of the variables used for the dependent and predictor, the nesting effect of the individual nurse, intraclass correlations were performed. Correlations were .129 to.488 reflecting some association but showing independence.

Findings show a statistically significant relationship between leadership and the outcome ITL but not any of the other predictor variables. None of the communication variables: Timely, open, and accurate communication between RNs and among RNs and MDs were significantly associated with PICU nurses' ITL. Nor was collaboration significant to PICU nurses' ITL. However, years of experience as an RN had a statistically significant inverse relationship ($p<.01$) with ITL. No other RN characteristics were associated with ITL. The hospital variables HPPD, Magnet, union and whether the manager is responsible for more than one unit showed no statistically significant association with ITL among the pediatric critical care nurses in this sample.

Multiple regression models were run to learn more about the relationship between predictor variables (communication, collaboration and leadership) and the outcome or dependent

variable ITL. Several models were tested and two of the models were significant at the 0.05 level established for this study. While two of these models were significant, none of the models could account for more than 7% of the variability in ITL (See Table 5).

The models were first performed with the predictor variables collaboration, leadership and the five domains of communication. (See Model 1 in Table 5). Because the percentage of variability (R2=.029) was so low and the model was not statistically significant, different predictor variables were included for the second regression.

Model 2 tested the relationship between leadership, communication timeliness, communication accuracy between RN-RN and between RN-MD, communication openness between RN-RN and between RN-MD, and nurses' ITL. This model was also not statistically significant at the .05 level (p =.116). Additional models were run that were not included in Table 4 with different variables for the different domains of communication. They too were not statistically significant at the .05 level. Because the first two models were not significant with the main independent variables, demographic and unit variables were included in the next two models.

Model 3 included years of experience, leadership and communication timeliness. This model was statistically significant (p<.01), but had an R2 =.034 that only predicts 3% of the model change which is very low. Additional models were run to find a model that could explain greater than 10% of the variance but no models met this level of prediction. There could be other predictors that were not measured in this study that could explain the variance including commitment to the organization, recognition, identity, and pay.

Model 4 tested the relationship between communication, collaboration, leadership, years of experience, highest level of education, age as well as Magnet designation, HPPD and

managerial supervisory responsibility for more than one unit. This model was statistically significant ($p<.05$) with an adjusted R2 value of .069 indicating that only 7 % (R= .069) of the variance in ITL was predicted by all of these variables combined. This model revealed an inverse relationship between leadership and nurses' intent to leave demonstrating that the stronger the leadership presence and perceived leadership support nurses reported, the lower their ITL. As the variables of communication timeliness, communication openness between RN-MD, communication accuracy between RN-RN, HPPD and age went up, the ITL score went down. Unfortunately, only two models were significant, but none of them were strong enough to predict the relationships between the independent variables and the dependent variable ITL. Collinearity diagnostics were run for the dependent variable ITL that showed multicollinearity was not present.

Limitations of the Study

There are a number of limitations to this study. First it is a cross-sectional, descriptive design. Although the sample was representative of RN population, the demographics variables are similar with the majority of the nurses being female and Caucasian which may influence the findings relative to communication and perceived leadership support. Because the sample was from only ten PICUs, there is an increased risk of a Type II error (failure to find significant relationships). The dependent variable and predictor variables (i.e. Magnet, HPPD, and manager supervisor responsibility for more than one unit) were used for each nurse on a unit. This creates a clustering or hierarchy and that could have potentially created non-independent observations in the regression analysis, although intraclass correlations indicated independence. However, sample bias might be present as nurses that are more satisfied with their job may have been more likely to participate.

Discussion

Nursing leadership was found as the most important factor related to low ITL and turnover in PICU nurses. Study findings support results reported in several other studies (Larrabee, Janney, Ostrom, Withrow, Hobbs et al., 2003; Raup, 2008; Gunnarsdottir, Clarke, Rafferty & Nutbeam, 2009). Leadership is critical in optimizing the work environment and increasing retention for the PICU nurses. Because hospital structures are so complex and the care delivery processes are important for safe, effective and efficient care, good leadership is necessary to optimize the work environment for the bedside RN. Support from unit level nurse managers has a strong association with job satisfaction (Aiken et al., 2002; McNeese Smith, 1999; Upenieks, 2002) which when combined with good communication and collaboration, increases patient safety and improves nurse and patient outcomes. It is important that nurses have access to their nurse leaders and that hospitals work to decrease the number of units one nurse manager oversees. Supportive relationships which empower frontline nurses may enhance their ability to provide safe patient care and decrease turnover (Gunnarsdottir, Clarke, Rafferty & Nutbeam, 2006; Ritter, 2011; Anthony et al., 2005; Duffield et al., 2011).

In another analysis, when communication, collaboration and leadership were present, significant associations with better patient outcomes were found (Cite this study). Although communication, collaboration and leadership were not predictive of ITL among PICU RNs, they are important in creating HWE. Communication has been found to be important in nurse manager's engagement with their staff. The nurse manager's leadership and communication contribute in a vital way to HWEs. Nurses don't leave organizations, they leave their managers (Espinoza, Lopez-Saldana and Stonestreet, 2009). Managers that feel supported by organizations, in turn, support their staff.

Many nurse managers are responsible for supervising more than one unit (Shirey & Fisher, 2008). The number of direct reports for managers in that study was 71 which are too many employees to manage to provide good leadership (Ritter, 2010). In this study, four of the units had managers that supervised other units. There were no significant findings though regarding PICU nurse managers supervising more than one unit or not and ITL. Study findings did show a strong relationship between nursing leadership and nurses' ITL. With the complexity in the PICU, it is essential to have strong leadership that is visible and available to the staff. Therefore, it is vital to decrease the nurse manager's workload in the PICU to maximize the effectiveness of their leadership and enable them to spend more time with frontline nursing staff.

A second finding in this study was the more years of experience the nurses had, the less likely they would be to leave their current job. As nurses' seniority increased, their intention to leave was significantly lower. Pediatric ICU nurses in this study are modeling what has been found to be the case among many employees in other industries and consistent with findings in other studies (McGillis, Doran & Pink, 2008). When employees are younger and less experienced, they tend to be more mobile and more apt to switch jobs than more experienced employees.

While communication and collaboration are important in creating HWE, they were not as important in decreasing turnover in this study. Communication accuracy between RNs showed an inverse relationship with ITL in the regression models but it was not significantly related. This could have been because the overall mean scores were high in these areas (3.26 out of 5). The highest communication score mean was in communication openness between RNs (4.11 out of 5). Although it was expected that both communication and collaboration would influence ITL, this was not the case.

Conclusion

Findings from this study indicate that effective nursing leadership is important to PICU RNs and significantly influences their decisions about staying in their current job. This underscores the important role that the critical care nurse manager has in fostering retention of pediatric critical care RNs and contributing to the quality of the work environment in ICUs. The leadership abilities of the ICU nurse manager are particularly valuable not only because of the expected, serious shortage of health care professionals, particularly those in specialty, high-technology areas but also because effective nurse leaders who produce high retention save their hospitals thousands of dollars in recruitment and replacement costs.

One can not discount the role of authentic leadership at the unit level. It is important that hospitals provide leadership training for first line nurse managers so they can support the work of front line staff at the bedside. Further research is needed to find out from RNs what they value in their leaders that keep them in their job. To decrease turnover and ultimately decrease hospital costs related to new employee orientation, training and use of temporary staff, a continued focus on building and supporting strong leadership at the unit level in hospitals is needed.

Research that further explores how the leadership behavior of nurse managers directly impacts retention/ITL and to what extent leadership development for these nurse managers can improve their relationships as leaders with RN staff is recommended. Future research is needed to determine if there are other variables that weren't studied that could be accounting for the variance, including pay, benefits, commitment to the organization and recognition. The results of this study are useful to hospital administrators working to decrease turnover and are particularly useful to chief nurse executives and nurse managers of PICU so that they can focus their efforts

on what matters to frontline nurses and use empirical evidence to support their decisions in doing so.

Figure 1. Conceptual Framework of structures, processes and outcomes for a Healthy Work Environment components communication, collaboration and leadership

*Adapted from Donabedian's Structure-Process-Outcome of Quality of Care Model

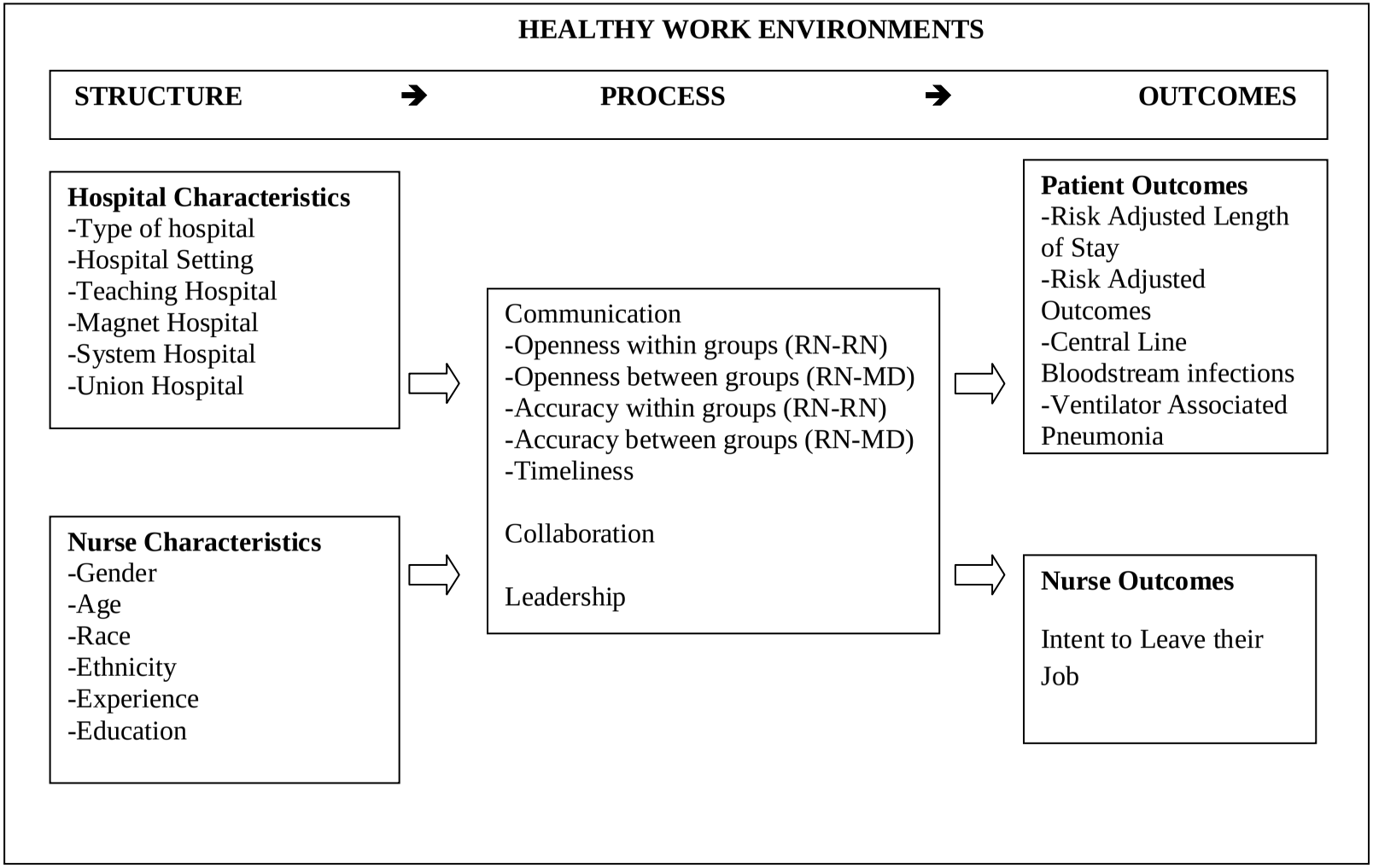

Table 1: Participant Demographic Variables

Variable		Number	Percentage
Sex	--Male	25	6
	--Female	390	94
Race	--American Indian/Alaskan Native	5	1
	--Asian	36	9
	--Hawaiian/Pacific Islander	4	1
	--Black/African American	7	2
	--Caucasian/White	363	87
Ethnicity	--Hispanic/Latino	20	5
	--Non-Hispanic or Latino	395	95
Education	--Diploma	19	5
	--Associate's Degree	71	17
	--Bachelor's Degree	311	75
	--Master's Degree	13	3
	--Doctorate	1	<1
Highest Education	--Diploma	11	3
	--Associate's Degree	35	8
	--Bachelor's Degree	322	78
	--Master's Degree	46	11
	--Doctorate Degree	1	<1
Certification	--Yes	192	46
	--No	223	54
Current Status	--Full Time	339	82
	--Part Time	60	14
	--Per Diem	16	4
Age in Years*	--23-30	144	41
	--31-40	102	29
	--41-50	65	18
	--51-60	37	10
	--61+	6	2
Years as RN	--1-10	270	65
	--11-20	66	16
	--21-30	58	14
	--31-40	20	5
	--40+	1	<1
Years as PICU RN	--1-10	292	70
	--11-20	64	15
	--21-30	50	12
	--31-40	9	3
Years in current position	--0-10	332	80
	--11-20	44	11
	--21-30	34	8
	--31-40	5	1

* One unit did not allow collection of age

Table 2: Characteristics among hospitals of PICUs sampled

Hospital	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Children's Hospital	X	X	X	X	X	X	X	X	X	X
Academic Medical Center	X	X	X	X	X	X	X	X	X	X
MD Fellowship	X	X	X	X	X	X	X	X	X	X
Magnet	X	X	X	X	X	X	-	X	-	X
Beacon	X	-	-	-	X	X	-	-	-	-
Union	-	-	X	X	-	-	X	-	X	-
Manager Supervises only this unit	X	X	-	-	X	X	-	X	-	X
CNS	X	X	X	X	X	-	X	X	X	X
Nurse Practitioner	X	X	-	-	X	X	X	X	X	X
Patient Days 2011	6240	5065	4513	4031	2000	9892	5354	8319	15750	3010
Nursing hours per patient day	19.2	21.0	19.90	22.85	21.38	21.00	20.83	20.00	22.60	19.32

Table 3: Summary Statistics for Predictor Variables

Variable or Outcome	Mean (SD)	Range	Possible Range
Intent to Leave	1.37 (0.96)	1 - 5	1-5
Leadership (From PES-NWI)	2.98 (0.59)	1 - 4	1-4
Collaboration (From PES-NWI)	3.30 (0.49)	1 - 4	1-4
Shortell's Communication Scales			
-Within Group Openness (RN-RN)	4.11 (0.63)	1.75 - 5	1-5
-Between Group Openness (RN-MD)	3.98 (0.65)	1.75 - 5	1-5
-Within Group Accuracy (RN-RN)	3.26 (0.70)	1.50 - 5	1-5
-Between Group Accuracy (RN-MD)	3.60 (0.71)	1.67 - 5	1-5
-Communication Timeliness	3.99 (0.49)	2.25 - 5	1-5

Table 3: Pearson Correlation Among Predictor Variables and Nurse Outcomes

	1	2	3	4	5	6	7	8	9	10	11	12	13
1													
2	.475[a]	-											
3	.479[a]	.512[a]	-										
4	.355[a]	.709[a]	.540[a]	-									
5	.232[a]	.234[a]	.280[a]	.190[a]	-								
6	.239[a]	.402[a]	.275[a]	.410[a]	.436[a]	-							
7	.366[a]	.466[a]	.495[a]	.533[a]	.276[a]	.419[a]	-						
8	-.117[b]	.002	.004	-.009	-.062	.010	-.050	-					
9	-.016	-.038	-.116[b]	-.031	-.063	.027	.035	-.134[a]	-				
10	.017	-.010	.118[b]	.033	-.001	-.082	-.054	.096	-.203[a]	-			
11	-.263[a]	-.144[a]	-.177[a]	-.144[a]	-.080	-.046	-.076	-.004	.128[a]	-.071	-		
12	-.274[a]	-.254[a]	-.314[a]	-.273[a]	-.129[a]	-.212[a]	-.264[a]	-.003	-.019	-.002	.0391[a]	-	
13	.109[b]	.306[a]	.143[a]	.219[a]	.068	.187[a]	.208[a]	-.029	-.061	.021	-.239[a]	-.502[a]	-
14	-.022	-.025	.018	-.031	-.028	-.028	-.056	.018	.093	-.041	.578[a]	.058	.399[a]

[a] Correlation is significant at the 0.01 level (two-tailed)

[b] Correlation is significant at the 0.05 level (two-tailed)

Variable:

1. Leadership
2. Collaboration
3. Communication Openness within groups (RN-RN)
4. Communication Openness between groups (RN-MD)
5. Communication Accuracy within groups (RN-RN)
6. Communication Accuracy between groups (RN-MD)
7. Communication Timeliness
8. Intent to Leave
9. Years of experience as an RN
10. Highest Education Level
11. HPPD
12. Magnet
13. Union
14. Manager manages more than one unit

Table 5: Multiple Regression Models Intent to Leave

	Outcome											
	Model 1			**Model 2**			**Model 3****			**Model 4 ****		
Variable	**Coef**	**SE**	**t**	**Coef**	**SE**	**t**	**Coef**	**SE**	**t**	**Coef**	**SE**	**t**
Comm-Timeliness	-0.118	0.127	-0.93	-0.115	0.127	-0.91	-0.002	0.105	0.99	-0.053	0.135	-0.39
Comm-Accuracy BG	0.086	0.084	1.03	0.097	0.083	1.16				0.14	0.09	1.56
Comm-Accuracy WG	-0.103	0.079	-1.29	-0.101	0.079	-1.27				-0.116	0.081	-1.42
Comm-Openness BG	-0.062	0.116	-0.54	0.006	0.099	0.06				-0.111	0.124	0.89
Comm-OpennessWG	0.145	0.102	1.43	0.156	0.101	1.54				0.071	0.109	0.65
Collaboration	0.168	0.153	1.10							0.222	0.164	0.07
Leadership	**-0.270**	**0.447**	**-2.72**	**-0.241**	**0.096**	**-0.25**	**-0.196**	**0.088**	**-0.24**	**-0.287**	**0.108**	**-2.65**
Magnet										0.009	0.145	0.06
HPPD										-0.042	0.061	-0.68
Yrs. of Experience							**-0.014**	**0.005**	**-2.87**	0.014	0.012	1.231
Highest Education										0.126	0.1	1.26
Manager one unit										0.122	0.127	0.96
Age										**-0.027**	**0.011**	**-2.52**
R-square	0.029			0.026								

** p<0.05
Shaded: significant association in predicted direction

HPPD = Hours per patient day
Yrs. of Experience = Total years of nursing experience
Manager one unit = Manager manages more than one unit

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APPENDICES

APPENDIX A

HOSPITAL SURVEY TOOLS

Healthy Work Environment Hospital Survey

(For specific data requested about the unit please use 2011)

Unit/Hospital Name: _____

Hospital Data

1. Type of Hospital: Free standing children's hospital 1
   Children's Hospital within an adult hospital 2

2. Hospital Setting: Urban 1
   Rural 2
   Suburban 3

3. Academic Medical Center: Yes 1
   No 2

4. Magnet Hospital: Yes 1
   No 2

5. Is the hospital one of a larger system: Yes 1
   No 2

6. Are the nurses represented by a union: Yes 1
   No 2

Unit Specific Data

7. Nursing Hours Per Patient Day (Direct Care only): _____

8. Do you staff by acuity or ratios: Acuity 1
   Ratios 2
   Both 3

9. Beacon unit: Yes 1
   No 2

10. Patient days in unit for calendar year 2010: _____

11. Does the nursing manager supervise: Only this unit 1
    More than one unit 2

12. Is there a CNS dedicated to the unit: Yes 1
    No 2

13. Is the PICU Fellowship program ACGME approved: Yes 1
No 2

14. Are attending physicians in house 24/7: Yes 1
No 2

15. Are there Nurse Practitioners in the unit: Yes 1
No 2

16. Percentage of nurses in the unit that are certified: _____

17. Please share any hospital or unit designation that is a nationally recognized designation:

_____

This information will remain confidential and your hospital will be coded with only the PI having access to the coding document. Once the study is complete you will receive a comparative chart with your results compared to the aggregate data of the other nine hospitals.

Healthy Work Environment Survey

Patient Outcome Data

Unit Name - _____

(Please provide information for the time period July 1, 2011 – September 30, 2011)

1. Risk Adjusted Length of Stay (Mean score for unit from PRISM Score):

   _____

2. Risk Adjusted Mortality (Mean score for unit from PRISM Score):

   _____

3. Ventilator Assisted Pneumonia (Previous 12 months):

   _____

4. Central Line Infections (Previous 12 months):

   _____

APPENDIX B

RECRUITMENT TOOLS

RN Questionnaire Survey:
A Research Study
You Are Invited To Participate!

The Relationship between the Nurses' Work Environment (Communication, Collaboration and Leadership) and Patient and Nurse Outcomes

- Spend about 20 minutes completing an anonymous questionnaire survey.
- Survey questions ask your opinion about your work environment which are specific to communication, collaboration and leadership.
- Who can participate? All RNs who have been in the ICU for 6 months or longer.
- Once the survey is completed, you are eligible to receive a $5 Starbucks gift card.
- If you are interested log on to https://www.surveymonkey.com/s/PICUnurse
- If you have any questions prior to completing the survey you can contact Nancy Blake, RN, MN, UCLA Doctoral Student.

Thank you,
Nancy Blake RN MN CCRN NEA-BC
UCLA Doctoral Student
nancyblake@ucla.edu

Microsoft.com, 2006

Nancy Blake RN MN CCRN NEA-BC
25720 Oak Leaf Court
Valencia, CA 91381
UCLA Doctoral Student

Dear ICU Nurse,

I am a fourth year doctoral student at the UCLA School of Nursing and I am writing to request your assistance in my dissertation research. I am studying the relationship between the nurses' work environment, looking specifically at communication, collaboration and leadership and patient outcomes and nurse outcomes. I have had an interest in this topic for some time as I have been the Director of Critical Care Services at Children's Hospital Los Angeles for over 15 years. I would like to collect data from at least ten, but not more than twenty hospitals. I am looking specifically at pediatric intensive care units that are in hospitals that also have cardiac intensive care units and have pediatric intensive care fellowship programs. As a nurse in the intensive care unit, you are being invited to participate in completing a short 20 minutes survey on the work environment. There will also be a demographic questionnaire for you to complete. The patient outcome data will be collected from the unit which is captured via the VPS database. The Risk Adjusted Length of Stay and the Risk Adjusted Outcome Score for the quarter ending September 2011 will be collected. The Central Line Infection Rate and Ventilator Assisted Pneumonia information for the previous twelve months will also be collected.

The primary point of contact for me at your facility will be your Nurse Manager in the ICU to get the word out to the nursing staff, but the survey will be completely anonymous and no one at your facility will see the individual questionnaires. I have received IRB approval at your facility if necessary and there will be no identifiable data collected with the questionnaire. At the completion of the survey you will be offered a $5 Starbuck's gift card. You will need to provide an email address for me to send that egift card, but you can provide any email address you would like for me to send it to. Your hospital's identity will be blinded and will only be known to the PI (Nancy Blake). Your hospital will get the aggregate results as they compare to results of the other hospitals, but the names of the other hospitals will not be disclosed. I hope to complete my data collection by the end of March and have the results of the study done by the end of May. The abstract of this study is also attached. If you agree to participate in this study, please log on to the internet at http://www.surveymonkey.com/s/PICUnurse and complete the survey. I appreciate your assistance in helping me complete my dissertation on the Relationship between the Work Environment and Patient and Nurse Outcomes. If you have any questions, feel free to email me at nancyblake@ucla.edu.

Sincerely,

Nancy Blake RN PhDc CCRN NEA-BC
UCLA Doctoral Student

University of California, Los Angeles

CONSENT TO PARTICIPATE IN RESEARCH

The Relationship between the Nurses' Work Environment (Communication, Collaboration and Leadership) and Patient and Nurse Outcomes

You are being asked to participate in a research study conducted by Nancy Blake, RN, MSN, Principal Investigator and doctoral student in the School of Nursing working with Dr. Linda Searle Leach, PhD, RN, NEA-BC faculty sponsor at the University of California, Los Angeles. You were selected as a possible participant in this study because your pediatric intensive care unit is one of the sites in this study. Your participation in this research is voluntary.

Why is this study being done?

The purpose of this research is to investigate the relationship between the nurses' work environment in pediatric intensive care units, patient outcomes and nurses' intent to leave their organization. The literature indicates that unhealthy work environments have a potentially negative impact on patient outcomes and nurse turnover. This type of study has not been done in pediatric intensive care units.

What will happen if I take part in this research study?

If you volunteer to participate in this study, you will be asked to complete a short on-line questionnaire that will be anonymous. This questionnaire will be completed via the internet on-line. You will be asked routine demographic questions and questions about your perspective of the work environment in your unit and your current job.

How long will I be in the research study?

Completing the questionnaire will take about a total of 20 minutes.

Are there any potential risks or discomforts that I can expect from this study?

There are no anticipated risks or discomforts associated with participating in the study. All hospital names will remain confidential and the data will be coded to maintain confidentiality of the hospital and unit names.

Are there any potential benefits if I participate?

You will not directly benefit from participation in this study, but your involvement will contribute to increased knowledge and understanding about the relationships between the work environment in the PICU and patient and nurse outcomes. Results from this research will be published and disseminated at professional nursing conferences to improve the work environment in pediatric intensive care units. This is the expected benefit to society.

Alternatives to participation

You may choose not to participate in this study.

Will I receive any payment if I participate in this study?

You will receive a $5 Starbucks gift card if you participate.

Will information about me and my participation be kept confidential?

Any information that is obtained in connection with this study and that can identify you will remain confidential. When you have completed the completed the questionnaire you will be asked to specify a name and address of an individual to receive the gift card. If you do not want to disclose your name, you can give the name of a family member or friend to receive it for you. There will be no means of identifying you via the internet survey process. Confidentiality of your unit will be maintained by means of coding the units by number and the Principal Investigator will have that coding information and it will be maintained in a locked cabinet in her office. The results for your unit will be reported back to the hospital, but your information will be kept confidential. The demographic data will be reported in aggregate in order to maintain confidentiality.

Withdrawal of participation by the investigator

The investigator may withdraw you from participating in this research if circumstances arise which warrant doing so. If you are not an RN or have not been an RN in your unit for 6 months or more, you will be excluded from the study. If you do not meet the criteria, you will not be able to move forward on the internet questionnaire.

What are my rights if I take part in this study?

You can choose whether or not you want to take part in this study. If you volunteer to be in this study and fill out the questionnaire, you may stop participating at any time without consequences of any kind. You are not waiving any of your legal rights if you choose to be in this research study.

Who can answer questions I might have about this study?

If you have any questions, comments or concerns about the research, you can contact the Principal Investigator, Nancy Blake at nancyblake@ucla.edu or the Faculty Sponsor, Linda Searle Leach at lleach@sonnet.ucla.edu.

If you wish to ask questions about your rights as a research participant or if you wish to voice any problems or concerns you may have about the study to someone other than the researchers, please call the Office of the Human Research Protection Program at (310) 825-7122 or write to Office of the Human Research Protection Program, UCLA, 11000 Kinross Avenue, Suite 102, Box 951694, Los Angeles, CA 90095-1694.

Protocol ID:IRB#10-000992 UCLA IRB Approved Approval Date: 10/21/2010 Through: 10/20/2011 Committee: South General IRB

SIGNATURE OF STUDY PARTICIPANT

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form. By checking the box below, you agree to participate in this study.

☐ I agree to participate in this study.

Protocol ID:IRB#10-000992 UCLA IRB Approved Approval Date: 10/21/2010 Through: 10/20/2011 Committee: South General IRB

APPENDIX C

SURVEY TOOLS

Demographic Questionnaire

1. What is your gender?	Male	1
	Female	2
2. What is your age?		____ Years
3. What is your race?	American Indian/Alaskan Native	1
	Asian	2
	Hawaiian/Pacific Islander	3
	Black or African American	4
	White/Caucasian	5
4. What is your ethnicity?	Hispanic or Latino	1
	Non-Hispanic or Latino	2
5. Years of experience as an RN?		_____Years
6. Years of experience as a PICU RN?		_____Years
7. Years of experience in your current position?		_____Years
8. What was your initial nursing education?	Diploma	1
	Associate's Degree	2
	Bachelor's Degree	3
	Master's Degree	4
	Doctorate Degree	5
9. What is your highest level of education?	Diploma	1
	Associate's Degree	2
	Bachelor's Degree	3
	Master's Degree	4
	Doctorate Degree	5
10. Do hold a certification in:	Critical Care Nursing	1
	Pediatric Nursing	2
	Both	3
	Other	4
	None	5
11. Current employment status?	Full-Time	1
	Part-Time	2
	Per Diem	3
12. Current Shift?	8 hour shifts	1
	12 hour shifts	2

13. What time of day do you work?	Day shift 8 – hours	1
	Evening shift 8 – hours	2
	Night shift 8 – hours	3
	Day shift 12 – hours	4
	Night shift 12 – hours	5

14. What are your job plans in the next 6 months?	Stay in current job	1
	Leave current job	2

Reasons for leaving:
-Get another position
-Maternity Leave/Medical Leave
-Retire

15. In the past 6 months have you worked overtime?	Yes	1
	No	2

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

Source: Eileen T. Lake. “Development of the Practice Environment Scale of the Nursing Work Index.” *Research in Nursing & Health*, May/June 2002; 25(3): 176-188.

THE ORGANIZATION AND MANAGEMENT OF INTENSIVE CARE UNITS

School of Public Health
University of California, Berkeley

Principal Investigator:	**Stephen M. Shortell, Ph. D.**
Senior Investigators:	**Denise M. Rousseau, Ph. D.** **Edward F. X. Hughes, M.D., M.P.H.**
Project Director:	**Robin R. Gillies, Ph. D.**

ICU Nurse Questionnaire
(Short Version)

INFORMATION FOR USERS OF THE ICU
NURSE-PHYSICIAN QUESTIONNAIRE

This instrument was developed for use in intensive care units. Information regarding the psychometric characteristics of the instrument in the National Study of Intensive Care Units is available in S. Shortell *et al*, "Organizational Assessment in Intensive Care Units (ICUs): Construct Development, Reliability, and Validity of the ICU Nurse-Physician Questionnaire," Medical Care, Volume 29, August 1991, pp 709-727. The scales developed from the items in this questionnaire are also detailed in the Medical Care article. The results of the study are reported in S. Shortell *et al*, "The Performance of Intensive Care Units: Does Good Management Make a Difference?" Medical Care, Volume 32:5, May 1995, pp 508-525.

Although originally designed for ICUs, we believe the questionnaire can be used in other hospital settings (units). However, use in other settings will require that the specified unit of interest be changed throughout the questionnaire. For example, "It is easy for me to talk openly with the nurses of this ICU" can be changed to "It is easy for me to talk openly with the nurses of this ER" for evaluating an emergency room or "It is easy for me to talk openly with the nurses who work with coronary artery bypass graft patients" for evaluating a coronary bypass patient critical pathway. We believe this can be done without jeopardizing the reliability and validity of the questionnaire, and subsequent use by other researchers seems to support this belief.

On the next page is the background information discussion from the questionnaire that may serve as a guide for your own set of instructions to potential respondents. Indicating how the respondent will benefit from the completion of the questionnaire is important for promoting response. We also found it useful to include a paragraph such as "Please Keep in Mind" to alleviate any concerns about the consequences of providing the information requested.

Overall, the questionnaire should take approximately 20 minutes to complete. You may want to add on a section requesting relevant background information (education, position, experience, full-time/part-time, shift, certification/specialties, sex, age, citizenship, etc.) on the respondent. You may also want to include a section for open-ended questions or comments.

If you wish to use the ICU Nurse-Physician Questionnaire, please send/fax a written request to Stephen M. Shortell, Ph.D., c/o Robin Gillies, using the contact information listed below. Formal permission will be quickly granted. There is no cost for use of the instrument for research purposes. In exchange for permission to use the questionnaire for research purposes, we request that it be cited in any publications and research materials that result from your research. The proper citation for use is: "Excerpted from The Organization and Management of Intensive Care Units. Copyright 1989, Shortell and Rousseau." Again, it is permissible to adapt the instruments to suit your specific situation. We do request, however, that you share your findings from the use of the instrument with us.

If you have any questions regarding the instruments, please contact Robin Gillies, Ph.D., at Health Policy and Management, School of Public Health, 140 Warren Hall, University of California, Berkeley, CA 94720-7360 (Tel: 510/643-8063; FAX: 510/643-8613**;** e-mail:gillies@uclink4.Berkeley.edu).

THE ORGANIZATION AND MANAGEMENT OF INTENSIVE CARE UNITS
NATIONAL STUDY BACKGROUND INFORMATION

Overall Purpose

The questionnaire you are being asked to complete is part of a nation-wide study of the organization, management, and performance of intensive care units. The purpose of this study is to examine the organization and management practices of ICUs and their relationship to patient severity adjusted outcomes. A long-term goal is to develop managerial and organizational guidelines that you and other hospitals can use to improve the quality of ICU care and reduce mortality. It is estimated that such improvements could save up to 10,000 lives a year.

Questionnaire Content

The questionnaires you have been given have been used successfully in many other organizational studies and have been extensively pre-tested. The questions are concerned with issues related to communication, coordination, conflict management, leadership, perceived unit team effectiveness, and related factors. Please keep in mind that questions pertaining to physicians refer to full and part-time salaried ICU physicians, house staff, and attending physicians who regularly admit to the ICU. We estimate that the questionnaire will take approximately 20 minutes to complete.

How You Benefit

Completion of these questions will be of direct benefit to you in two ways. First, we will provide you with specific feedback (in aggregate) on your unit's score on each of the measures of interest. Second, we will provide you with a comparison of your unit's score with that of the other hospitals in the study. This will enable you to assess your comparative performance. The feedback on your unit's scores and the comparison with other hospitals can be used to assess your performance and serve as a basis for continuous improvement of the quality of care provided in your unit.

Please Keep in Mind

You are asked to respond to each question as you believe the situation really exists, not as you think it should be or wish it to be. Responses are confidential; the numbers on the questionnaires are for tracking returns. Analyses will be based on aggregate responses only.

Please seal the completed questionnaire in the envelope provided and place it in the U.S. Post Office mail. Thank you for your assistance.

Please note: ANY QUESTIONS WHICH YOU HAVE OR ASSISTANCE NEEDED IN COMPLETING THIS QUESTIONNAIRE SHOULD BE DIRECTED TO ANY ONE OF THE FOLLOWING INDIVIDUALS.

Robin Gillies, Ph.D.
J.L. Kellogg Graduate School of Management
(847) 491-5540 ***(No longer valid)***

Denise Rousseau, Ph.D.
Carnegie-Mellon Universiry
(412) 268-8470 ***(No longer valid)***

Stephen M. Shortell, Ph.D.
J.L. Kellogg Graduate School of Management
(847) 491-5540 ***(No longer valid)***

SECTION ONE: RELATIONSHIPS AND COMMUNICATIONS WITHIN THE ICU

I. For each of the following statements, please circle the number under the response that best reflects your judgment.

Statement	Strongly Disagree 1	Disagree 2	Neither Disagree Nor Agree 3	Agree 4	Strongly Agree 5
Nurse-to-Nurse Relationships: These statements refer to relationships between nurses.					
1. It is easy for me to talk openly with the nurses of this ICU.	1	2	3	4	5
2. I can think of a number of times when I received incorrect information from nurses in this unit.	1	2	3	4	5
3. Communication between nurses in this unit is very open.	1	2	3	4	5
4. It is often necessary for me to go back and check the accuracy of information I have received from nurses in this unit.	1	2	3	4	5
5. I find it enjoyable to talk with other nurses of this unit.	1	2	3	4	5
6. When nurses talk with each other in this unit, there is a good deal of understanding.	1	2	3	4	5
7. The accuracy of information passed among nurses of this unit leaves much to be desired.	1	2	3	4	5
8. It is easy to ask advice from nurses in this unit.	1	2	3	4	5
9. I feel that certain ICU nurses don't completely understand the information they receive.	1	2	3	4	5
Nurse-to-Physician Relationships: These statements refer to relationships between nurses and physicians.					
10. It is easy for me to talk openly with the physicians of this ICU.	1	2	3	4	5
11. I can think of a number of times when I received incorrect information from physicians in this unit.	1	2	3	4	5

Statement		Strongly Disagree 1	Disagree 2	Neither Disagree Nor Agree 3	Agree 4	Strongly Agree 5
12.	Communication between nurses and physicians in this unit is very open.	1	2	3	4	5
13.	It is often necessary for me to go back and check the accuracy of information I have received from physicians in this unit.	1	2	3	4	5
14.	I find it enjoyable to talk with physicians of this unit.	1	2	3	4	5
15.	When nurses talk with physicians in this unit, there is a good deal of understanding.	1	2	3	4	5
16.	The accuracy of information passed between nurses and physicians of this unit leaves much to be desired.	1	2	3	4	5
17.	It is easy to ask advice from physicians in this unit.	1	2	3	4	5
18.	I feel that certain ICU physicians don't completely understand the information they receive.	1	2	3	4	5

General Relationships and Commmunications: These statements refer to general relationships and communications within the ICU.

19.	I get information on the status of patients when I need it.	1	2	3	4	5
20.	When a patient's status changes, I get relevant information quickly.	1	2	3	4	5
21.	There are needless delays in relaying information regarding patient care.	1	2	3	4	5
22.	In matters pertaining to patient care, nurses call physicians in a timely manner.	1	2	3	4	5

SECTION TWO: TEAMWORK AND LEADERSHIP

II. For each of the following statements, circle the number under the response that best reflect your judgment.

Statement	Strongly Disagree 1	Disagree 2	Neither Disagree Nor Agree 3	Agree 4	Strongly Agree 5
Nursing Leadership: These statements refer to your overall judgment of the characteristics of the ICU nursing leadership (i.e., nurse manager, assistant nurse manager, clinical nurse specialist, charge nurse; this excludes hospital administration). "Unit physicians" refers to all full and part time ICU physicians, house staff, and attending physicians who regularly admit patients to the ICU. The terms "staff" and "unit members" refer to all nurses and physicians associated with the unit.					
1. ICU nursing leadership emphasizes standards of excellence to the staff.	1	2	3	4	5
2. ICU nursing leadership is sufficiently sensitive to the different needs of unit members.	1	2	3	4	5
3. The ICU nursing leadership fails to make clear what they expect from members.	1	2	3	4	5
4. ICU nursing leadership discourages nurses from taking initiative.	1	2	3	4	5
5. Unit nurses are uncertain where they stand with the ICU nursing leadership.	1	2	3	4	5
6. The ICU nursing leadership is out of touch with nurse perceptions and concerns.	1	2	3	4	5
7. ICU nursing leadership often makes decisions without input from unit nurses.	1	2	3	4	5
8. ICU nursing leadership effectively adapts its problem-solving style to changing circumstances.	1	2	3	4	5

Statement	Strongly Disagree 1	Disagree 2	Neither Disagree Nor Agree 3	Agree 4	Strongly Agree 5

Physician Leadership: These statements refer to your overall judgment of the characteristics of the ICU physician leadership (i.e., ICU medical director and designated assistants or whichever physician is in charge of patient care). "Unit physicians" refers to all full and part time ICU physicians, house staff, and attending physicians who regularly admit patients to the ICU. The terms "staff" and "unit members" refer to all nurses and physicians associated with the unit.

9.	ICU physician leadership emphasizes standards of excellence to the staff.	1	2	3	4	5
10.	ICU physician leadership is sufficiently sensitive to the different needs of unit members.	1	2	3	4	5
11.	The ICU physician leadership fails to make clear what they expect from members.	1	2	3	4	5
12.	ICU physician leadership discourages nurses from taking initiative.	1	2	3	4	5
13.	Unit nurses are uncertain where they stand with the ICU physician leadership.	1	2	3	4	5
14.	The ICU physician leadership is out of touch with nurse perceptions and concerns.	1	2	3	4	5
15.	ICU physician leadership often makes decisions without input from unit nurses.	1	2	3	4	5
16.	ICU physician leadership effectively adapts its problem-solving style to changing circumstances.	1	2	3	4	5

General: These statements refer in general to teamwork and leadership in the ICU.

17.	Our unit has constructive work relationships with other groups in this hospital.	1	2	3	4	5
18.	Our unit does not receive the cooperation it needs from other hospital units.	1	2	3	4	5
19.	Other hospital subunits seem to have a low opinion of us.	1	2	3	4	5
20.	Inadequate working relationships with other hospital groups limit our effectiveness.	1	2	3	4	5

SECTION THREE: PERCEIVED EFFECTIVENESS

III. For each of the following statements, circle the number under the response that best reflects your judgment.

Statement		Strongly Disagree 1	Disagree 2	Neither Disagree Nor Agree 3	Agree 4	Strongly Agree 5
1.	Our unit almost always meets its patient care treatment goals.	1	2	3	4	5
2.	Given the severity of the patients we treat, our unit's patients experience very good outcomes.	1	2	3	4	5
3.	Our unit does a good job of meeting family member needs.	1	2	3	4	5
4.	Our unit does a good job of applying the most recently available technology to patient care needs.	1	2	3	4	5
5.	We are able to recruit the best ICU nurses.	1	2	3	4	5
6.	We do a good job of retaining ICU nurses in the unit.	1	2	3	4	5
7.	We are able to recruit the best ICU physicians.	1	2	3	4	5
8.	We do a good job of retaining ICU physicians in the unit.	1	2	3	4	5
9.	Overall, our unit functions very well together as a team.	1	2	3	4	5
10.	Our unit is very good at responding to emergency situations.	1	2	3	4	5

11. Relative to other ICUs within your area, how does your unit compare on the following items?

	Much Worse Than	Somewhat Worse Than	Same As	Somewhat Better Than	Much Better Than
a. Meeting its patient care treatment goals.	1	2	3	4	5
b. Patient care outcomes, taking into account patient severity	1	2	3	4	5
c. Meeting family member needs.	1	2	3	4	5
d. Applying the most recently available technology to patient care needs.	1	2	3	4	5
e. Recruiting ICU nurses.	1	2	3	4	5
f. Retaining ICU nurses.	1	2	3	4	5
g. Recruiting ICU physicians.	1	2	3	4	5
h. Retaining ICU physicians.	1	2	3	4	5

SECTION FOUR--PART A: MANAGING DISAGREEMENTS BETWEEN NURSES

IV--PART A: Consider what happens when there is a disagreement or conflict between ICU nurses. Based on your experience in this unit, how likely is it that:

Statement		Not at all likely 1	Not so likely 2	Somewhat likely 3	Very likely 4	Almost certain 5
1.	When nurses disagree, they will ignore the issue, pretending it will "go away."	1	2	3	4	5
2.	Nurses will withdraw from the conflict.	1	2	3	4	5
3.	All points of view will be carefully considered in arriving at the best solution of the problem.	1	2	3	4	5
4.	All the nurses will work hard to arrive at the best possible solution.	1	2	3	4	5
5.	The nurses involved will not settle the dispute until all are satisfied with the decision.	1	2	3	4	5
6.	Everyone contributes from their experience and expertise to produce a high quality solution.	1	2	3	4	5
7.	Disagreements between nurses will be ignored.	1	2	3	4	5

SECTION FOUR--PART B: MANAGING DISAGREEMENTS BETWEEN NURSES AND PHYSICIANS

IV--PART B: Consider what happens when there is a disagreement or conflict between ICU nurses and physicians. Based on your experience in this unit, how likely is it that:

1.	When nurses and physicians disagree, they will ignore the issue, pretending it will "go away."	1	2	3	4	5
2.	Both parties will withdraw from the conflict.	1	2	3	4	5
3.	All points of view will be carefully considered in arriving at the best solution of the problem.	1	2	3	4	5
4.	The nurses and physicians will work hard to arrive at the best possible solution.	1	2	3	4	5
5.	Both parties involved will not settle the dispute until all are satisfied with the decision.	1	2	3	4	5
6.	Everyone contributes from their experience and expertise to produce a high quality solution.	1	2	3	4	5
7.	Disagreements between nurses and physicians will be ignored.	1	2	3	4	5

SECTION FIVE: AUTHORITY

V. For each of the following statements, circle the number on the scale which best reflects your judgment.

Statement	Strongly Disagree 1	Disagree 2	Neither Agree Nor Disagree 3	Agree 4	Strongly Agree 5
A. Our ICU Medical Director has sufficient authority regarding:					
(l) Admitting and discharging patients	1	2	3	4	5
(2) Treatment protocols	1	2	3	4	5
(3) Budgeting	1	2	3	4	5
(4) Hiring and firing physician staff	1	2	3	4	5
(5) Equipment purchases	1	2	3	4	5
B. Our ICU Nurse Manager/Head Nurse has sufficient authority regarding:					
(l) Admitting and discharging patients	1	2	3	4	5
(2) Treatment protocols	1	2	3	4	5
(3) Budgeting	1	2	3	4	5
(4) Hiring and firing staff	1	2	3	4	5
(5) Equipment purchases	1	2	3	4	5

SECTION SIX: SATISFACTION

VI. Overall, how satisfied are you in your job? Circle the appropriate response.

Very Dissat-isfied 1	Dissat-isfied 2	Neither Dissatisfied Nor Satisfied 3	Satisfied 4	Very Satisfied 5

Thank you very much for your help and cooperation in answering this questionnaire! Please return in the addressed postage paid envelope provided.

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March 7, 2011

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Dear Nancy:

I am writing in response to your recent request for permission to use our ICU nurse-physician questionnaire. This letter should serve as formal indication that you have our permission to use the questionnaire as long as it is cited in any publications and written materials that may result from your research. The proper citation for use is: "Excerpted from The Organization and Management of Intensive Care Units. Copyright 1989, Shortell and Rousseau." I would like to emphasize that **permission does not extend to either Section II (The Workplace and Facilities) or Section III (The Organization Culture) of the original full-length questionnaire that are under control of Human Synergistics and require written permission from Human Synergistics (these sections are not in the short version)**. You may adapt any of the other questions in the questionnaire as necessary for your purposes. Additional information regarding the ICU project and related materials is available at http://shortellresearch.berkeley.edu/ICU.htm.

We would be very interested in learning of the results (a summary only) of your research. Our best wishes in your work.

Sincerely,

Stephen M. Shortell

Stephen M. Shortell, Ph.D.

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